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BURMA,
ITS
PEOPLE AND PRODUCTIONS;
OR,
NOTES ON THE FAUNA, FLORA AND MINERALS
OF
TENASSERIM, PEGU AND BURMA.

BY
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NATURAL HISTORY, AND OF THE LYCEUM OF NATURAL HISTORY, NEW YORK.

VOL. I.
GEOLOGY, MINERALOGY
AND
ZOOLOGY.

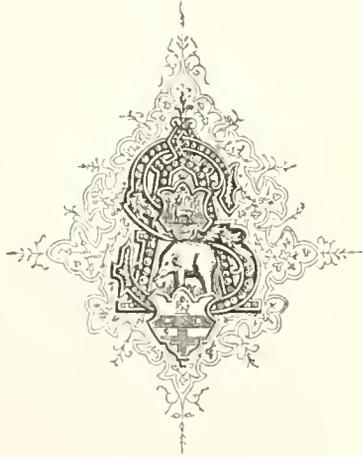
REWRITTEN AND ENLARGED
BY
W. THEOBALD,
LATE DEPUTY-SUPERINTENDENT GEOLOGICAL SURVEY OF INDIA.

PUBLISHED BY ORDER OF THE CHIEF COMMISSIONER OF
BRITISH BURMA,
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PREFACE TO THE PRESENT EDITION.

BY THE EDITOR OF THE ZOOLOGICAL AND BOTANICAL PORTIONS.

THE Chief Commissioner of British Burma having determined to bring out a new edition of Dr. Mason's work, placed the manuscripts of the Zoological and Botanical portions in my hands for the purpose of arranging a thoroughly revised Edition. The MSS. in question consisted of various emendations of the printed text, and a very heterogeneous mass of scraps and cuttings, accumulated by my late friend before his death, but which were certainly not all of them intended for publication, but rather as materials for the preparation of an edition he never lived to bring out. Under these circumstances I accepted the office, with the understanding that the work was to be completely rewritten by myself, as that I saw was the only way it was possible properly to amalgamate such a mass of material, and hence the different arrangement of the present edition from that adopted in the previous ones. Indeed, I had no choice in the matter; for several branches of the subject had since been so fully investigated, that the task before the compiler of any new edition of Dr. Mason's work was not so much to incorporate the new materials with the old, as to combine the old materials with the actually larger and fuller accessions to our knowledge of subsequent date; and as Dr. Mason himself did not so much claim to be an original observer in the various branches of natural history, as the historian of the labours of other workers in its several departments, I felt that the task I proposed to myself was merely the task that Dr. Mason would himself have undertaken had he been spared thereto, though of course the charm of the popular style of Dr. Mason's writing would be lost, in the execution of the work by another pen.

As so much of Dr. Mason's distinctive style will of necessity disappear in the body of the work, it has been deemed advisable to append the original prefaces of the earlier Editions, wherein my deceased friend explains the origin of the work, and justifies even an imperfect attempt to meet a pressing and undoubted want.

In the Botanical portion of the work I have to acknowledge the friendly and valuable assistance I have received from the Revd. C. Parish, to whom I am indebted for the Catalogues of Orchids, Ferns, Mosses, Lichens, Fungi, and Algæ, which have been arranged and mostly written by himself. The substance of the work may be described as mainly derived from the Papers on Burmese Plants contributed by Kurz to the Journal of the Asiatic Society of Bengal, and the Forest Flora of British Burma by the same author. I have also consulted the fine work of Le Maout and Decaisne on Descriptive and Analytical Botany, translated by Mrs. Hooker and edited by Sir J. D. Hooker, C.B.; Balfour's Forest Trees; and the Cyclopædia of India, embodying the researches of Brandis, and numerous other authorities, which need not here be quoted at length.

W. THEOBALD,

DEPUTY SEPT. GEOLOGICAL SURVEY OF INDIA.

LIME HOUSE, *Oundle*, 1882.

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(Title and Preface to the First Edition.)

THE
NATURAL PRODUCTIONS OF BURMAH;
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NOTES
ON THE
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PREFACE

(TO THE FIRST EDITION).

THIS work owes its origin to the wants experienced by a translator of the Bible.

Ever since the day that man was set to dress the garden of Eden and to give "names to all cattle, and to the fowl of the air and to every beast of the field," he has in every age and every clime been a lover of nature. It has been remarked of the Hebrews, especially, that "they make such frequent recurrence, for metaphorical expressions, to natural objects, and particularly to plants and trees, that their poetry may almost be termed the botanical poetry." The Hebrew and Greek Testaments contain between seven and eight hundred names of natural productions found in the countries where the books were written, and Michaelis says "there are upwards of two hundred and fifty botanical terms." These names and terms enter into many thousands of verses, THE PROPER RENDERING OF WHICH DEPENDS UPON A CORRECT KNOWLEDGE OF THE THINGS DESIGNATED. And how much more lucid and interesting will appear the Book of God if these terms be rightly translated!

Throughout the inspired writings of the ancient Scriptures and in all the teachings of the Apostles we find constant allusion to the works of nature. And our Saviour in his parables and similitudes continually draws from the natural scenes of the earth which his almighty hand had fashioned, that "the invisible things of Him from the creation of the world might be clearly seen, being understood by the things that are made." But had his hearers been unacquainted with the peculiar names and properties of the plants or animals to which he referred, they could never have felt as they did the overwhelming power of his arguments and illustrations. And yet by some translators, a very considerable proportion of the botanical and zoological names that occur in the Bible are unnecessarily transferred! "Not being a zoologist, botanist, or mineralogist," wrote a distinguished translator, "I have not unfrequently, in disposing of technical terms, whose meaning I could not satisfactorily settle, gone the whole animal, plant, or mineral, as the case might be, and transferred it."

In this way many words are transferred for which there are good vernacular names, and a native has in his word a barbarous word that conveys no idea, while, it may be, the original word designates a flower that is wafting its fragrance within the lattice where he sits reading. This is no fancy sketch. The camphire of the English Bible, the exquisitely fragrant *Laursonia inermis* or henna, is rendered in one Indian version by camphor, and in another the name is transferred, while the shrub itself is growing by the doors of myriads of native houses in both Indias, and for which there are established vernacular names in every Indian language to which I can refer.

Such transfers always cast a deep shadow over the signification of the passage in which they occur, and sometimes wrap it in impenetrable darkness. For instance, Christ says to the Scribes and Pharisees, "Ye pay tithes of mint and anise and cummin and have omitted the weightier matters of the law, judgment, mercy and faith." Here the antithesis can only be seen by a knowledge of the trifling character of mint, anise and cummin, yet in two Indian versions every one of these names is transferred, which renders the clause, without a paraphrase, as unintelligible as the English Bible would be with as many Choctaw words in their place. Still nothing could be more unnecessary, for the readers of the version are nearly as familiar with mint, anise and cummin as the people of Europe, and have as well established names for them in their language.

In two versions made several thousand miles apart, the translators transferred the original word for wood-aloes, although the people for whom they wrote were well acquainted with it, and there were good terms in the languages in which they were translating by which to render the word, but of both facts the translators were manifestly ignorant.

These examples, which might be easily multiplied, illustrate the advantages which a translator with some knowledge of the natural sciences possesses in dealing with the Word of God. But the reader asks, Why need he enter scientifically into these studies? Why does he not take the lexicons and other helps prepared for him?

Many are the admirers of nature, but let it not be supposed that all are her observing students. The pages of learned men in Europe and America, who have incidentally written upon natural history, prove that they are not.

Rosenmüller is the author of the best work extant on the botany of the Bible, yet his unskilful treatment of the subject sufficiently attests his slight knowledge of the science. His descriptions are usually ill-written, and bring before the eye of the reader no definite picture. They are often, moreover,

very defective, giving popular names, as beans and lentils, which are indefinite and applicable to different species, and even to different genera, without the systematic names, which alone are definite and enable a translator to render accurately.¹ Occasionally his statements are erroneous. Of agallochum or wood-aloes he says, "There is a species of this tree that grows in the Moluccas called *garo*, Linnaeus has described it as *Esacaria agallocha*." It would perhaps be difficult to find two trees in the whole vegetable kingdom with more opposite properties than these two species. The Burmese are well acquainted with both. Mr. O'Riley observed correctly that "Akyau is a very fragrant and a very scarce wood, of high value with the natives." This is agallochum or wood-aloes. The other is a tree that the Burmese call *ta-yau*, abundant near the sea, the juice of which is said to produce the most intense pain, and often blindness if it enters the eye. From its power to produce blindness, the Karens call it the "blind tree"; and the natives are all of them so much afraid of it that I have sometimes found it difficult to induce my boatmen to pull up beneath its shade.

In Carpenter's Natural History of the Bible, a popular English work, reprinted by Abbott in America, a description of the gecko is given worthy of the days of King Arthur. "It is thus described," says the author, "by Cefede. Of all the oviparous quadrupeds whose history we are publishing, this is the first that contains a deadly poison. This deadly lizard, which deserves all our attention by his dangerous properties, has some resemblance to the chameleon. The name geekoo imitates the cry of this animal, which is heard especially before rain. It is found in Egypt, India, Amboyna, etc. It inhabits by choice the crannies of half-rotten trees, as well as humid places. It is sometimes met with in houses, where it occasions great alarm, and where every exertion is used to destroy it speedily. Bontius states that its bite is so venomous that if the part bitten be not cut away or burned, death ensues in a few hours."

It is well known in India that the gecko is as harmless as the cricket. I have had them drop from the ceiling upon my naked hand, and hang suspended by the feet from my fingers without the slightest pain or inflammation ensuing.

Stuart on Rev. xxi. 18, says, "The bottom row of foundation stones was jasper, which is of a green transparent colour streaked with red veins" Such a definition of jasper I have never been able to find in any work on mineralogy, and Webster, following Dana, defines it, "An opaque impure variety of quartz, of red, yellow and also of some dull colours."

¹ See too a curious recent illustration in the Appendix, under Marco Polo and Polar bears.

The distinctive character of jasper from other minerals that represent it is, "its opacity." The Greek word as used by the Apostle undoubtedly designated the stone now called heliotrope or bloodstone, a mineral of a remarkably deep rich green and translucent, but spotted with opaque red spots, supposed to be red jasper. There is in it something peculiarly agreeable to the eye above all other precious stones I ever saw, or that probably exist, and with heliotrope inserted in the version, the imagination of every reader would picture to himself a foundation for the Heavenly Jerusalem of the pleasantest stone for the eye to gaze upon that earth can produce.

Murray, in his *Encyclopædia of Geography*, the first work of its class, says, "To the fig tribe belongs the famous banyan of India, commonly called peepul tree, and constantly planted about Hindoo temples (*Ficus religiosa*)." But the famous banyan is not commonly called peepul, but bir, and the peepul is not the banyan, and the tree which is usually planted about Hindu temples is not the banyan, but the peepul, and the banyan is not *Ficus religiosa*, but *Ficus indica*. Again, he remarks, "Far superior to this (the cocoa) in the magnitude of its leaves, of which a single one will shelter twelve men, is the palmyra palm (*Borassus flabelliformis*), which sometimes attains to one hundred feet, while its trunk yields abundantly toddy or palm wine."

It is true the palmyra produces toddy, not however from the trunk, but from the spathes that bear the flowers and fruits; but the leaf of the palmyra is not much larger than a large cabbage leaf, and the reference to the leaf should have been to the great fan palm of Ceylon, *Corypha umbraculifera*, a palm not of the same genus with the palmyra.

In a little book published by the American Tract Society, it is written, "In some hot countries, where water is scarce, travellers obtain a supply from the palm tree," and the statement is illustrated by a very good representation of the common plantain tree with a fine stream of water gushing from an incision that has been made in the trunk.

The writer had probably some confused ideas of the palm producing toddy, or the traveller's tree, handsome urania, which produces water when a leaf is broken off, or of the water vine phytoerene, an immense creeper, that grows on our thirsty mountain sides, which, when dissevered, discharges a large quantity of water, that is a most grateful beverage on a hot day when far above the streams of the valleys.

In one of the elaborate volumes of the United States Exploring Expedition, it is said, "In its wild state the peacock is peculiar to Hindustan," while they are roving wild all over these Provinces, Aracan and the Burman Empire. Webster defines dammer as "a resinous substance

obtained from a species of agathis or dammara, a tree allied to the pines," while here it is obtained from the wood-oil tree family, and a considerable proportion of what Europeans often call dammer is a hard kind of beeswax produced by a bee that builds in hollow trees.

With teachers like these, Europeans and Americans come to India and find themselves in the midst of a fauna and flora with which they are unacquainted. In sections where there are lexicons that define correctly the vernacular names, the difficulty is scarcely felt. In Wilson's Sanscrit Dictionary, for instance, the systematic name of nearly every plant and animal known to the language can be found at once; but if, as in Farther India, the lexicographers are as much in the dark as the inquirer who consults them, he has no alternative but to remain in darkness, or sit down to the patient study of the objects themselves, and to this trial the translator of the Scriptures must address himself, for it is not optional with him, but is a part of his professional duty to render, if possible, every word of the original by its corresponding word in the vernacular, and he is so far wanting in the trust committed to him by the churches or societies whose ambassador he is, if he shrinks from any study requisite to qualify him for the accurate performance of his work.

In ordinary circumstances, the professional duties of most men preclude them from bestowing the time and attention to the natural sciences necessary to enable them to determine accurately the character of the objects of nature with which they are unacquainted. It is not remarkable then that our Chin-Indian literature abounds in error. Throughout India, wherever there is European society, there is found a numerous class of English names incorrectly applied to Indian productions, which almost unavoidably lead the translator or author astray, when unable to make a scientific examination for himself. On this coast, for instance, it has passed from conversation to books published within the last ten years, that turmeric is saffron; the flower of the thorn apple, the trumpet flower; the tamarind tree, the tamarisk, and its timber, iron wood; the ebony tree is the cabbage tree of one author, and the fig tree of another; and ebony not being supposed to exist, though abundant throughout the Provinces, is defined as "a kind of tree." The fennel flower is "a kind of rice"; nettles, "a kind of thorn." Sweet flag, sugar cane; and the date tree is the palmyra palm. Mica is tale; serpentine, jasper; the carnelian, a garnet or ruby; gamboge, realgar, the red sulphuret of arsenic; natron, the carbonate of soda, is saltpetre; the nitrate of potash and antimony is bismuth according to one authority, and James' powder according to another. The porcupine is a hedge-hog; the hedge-hog, a pangolin; the shrew mouse, a musk rat; the sand badger or aretonix, a hyæna; barking

deer, porcine deer; the monitor, a guana; and the bloodsucker, a chameleon. The adjutant is a gull; the eagle, a swan; the hornbill, a crane; the sunbird, a skylark; and the grey heron, a water hen.

In a work translated from the Burmese into English, and printed at the expense of Government, the Burmese name of the common wild ox, *Bos sondaicus*, is translated bison; the sambur or rusa deer is elk; barking deer, spotted deer; the eagle is an adjutant; cranes are called *cyrusses*; umbirds *huan-sok*; a coluber is translated a *leng* snake; a crocodile, an alligator; the toad, a "rough frog." Tin in one place is lead; and pewter, or a mixed metal resembling it, is translated "white copper." The Bengal quince is rendered *oksweet*; one species of millet, *sap*, another species of millet, barley; barley is translated *mayau* in one place, and *mace* in another; arum is "ping (root)," a species of yam, *thadaw*; and the corypha palm, the palmyra palm.

This last error may be supposed to be of little consequence, and yet through it, the whole paragraph in which it occurs becomes false, and illustrates a precisely opposite argument from that for which it is brought. The writer says, "As regards the inheritance like a palmyra tree, it is the nature of this tree not to grow from cuttings or shoots. Having lived its time, it flowers and bears fruit. When the fruit has fallen off, the parent tree dies. After its death each fruit becomes a tree, and continues the family. Whilst the tree was alive, no other tree could be produced; so only on the death of their parents do children inherit." The palmyra tree produces its fruits annually, as regularly as the apple tree, and young trees may be raised from it as easily as from apple seeds, while the parent tree is still living; so, if the comparison proves anything, it proves that children may inherit before the death of the parent, just the converse of that for which the comparison was made. Let however the original word be correctly translated, and no simile can be more striking and appropriate. A corypha palm, after it has borne fruit, lifts its blackened leafless head above all the other trees of the forest, like the dead father of the woods struck by lightning.

Where two or more systematic names are attached to an article in this work, they are, unless the contrary be indicated, the different names by which the same object is designated by different writers. In Zoology, these synonymes have been selected principally from articles published in the Journal of the Asiatic Society by Dr. Cantor and Mr. Blyth. In Botany, the first name is the one under which the article will be found in Voigt's Catalogue, if in that work, and in other modern writers; while the second is the Linnean name or the one by which it was described by Roxburgh and by other authors of the old school.

The utility of these synonymes will be best understood by an example.

Gesenius, Rosenmüller, Harris, and other Biblical writers, tell their readers that *copher* designates *Lawsonia inermis*, and Dr. Wright, in his Illustrations of Indian Botany, gives a handsome coloured figure of *Lawsonia alba*. To a person not read in botany these will be regarded as different species; but on turning to my article, the reader will learn at a glance that they are different names given by different writers to the same plant. Thus it will be seen that our common barking deer lies scattered over the pages of natural history under twelve different names, and without the synonyms, it might be taken for twelve different species. In like manner, when objects have several native names, as they often have, I give all that I have heard.

Still the investigator will not always obtain the object he seeks from the native name, and this is a difficulty which no author can obviate, as it exists in the language. Different objects sometimes have the same name, as, for instance, the goat-sucker and the snipe. The Burmese call both *mye-wote* from their habit of dwelling on the earth. Sometimes a slight distinction is supposed to exist between different things, which is not always observed. The Amherstia and the Jonesia are both *athauka* trees, but the Amherstia is regarded as the female, and the Jonesia as the male tree, which is therefore denominated *athauka-pho*. So the male of the fragræa is the gordonia or *anan-pho*. The same object is often known by different names. Our knowledge of the existence of platina in Burmah was first furnished by Mr. Lane, who said the Burmese called it *sheen-than*, but in his dictionary he defines it *shwe-phyu* or white gold. Some persons make distinctions which others neglect. The water-lily and the nelumbium are both called *kya*, or the *kya* is restricted to the water-lilies and the nelumbium called *pa-dung-ma*. To many obscure species in every department of the natural kingdom the natives have no definite names, on which they can agree among themselves.

The local names used in Tavoy and Aracan are given where known, the latter on the authority of Col. Phayre, from whom also were first derived some of the Burmese names for birds and the smaller mammalia. It is only within the last two years that the proper Burman name for eagle has found its way into books, though it was communicated first by Col. Phayre some eight or ten years ago.

The present work does not explain mere technicalities for the naturalist, but brings to light in the department in which it enters, a host of common English words that have hitherto been left in this country like useless lumber in the shade. To illustrate this position, take a single example from the Ichthyology, in which, for the first time, the correct native names are furnished of the following fish known to English readers: river-perch, cockup, band-fish, umber or sea-perch, Indian whiting, mullet, mango-fish,

climbing perch, snakehead, ophidian, long-snout, doree, pomphret, riband-fish, goby, carp, barbel, gudgeon, bream, white fish, roach, flat-bellied herring, thryssa-anchovy, bristle-finned sprat, fresh-water herring, flying fish, gar fish, half-billed gar fish, plagusia sole, brachirus turbot, adipose cat fish, short-headed cat fish, eight-barbuled cat fish, long-finned cat fish, two-barbuled cat fish, fork-tailed cat fish, barbuleless cat fish, plotosus cat fish, elarias cat fish, long-headed cat fish, hammer-headed shark, saw-fish, skate or ray, sea porcupine or square fish, fishing frog, common eel, serpent-hearted eel, and conger eel.

Still no pretensions are made in this work to completeness. It is not a book composed in the luxury of literary leisure, but a collection of notes which I have been making during the twenty years of my residence in this country in the corners of my time that would otherwise have been wasted. Often to forget my weariness when travelling, when it has been necessary to bivouac in the jungles while the Karens have been seeking fuel for their night fires, I have occupied myself with analyzing the flowers that were blooming around my couch, or examining the fish that were caught, or an occasional reptile, insect, or bird, that attracted my attention. With such occupations I have brightened many a solitary hour, and often has the most unpromising situation proved most fruitful in interest; for the barren heath with its mosses, lichens and insects, its stunted shrubs and pale flowers, becomes a paradise under the eye of observation, and to the genuine thinker the sandy beach and the arid wilds are full of wonders.

Without books and without means to convey away specimens, my plan was to note down just such characteristics in the objects that I observed as secured most of my attention; but when I came to compare my notes with descriptions in books, they would often be found to contain insufficient data to determine the species, and sometimes even the genus, but perhaps enough for the tribes or families. In Botany this was sometimes necessarily the case, because I frequently met with a plant in flower without the fruit, or in fruit without the flower, where both flower and fruit were necessary to determine the genus. Often, again, never contemplating publication, when I had no use for the article in translation, and no object in being precise, I was content, as with fish for instance, to satisfy myself that it was a cat fish, a member of the carp family, or an eel, as the case might be, without making observations which would enable me to distinguish the species.

Further investigation will supply many deficiencies and correct many errors that are inseparable from a first attempt like the present, which involves the observation of so many objects in so many different departments of natural science and their names in so many languages. Still it is confidently believed that no one can longer say of Farther India, as does Murray in his

Encyclopædia of Geography: "There are no materials on which we can attempt a botanical or geological delineation of this territory. The zoology also of these immense and luxuriant regions is scarcely known."

It will therefore be seen that a work like this was demanded, and I trust it will commend itself not only to the Biblical student, but to authors in the vernacular languages, especially to such as shall hereafter prepare native works on natural history. It will also be serviceable to those who translate from the Burmese or Karen into English, and to all natives who read English, and particularly to every one who desires to write on these provinces, either in India, England, or America.

This is my reply to those machines for eating and drinking, digging and working, hoarding and spending, who ask "WHAT'S THE USE OF IT?" They cannot well see the use of studying the stars, observing the stratification of rocks, or being curious about shells, minerals, and plants, birds, beasts, and insects.

TAYLOR, 1852.

(Title and Preface to the Second Edition.)

BURMAH,
ITS
PEOPLE AND NATURAL PRODUCTIONS;
OR
NOTES
ON THE
NATIONS, FAUNA, FLORA AND MINERALS
OF
TENASSERIM, PEGU AND BURMAH.
WITH
SYSTEMATIC CATALOGUES
OF THE KNOWN
MAMMALS, BIRDS, FISH, REPTILES, MOLLUSKS, CRUSTACEANS, ANNELIDS,
RADIATES, PLANTS AND MINERALS.
WITH
VERNACULAR NAMES.

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Celebrant te Domine omnia tua opera, tui te pii collaudant.

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(Dedication to the Second Edition.)

TO

LIEUT.-COL. ARTHUR P. PHAYRE,

COMMISSIONER OF PEGU.

THIS BOOK OF PEGU AND BURMAH,

WHICH IS MUCH INDEBTED TO HIS RESEARCHES,

IS RESPECTFULLY INSCRIBED

BY THE AUTHOR.

The golden age when Pegu was *savanna-humme* "The land of gold," and the Irrawaddy *savanna-nadeo* "The river of gold," has passed away, and the country degenerated into the land of paddy, and the stream into the river of teak. Yet its last days are its best days. If the gold has vanished, so has oppression;—if the gems have fled, so have the task-masters;—if the palace of the "Brama of Toungoo" is in ruins who had "twenty-six crowned heads at his command," the slave is free.

Though a poor man cannot find sudden wealth as he may perchance in Australia or California, he can ever find work, and by two days' labour he can always earn enough to maintain himself the whole week; so by one year's toil he may gain sufficient to support himself three.

There is perhaps no country in the world where there are so few beggars, so little suffering, and so much actual independence in the lower strata of society as in Pegu. And perhaps in no part of India is the fire of truth upheaving those strata to the light, and metamorphosing them mentally, morally and socially, more surely or more rapidly than in Pegu.

Tutus bos etenim rura perambulat,
Nutrit rura Ceres, almaque Faustitas,
Pacatum volitant per mare navitae,
Culpari metuit Fides;

Nullis polluitur casta domus stupris,
Mos et lex maculosum edomuit nefas,
Laudantur simili prole puerperae,
Culpam poena premit comes.

Longas o utinam, dux bone, ferias
Praestes Burmahiae! dicimus integro
Sicei mane die, dicimus uvidi,
Quum Sol Oceano subest.

PREFACE

(TO THE SECOND EDITION).

SINCE the first edition of this work was printed, the annexation of Pegu has widened the field of observation, and the influx of European residents has multiplied observers. The results have been commensurate with the favourable circumstances, and our knowledge of the country, its nations, fauna, and flora, has greatly increased.

We are now well acquainted with several wild tribes, that seven years ago were scarcely known by name. When Capt. Yule wrote in 1857, he had heard of no Karens "farther north in Burmah than the district of Tsalen." We now trace them above Ava, and Bamo is of common occurrence in Bghai poetry as the name of a large Burmese city to which the people formerly went to make purchases, as they now do to Toungoo. His stock of Red Karen vocables, which consisted of a single word, has been multiplied a thousand-fold, and a book in the language is nearly ready for the press. Still the want of some "really good account of these tribes" remains in all its force, and is felt by none more deeply than by the writer. All our knowledge of them is fragmentary and unsatisfactory. The knowledge desired has not yet come up from the abyss of darkness. It is easier to ask a native a thousand archæological questions than for him to answer one correctly. Still the fragments are constantly increasing, and time is a great revealer of secrets.

Materials for this edition have been gleaned from every available source, both from printed papers and private correspondence, and our advance upon the first, which was very favourably received, may be seen in every branch. Col. Phayre has added the Jackal; Major Berdmore the Mole; Major Sparks the Rorqual; and Rev. Mr. Benjamin the Dugong or sea cow, to our Mammalia. From Mr. Blyth's reports, the birds have been increased from two hundred species to nearly five hundred. Major Berdmore, who was distinguished in nearly every branch of zoology, was especially successful in his researches among the fish and reptiles, and has contributed many new species. Capt. Smyth has furnished three hundred beetles, and Mr. Theobald a large number of shells. In botany the book is indebted for nearly all it contains on the Ferns and Mosses to Rev. C. P. Parish, who has also largely increased the number of flowering plants: while in Glossology the three Karen vocabularies have been increased to nine, pertaining to as many distinct tribes. Many good ideas have been appropriated from Capt. Yule's book, which is a fountain of facts on the history,

geography, and ethnology of Burmah. Extracts are given from Col. Phayre's reports indicative of a new government policy. From the patronage afforded the Karens, Government seems disposed now to foster the upward tendencies of the wild tribes in India, more than heretofore. In a political point of view the Christianization and civilization of these tribes is a matter of much more importance than is usually given it. Recent events have proved that one hundred years of British supremacy in India have not attached the Brahmin and Musselman to their English rulers any nearer than they were at the close of the battle of Plassy. It is equally apparent that where the Government acts in harmony with the Missionary, a Christian and civilized community is formed on the mountains, which is bound to the Government by a common religion and a common civilization. Though it may be comparatively small, it may be made, by a wise government, much more powerful than would be supposed by merely counting the heads. For instance, here is a Karen who keeps in his nest a Sharp's rifle, and knowing that he can use it twenty-five times without priming again, and can load it at the breech with great rapidity without any extraordinary amount of courage, he has confidence in his arms, and feels himself a match for a dozen ordinary equipped natives. Thus a small population, able to avail itself of the science of the nineteenth century, is of far more political importance than a tenfold larger one at the same point of civilization they were in when the Greeks ruled Asia. A force might be organized in the mountains that the Buddhist inhabitants of the plains in the event of war would dread; but to be efficient it must not be organized after the manner of ordinary corps. To bring the Karens to fight under their own chiefs must be the object, and this with judicious management can be done; but to induce them all to obey cordially a single head is a work of no easy accomplishment, owing to the clannish spirit which exists so strongly among them. The Maunepghas are jealous of the Pakus. The Pakus would not obey a Maunepgha Colonel, and neither would follow a Bghai leader. The same difficulties exist with the Mophas, Manumanaus, and Gay-khos, and until something common to all is found, they can never be brought to act together. Christianity, and Christianity alone, furnishes this point of union. Widely as these tribes have been separated in habits and feelings for untold ages, already the enquiry is, when they meet a stranger, not to what clan he belongs, but whether he is a *pgha-ba-yuwa-pho*, "a worshipper of Jehovah." Any attempt to bring Christians and heathen together will prove a failure. The banner of the corps must be the Cross, and their motto the same that led Constantine to victory,

IN HOC SIGNO VINCES.

TOUNGOO, 1860.

E R R A T A .

For trivial errata the reader's indulgence is solicited, especially as regards the barbarous and unfamiliar names of many insects. The more important are given below.

- Page 19, line 23, *for* STELLARIDÆ *read* STELLARIDEA.
 „ 59 „ 16, *erase* BITHIA EXCLUSA and synonyms.
 „ 61 „ 16, *after* Andamans *add* Tenassarim.
 „ 105 „ 7, *for* Papilis *read* Papilio.
 „ 130 „ 10, *for* Enelephas *read* Euelephas.
 „ 130 „ 11, *for* Enelephas Hyrudricus *read* Euelephas Hysudricus.
 „ 154 „ 3 from bottom, *for* Pagidula *read* Pagodula.
 „ 191 „ 7 from bottom, *for* S *read* L.
 „ 198 „ 25 from bottom, *for* Nyã *read* Ngã.
 „ 236 „ 3, *for* ZIBRINUS *read* ZEBRINUS.
 „ 237 „ last line, *for* mæchos *read* mœchos.
 „ 285 *for* SCYLLIDÆ *read* SCYLIDÆ.
 „ 356 „ 28, *for* II. *read* HIRUNDO.
 „ 377 „ 20, *remove* A. CORACINE *to below* A. INDICA.
 „ 361 „ 42, *remove* ARACHNOTHERA ASIATICA and the three species which follow *to below* A. CHRYSOGENYS.
 „ 404 *erase* lines 18 to 21 from the bottom, *transposing* lines 19-20 from the bottom to page 405 *after* S. MINIMUS.
 „ 466 „ 6, *for* P.M. $\frac{6}{8}$ M. $\frac{6}{8}$ *read* P.M. $\frac{8}{8}$ M. $\frac{4}{6}$.
 „ 466 „ 22, *for* P.M. $\frac{6}{8}$ M. $\frac{6}{4}$ *read* P.M. $\frac{8}{8}$ M. $\frac{4}{4}$.
 „ 467 „ 14, *for* P.M. $\frac{6}{6}$ *read* P.M. $\frac{8}{8}$.
 „ 468 *after* line 14, *add* Dentition, I. $\frac{6}{6}$; C. $\frac{2}{2}$; P.M. $\frac{8}{8}$; M. $\frac{4}{4}$.
 „ 469 8 lines from bottom, *for* P.M. $\frac{6}{8}$ M. $\frac{6}{4}$ *read* P.M. $\frac{8}{8}$ M. $\frac{4}{4}$.
 „ 478 line 20, *for* pretioso *read* pretioso.

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BURMA, ITS PEOPLE AND PRODUCTIONS.

GEOLOGY AND MINERALOGY.

THE chapters devoted in previous editions of this work to Geology and Mineralogy it has been deemed advisable completely to recast, as much of the information has been altogether superseded by later investigations.¹ In the earlier editions Dr. Mason thus quaintly prefaces the subject: "Burma is a gigantic geological museum full of magnificent specimens. All the principal formations in books, and gathered and labelled in glass cases, are spread over the land in immense masses, waiting for students to knock off specimens for themselves, and labelled by God himself in characters known and read of all men that interest themselves therewith. There are plutonic rocks and volcanic rocks, and fossiliferous rocks; Primitive, Transition, Secondary, Tertiary and Diluvial, Eocene, Miocene, and perhaps Pliocene. All that is wanting is a Curator to point out the places in the Museum where they are laid away. And here we are."

Burma is traversed in a general north and south direction by three main ranges of hills. Of these the most westerly is the Arakan range, which may be held to originate in the somewhat complicated ranges east of Chittagong, and to stretch thence south, with a general parallelism with the coast, to Cape Negrais, where it terminates. The next range to the eastward is the Pegu range, commencing above the frontier, and running south as far as Rangoon, which may be regarded as its furthest point in that direction. This range, which is not more than half the height of the hill-ranges to the east, rarely rising above 2000 feet, forms the water-parting between the Irrawaddy and the Tsittoung rivers. The hills east of the Tsittoung may all be classed with the system of ranges which runs through the Tenasserim provinces and then narrowing, is continued south and forms the backbone of the Malayan Peninsula. These ranges are in places far loftier than those to the westward, attaining to 7000 feet and upwards.

METAMORPHIC ROCKS.

These rocks consist in Burma of granitoid gneiss, hornblende gneiss, crystalline limestone, quartzite, and schists of various kinds. They mainly occupy

¹ For a fuller account of the Geology of Burma reference may be made to chapter xxix. of the "Geology of India" by Messrs. Medlicott and Blanford, and to the interesting sketch of the physical features of the Islands in the Bay of Bengal in "Stray Feathers," vol. ii. p. 29.

a belt of country to the eastward of the newer formations, corresponding with the main ranges east of the Tsittoung. Between the Tsittoung and the Salween the gneiss passes into a true granite, which weathers down into remarkable rounded masses, which have been well described by the Rev. C. Parish, in his notes of a trip up the Salween (J.A.S.B. 1865, part ii. p. 135). Hornblende gneiss is subordinately associated with the above rock, and crystalline limestone is also not uncommon. No crystalline rocks (connected with the present group) occur in Pegu or Arakan west of the ranges separating the Tsittoung and Salween Rivers.

THE MERGUI GROUP.

Resting on the metamorphic rocks, and next in order of age, we find in the southern portion of the Tenasserim Provinces, a great accumulation of pseudo-porphyrific beds, of sedimentary origin, the characteristic feature of which is derived from the presence therein of imbedded fragments of felspar. From having as yet only been detected in the neighbourhood of Mergui, they have been termed the Mergui group. The rock in its normal form is earthy, but highly indurated; it passes on the one hand into a slate, without the conspicuously porphyritic aspect produced by the imbedded fragments of felspar, and on the other into grits and conglomerates. With these grits, and resting upon them, are dark-coloured earthy beds, finely laminated, associated with hard quartzose grits. The thickness of this group may be placed between 9,000 and 12,000 feet. No fossils have been hitherto detected in it, and its age is uncertain, possibly Silurian.

MAULMAIN GROUP.

The beds of the last group in the Tenasserim valley are succeeded, in ascending order, by hard sandstones in either thin or massive beds, with thin earthy partings, often finely laminated. The prevailing colour is reddish, and some of the beds are calcareous. Over these sandstones occur grey shaly beds, also sometimes calcareous, with occasional beds of dark sandstone, succeeded by soft sandstones, thickly bedded with grey and pinkish shaly layers intercalated, and upon these a thick series of beds of massive limestone. The whole group is between 6,000 and 7,000 feet thick or more, and contains fossils throughout, though usually in too poor a state for precise determination. *Spirifer* and *Productus* are the prevailing fossils, and the group is of distinctly Carboniferous age. The upper limestone is more than 1000 feet thick. It forms the conspicuous murally-scarped hills near Maulmain, and ranges up the Salween valley into the Karen-ni country (of the "Red-Karens") beyond the British frontier; and the same formation not improbably forms part of the Mergui archipelago, many of the islands of which are known to consist of limestone, resembling that in the vicinity of Maulmain.

THE TRIASSIC GROUP.

Next in point of age comes in, a small area of rocks in quite another part of Burma, rocks of the Triassic age being only known as constituting a triangular tongue in the Arakan range, running down from the frontier to a point about west by north from Prome. The beds of this age are perhaps between 5000 and 6000 feet in thickness, the most characteristic of them being some white-speckled grits, with intercalated shales and sandstones, which attain about 1300 feet in thickness, in the Hlowa River, thirty-five miles west of Thayet-myo. Towards the base is a calcareous conglomerate and a rubbly limestone containing a *Cardita* and a few Gasteropods, and probably at about the same horizon. At some few other spots occurs a blue limestone, which has yielded the only typical fossil of the group, *Halobia Lonneli*, a Triassic bivalve of very wide distribution.

THE CRETACEOUS GROUP.

Beds of Cretaceous age are only certainly known on the west of the Arakan range, in the southern borders of Arakan, near Mait in Sandoway. The determination of the age of these beds, which have the appearance of being conformable to the last, rests on a single specimen of *Ammonites inflatus*, a characteristic 'Cenomanian' cephalopod, common in the 'Utatur' beds of Southern India. No other fossils were found, and the country is very wild, and has not yet been brought thoroughly under survey. There is, however, some probability that Cretaceous rocks may exist in Tenasserim. On the Lenya River, in the extreme south of the province, a bed of coal occurs of very laminated structure, and containing numerous small nodules of a resinous mineral like amber. This peculiar association of mineral resin is characteristic of the Cretaceous coals of Assam; and it is highly probable the Lenya coal is of the same age. From Cape Negrais northward stretches a considerable thickness of beds remarkable for the intense alteration they have locally undergone. Their precise relations with the Cretaceous strata to the north, or the Tertiary strata to the eastward, is not clear, and they may not improbably embrace beds of both Mesozoic and Tertiary age. They are frequently charged with silica, by infiltration, and in places display veins of fibrous white quartz, associated with soapstone, chiefly along the western side of the Arakan range, and nowhere can the intense alteration the rocks have locally undergone be studied better than between tide-marks on the coast, where the hardened rocks of this division stand out in the form of craggy ledges, boldly fretted by the action of the waves and spray.

THE NUMMULITIC GROUP.

Rocks of Eocene age occur both east and west of the Arakan range. On the east, at the frontier of Pegu, they are seventeen miles broad, in an east and west direction; but this breadth soon diminishes, though the group continues throughout Pegu as far as Puriam Point, at the mouth of the Bassein River. No precise estimate of the thickness of this group can be made, but it not improbably reaches to 10,000 feet. The most conspicuous member of this group is a pale-coloured limestone, charged with Nummulites and other fossils. Many of the shales, too, are crammed with similar organisms; but well-preserved fossils are rare, and without exception confined to the limestone or calcareous shales. In Thondoung ('lime hill'), near Thayet-myo, a bed of coal was formerly worked to a small extent, but its development was too capricious and irregular to prove of value. It is in this group, as will be explained further on, that the Burmese petroleum would seem to originate. Although the age of the Tenasserim coal is not known, it may not improbably be of early Tertiary age. Its quality is fine, the proportion of volatile matter being large, whilst the amount of ash is small. The beds containing this coal are nowhere of great thickness, probably less than 1000 feet, and are nowhere traceable over large areas, but form small basins along the Tenasserim valley, their inaccessible position being a great bar to the profitable extraction of the fuel they contain. At Thatay-khyoung, on the Great Tenasserim, a seam occurs seven feet in thickness, including small partings of sand and clay; whilst at Heinlap, six miles distant, the seam is over seventeen feet thick. At Kaunapeying, three-quarters of a mile north of Heinlap, there is a seam eight feet thick, but which contains much iron pyrites. A seam on the Little Tenasserim is only three feet thick. The coal of the Lenya River has been alluded to as of probably Cretaceous age.

THE SIWALIK GROUP.

Above the Nummulitic group in Pegu and Arakan occurs a vast series of sandstones and shales, the undoubted homologues of the Siwalik group of the sub-

Himalayan region, and representing the entire Middle and Upper Tertiary period (Miocene and Pliocene). The beds, however, differ from the corresponding deposits of Northern India, in being distinctly marine, with the sole exception of the uppermost beds of the series, which are probably of freshwater origin. A group of shales at their base, 800 feet or so thick, has been separated under the name 'Sitsyahn shales,' from a village on the right bank of the Irrawaddy above Prome, where they are well seen; and a great thickness of sandstones, often highly fossiliferous, which succeeds them, and cannot be far less than 3000 feet thick, has been named the Prome beds, from being largely developed near Prome; but the country occupied by these beds is not favourable for accurate estimates of thickness. Near Kāma, on the right bank of the Irrawaddy, a blue clay of this group is richly fossiliferous, being charged with Foraminifera and well-preserved though small shells. Many of these fossils fall to pieces on drying. The topmost beds of the group are sandstones abounding in parts in *Turritella*, corals of the genus *Cladocera*, and many other shells and radiates, together with sharks' teeth of two or three genera (*Lamna*, *Carcharodon*, etc.). These marine beds pass up into clays and sandstones in which no marine fossils have been detected, but wherein trunks of silicified trees abound; and as these are untouched by boring mollusca, it is presumed the water wherein they floated was fresh. The great bulk of this fossil wood is exogenous, and not coniferous; but in the gravels of the Irrawaddy rolled pieces of silicified endogenous wood occur, undoubtedly derived from the same beds. These silicified wood beds are the highest Tertiary beds exposed in Pegu, and are now much circumscribed in their area by denudation. They occur on the right bank of the Irrawaddy, near Thayet-myo; still more largely north of Prome, and along the Pegu range, till they are covered up to the south, and concealed by the gravel and surface detritus, to the formation of which they have so largely contributed. On the east of the Pegu range, in Toung-ngoo, they are also met with; and across the Tsittoung, to the eastward, they are represented by a lateritic belt, often conglomeratic, fringing the hills east of the river. The most characteristic fossils from these uppermost beds are *Stegodon Cliftii*, *Mastodon latidens*, *M. Sivalensis*, *Rhinoceros iravadicus*, *Acerotherium perinese*, *Hexaprotodon iravadicus*, *Merycopotamus dissilis*, *Vishnuthierium iravadicum*, *Colossochelys atlas*, besides other less characteristic forms, clearly demonstrating the relationship of these beds with the Upper Siwaliks of Northern India. These Tertiary beds have not been traced south of Pegu, but range in full force into Arakan, though their divisions have not yet been worked out.

RECENT DEPOSITS.

Alluvial deposits are roughly divisible into an older alluvium called *Bhangar* in India, and a newer alluvium termed *Khadir*. The present river-valleys are usually carved out of the former by wandering river action, whilst the *Khadir* is the deposit of flood-waters, in the broad valleys excavated in the older deposit. In Burma however, along the great river-valleys, as the Irrawaddy, Tsittoung, etc., the alluvium of the country belongs to the former class, no large areas being occupied by the newer deposits, which are restricted within the narrowest limits to the immediate channel of the river. In this respect a striking contrast exists between the delta of the Irrawaddy and that of the Ganges, the richest land of Lower Bengal being composed of *Khadir* land, which is almost wanting in Pegu. This difference in geological structure is an index of the different conditions of the two areas. Lower Bengal, being an area of subsidence, permits the accumulation *pari passu* of Gangetic silt, whereby the balance of level is maintained, whereas in Pegu, which is either stationary or rising, the deposits of the Irrawaddy in flood are swept out to sea, and no deposit of *Khadir* accordingly takes place save in actual proximity to the river-banks. Another cause operates to limit and reduce to a minimum the deposition of silt from the Irrawaddy in Pegu. The rains falling early, the flood-waters, deperated of their coarser particles, as they

leave the hills, spread in sheets over the plains, forming huge inland lakes, so that on the turbid waters of the river rising, they are prevented from spreading far from the banks, in spite of the flatness and low nature of the ground, by these depressions in the surface of the country being already occupied by water from the hills, which by the end of the rainy season has acquired a clear brownish colour, from decomposed vegetable matter in solution, but which deposits next to nothing on the area covered by it, and from which all intrusion of turbid river-water is effectually barred.

INTRUSIVE ROCKS.

Under this head are included all rocks of a plutonic or volcanic character, granite, trap, basalt, lava, serpentine, etc. Some rocks related to this class as 'ash-beds,' though the product of volcanic agency, are spread out contemporaneously with the beds wherein they occur by the action of the waters beneath which they were erupted. Beds of this class (ash-beds) are frequently not easy to distinguish from ordinary sedimentary deposits, and are rare in Burma, but a small patch occurs in Prome district at Minet-toung or the 'black hill,' so called from the colour of the surface soil, which precisely resembles the *regur*, or black cotton soil of India. There are three spots where this rock occurs; at two 'Minet-toungs' the ash-bed, a contemporary trap as it is in part, forms the top of the hill; whereas in the third, the dark line marks the outcrop of the same bed inclined at a considerable angle and clearly intercalated in the Tertiary series.

GRANITE.—This rock does not occur west of the Tsittoung, but east of that river it is largely developed, and gives rise to very picturesque scenery. It stretches away north beyond the British boundary up the Salween valley, and down south through the Tenasserim Provinces into Siamese territory. This great belt of granite is remarkable as the rock wherein the tin-stone is imbedded, which forms one of the most valuable mineral products of the country. There are no workings of this ore in Martaban, though just across the border it is worked by the Karens, and the metal run into the form of small pigs of about a 'viss' in weight each; but there seems reason to believe that the ore occurs within the British territory also, though in a wild and thinly-inhabited country. The ore is also known in Tenasserim on the streams falling into the Henzai basin, and will probably one day be worked with profit when the country becomes more accessible and populous.

TRAP, BASALT, GREENSTONE.—These rocks may be said to be unknown west of the Tsittoung, but dykes of them traverse the metamorphic rocks east of that river, and in Tenasserim; they are not, however, largely developed, and call for no special notice.

SERPENTINE.—This rock is met with in Pegu at various spots in the Arakan range, mainly on the east side, that is, within the Irrawaddy valley. These outbursts form three principal groups; the hills composed of this rock being remarkable for their sterile aspect. The most northerly mass constitutes a horse-shoe-shaped intrusion forming Bidoung hill nearly due west of Thayet-myo. Several masses also occur north-north-west of Prome, one of which forms a long dyke-like mass running for about five miles along the boundary of the Nummulitic and Triassic rocks, with the appearance of altering the latter, but not the former, though they are much crushed, indicating therefore that the newer rocks are brought in contact with the serpentine by a fault. Another group of upwards of twenty-one isolated serpentine intrusions occurs west of Henzada, scattered over a length of twenty-six miles in a north and south direction. The largest outburst is three miles in length, but the majority are less than a mile in diameter. Associated with the serpentine, and as though the result of its action on the neighbouring rocks, occurs a great deal of the soapstone (*kāngu*) used by the Burmese for writing. The mineral is identical with that imported from Upper Burma, and occurs in veins associated with fibrous quartz, the two being much interlaced. In some

places to the south, on the western side of the Arakan range, the same veins of fibrous quartz and soapstone occur, where no serpentine is known; but the rock may exist undetected, as the spots are in dense jungle, where any close examination of the ground is difficult, and the same mineral also occurs near Sandoway. The serpentine in Pegu is a characteristic dark-coloured rock, passing into a gabbro, and containing bronzite as an adventitious mineral, and thin veins or partings of golden chrysolite and carbonate of magnesia. The rock is unfortunately so much traversed by cracks or divisional planes as to be unfitted for ornamental purposes. Serpentine also occurs in the Andaman and Nicobar Islands, of probably the same age, and in a similar manner as in the Arakan range.

TRACHYTE.—The only known locality for trachyte in British Burma is four miles east by north of the village of Byān-gyee, on the Bassein River, fourteen miles south of Nga-pu-taw, and thirty miles south of Bassein. Here a mass of trachyte occurs six feet in diameter, surrounded by Nummulitic strata. It is known in the neighbourhood by the name 'Kyouk ta lon,' and is probably the projecting end of a 'pipe-vein' of the rock marking the point of issue of an old volcanic vent. It is only fifteen miles east of a straight line drawn from Barren Island, an active volcano in the Bay of Bengal, to Puppadoung, an extinct volcano in Upper Burma.

VOLCANOES AND MUD VOLCANOES.

The only volcanic islands, or volcanic cones as they really are, in the vicinity of Burma, are Barren Island and Narkondam Island, the former of which has displayed signs of activity in modern times, whilst Narkondam is densely wooded and appears extinct. These two islands are the termination in the Bay of Bengal of the line of volcanic vents of Java and the Malayan peninsula; but a further extension of the same line or volcanic belt is indicated by the extinct volcano of Puppadoung in Upper Burma.

The so called 'mud volcanoes' of Arakan and Burma belong to a totally different class, having no connexion with volcanic agency properly so called. The eruptions to which they are subject are due to the escape and ignition of volumes of 'marsh gas' which issues in a vast number of places in Burma along the Arakan range, together with petroleum and feebly saline springs. Mud and water are freely ejected by these 'volcanoes,' and lumps of stone and shale occasionally more or less acted on by the flames, but no scoriæ, lava, or other products of volcanic action proper. The principal vents are at Memboe, on the Irrawaddy, and in the islands of Ramri and Cheduba on the Arakan coast, with a few scattered vents on the neighbouring islands. The ignition of the gas is ascribed by Mr. Mallet to frictional electricity, and not to the high temperature of the substances ejected, which as a rule are unaltered by heat, partially calcined lumps being rare and exceptional.

In some parts of Prome, where springs issue in an alluvial tract or among argillaceous beds, a pool is formed of deep mud, into which any animal falling is in the utmost danger of being engulfed. These mud holes are especially dangerous in dry weather, when they become caked over, with a treacherous crust, with a soft patch of a few feet in diameter in the centre, but which suddenly yields beneath any heavy animal venturing on, and engulphs it in the semifluid paste beneath.

The known connexion of petroleum and brine springs in America suggests a few words on their relations in Burma. In Burma the only known localities for petroleum lie within the area of unaltered Nummulitic strata, or of rocks of younger age superimposed thereon. Brine springs, on the contrary, though rising through these younger rocks, are more plentiful in an area composed of altered rock of presumably older character; hence, although in America brine springs may indicate the probability of also meeting with petroleum, yet in Burma a copious brine spring

would probably signify that the boring had reached a horizon lower than that of the naphthagenous beds of the district. As the naphthagenous beds (as assumed) are on a higher horizon than the beds whence the brine springs originally issue, petroleum may of course be associated with them, and brought up along with them to the surface, *within the area* occupied by the newer naphthagenous beds; but the reverse does not hold good, and there is no ground for expecting to meet with petroleum everywhere, in connexion with brine springs, when such rise, or are 'tapped' outside of the area of the naphthagenous rocks. In a word, in America, petroleum is produced in rocks of very different ages, mainly Palæozoic, whereas in Pegu, it seems confined to rocks of Tertiary age alone, though the brine springs have a deeper origin, and are merely fortuitously associated with petroleum at their point of issue at the surface, when such point happens to fall within the area of the naphthagenous strata.

The Tenasserim Provinces, writes Dr. Mason, "are well supplied with hot springs, and some of them are probably not inferior in their medicinal qualities to the fashionable Spas of Europe and America." The hot springs of the Attaran are situated within two miles of the old town of Attaran, and are thus described by Dr. Helfer, "There are ten hot springs, or rather hot-water ponds, of which I could only examine the nearest, as the access to the others was through deep water of 130° Fahrenheit. This was a semicircular pond of about fifty feet in circumference. In one place it was thirty-five feet deep. The quantity of carbonic acid which the springs evolve seems to render the neighbourhood peculiarly adapted to support vegetable life. The ground round the spring is strongly impregnated with iron, and the water which runs over the ochre mud has a strong styptic taste. The springs on the Attaran approach in their composition nearest to the celebrated water of Teplitz."

Dr. Mason also records hot springs "about four miles below Mattah at the forks of the Tenasserim, and a few miles north of the latitude of Tavoy, highly charged with sulphuretted hydrogen gas, so readily recognized by its smell, which is precisely that of the washings of a gun barrel, the odour in both instances being produced by the same gas. Dr. Helfer says these springs belonged to the class of sulphurous mineral waters tinged slightly with chalybeate like the water of Brighton. Mr. Bennett at a recent visit found the thermometer to rise in the hottest spring to only 119°." Dr. Mason thus describes the Pai springs:—

"On the margin of the granite range east of Tavoy, either near the junction of the slate and granite, or in the granite itself, is a series of the hottest springs in the Provinces. I have visited four or five in a line of fifty or sixty miles, and found them uniformly of a saline character. Around one nearly east of Tavoy, the stones are covered with an efflorescence resembling epsom or glauber salt. Mr. Bennett found the thermometer in this spring to rise to 144°. Major McLeod visited one of the series at Palonk, and writes: 'There are two spots where the springs show themselves. One immediately in the right bank of the river, and another two or three minutes walk to the north-east inland. There must be 30 or 40 bubbling up along a line of about 50 feet by 20. The hottest was 196°, another 194°. No disagreeable smell or taste.'

"The hottest springs are at Pai, ten or fifteen miles north of those visited by Major McLeod. The principal spring at Pai,—for there are several,—is in a little sandy basin in the midst of granite rocks on the margin of a cold-water stream, where it bubbles up from three or four vents, and on immersing the thermometer into one, the mercury rises to 198°, within fourteen degrees of boiling water. Its location is rather peculiar, not being in a valley like the others I have seen, but on the side of a hill more than a thousand feet above the level of the sea, and surrounded by large masses of coarse-grained granite rocks, which seem to have been detached from the summit above."

Another observer, Capt. J. F. Stevenson, gives an account of other springs at the same place (J. A. S. B. 1863, p. 383):—"The Pai River is about sixty-five miles south from Tavoy town, near the Mergui boundary. It rises in the range of hills

which intersects this district between the Tenasserim and the Tavoy river-valleys, and after a generally direct east and west course, falls into the sea about six miles below the village of *Kyoukhtsay*."

"We found the springs in a narrow granite rock channel, through which a shallow stream falls in little cascades, divided by small pools. The most striking feature of the scene was the jet of steam which seemed to give off the greater portion of the clouds of steam overhead. It rushes out of a hole nearly midway down a cascade some six feet high, with a noise precisely like that of a steam jet, and with such force that it drives the water of the cascade horizontally out some four or five feet. The water which issues from this hole with the steam, or at least comes into contact with the steam, was hot enough to boil an egg well enough to eat, in three minutes."

Mr. Tween examined the water from Pai, and found it to contain—"iron, alumina, lime, potash, soda, silica, hydrochloric acid, sulphuric acid, hydrosulphuric acid, and organic matter which is nitrogenous."

In Martaban, hot springs are frequent, rising in the valleys which intersect the ranges east of the Tsittoung. Dr. Mason records a hot spring "at Toung-ngoo some twenty miles east of the city, in the granite mountains, two or three thousand feet above the plains; but the heat is not equal to those in the Tenasserim Provinces."

There are also hot springs in the Lapan-bew-choung, in lat. $19^{\circ} 16' 30''$, long. $96^{\circ} 36'$; another in the Choung-mah-nay valley, lat. $18^{\circ} 41'$, long. $96^{\circ} 46'$; and a hot spring of 157° Fahr. in the Hlay-loo-myong-choung, lat. $18^{\circ} 33'$, long. $96^{\circ} 51'$. These are but a few of the springs which rise along this range of mountains and few of which have ever been visited by a European.

The only hot spring known in Pegu rises in the bed of the Bulay stream, under the village of Kwon-bulay, lat. $19^{\circ} 15'$, long. $96^{\circ} 16'$; but the temperature could not be taken, as at the time of my visit it was concealed by a sand bank which had been washed over it.

Mr. Bambury also discovered a hot spring near the sources of the Sandoway River in lat. $18^{\circ} 6' 20''$, long. $94^{\circ} 54'$.

The list of minerals in the present edition is very much smaller than in previous ones, as a great number have been omitted; for example, all imported factitious minerals, as sulphate of copper, oxide of arsenic and its sulphides, vermilion, etc.; also minerals which have been included without any grounds, as borax, mercury, diamonds, etc.; and lastly minerals properly classed with rocks, as limestone, slate, clays, etc. The classification adopted is that of Dana.

Group I. NATIVE ELEMENTS.

GOLD—'*Shwac*.'

"Though not quite so abundant (writes Dr. Mason) as in California, there is perhaps no mineral except iron more universally diffused over Burma than gold. It is found near the old town of Tenasserim, where I have seen Burmans employed in washing the sands of the river. Almost all the creeks (writes Dr. Helfer) coming from the eastern or Siamese side of the Tenasserim river contain gold. Tavoy river at its sources is rich in gold, and on the Siamese side of the water-shed, several hundred persons are reported as permanently employed at the diggings. It has been collected in the tin deposits east of Tavoy and on the sea-side of the granite mountains south of Ye. Pegu was formerly so rich in gold that it obtained the name *Suwana-thumi* 'the land of gold,' and the Irrawaddy was called *Suwananadi* 'the river of gold,' while 'Thatung,' confessedly the oldest city on the coast, is derived, according to Hient. A. St. John, from *Thoon-letua-doung*, literally 'Silver-gold-city.' In modern times *Shwegyen* up the Tsittoung signifies 'gold sitting.'

Mr. Fedden saw people washing the sands of the Salween for gold above the Ta-can ferry, and heard that it was found near Bauzee, in the Myet-gwe valley, and Dr. Oldham wrote that in many of the streams in the upper part of the Irrawaddy gold is washed." The following is a list of the principal gold localities worked in Burma according to Dr. Mason :—

Near the town of Tenasserim.	Salween, above Ta-can ferry.
Eastern tributaries of the Tenasserim.	Near Bauzee, valley of Myet-gwe.
Western tributaries, with Tin.	Kibiung on the Irrawaddy, and its tributary streams.
Upper part of the Tavoy river.	Near Thingadhan.
Henzai river.	Kyen-dwen.
Shwegyen.	Near Bhamo.
Hoyan, near the Salween.	

Of the Shwegyen gold forwarded to Calcutta by Major Berdmore, Dr. Oldham wrote, "The specimens of gold forwarded consist of varieties ranging from dust of the finest kind that could be mechanically separated, to small 'nuggets.' These (nuggets) very well illustrate the mode of occurrence of the gold in its native state imbedded in quartz, while the other specimens show that the general form in which it is found in these washings is in small rounded flakes, or flattened plates of various sizes. This gold is of considerable purity, one specimen was examined with some care, and yielded in 100 parts 92 of gold and 8 of silver. This is sufficient to show that the Shwegyeng gold is fully equal in value to the average quality of Australian gold."

Mr. O'Riley also declares that a sample of Tavoy gold examined in Calcutta by the Assay Master of the Mint, yielded 88 parts nearly of gold, and 9 of silver, so that Burmese gold would seem to be alloyed with 8 or 9 per cent. of silver.

PLATINUM.

Platina (writes Dr. Mason) is found in the neighbourhood of Ava, but we know nothing of it beyond what Col. Burney wrote a quarter of a century ago. The locality given by Burney is the Kyendween River, and its western tributaries near the town of 'Kannee.' The Burmese call platina 'Sheen than,' and according to Burney it is associated with gold, in the small tributaries of the Irrawaddy in the direction of Bhamo. In confirmation of the occurrence of the metal in Burma, Mr. Johnstone, writing to Dr. Mason in April, 1872, says, "I have also heard something of platina, it is found at the place you mention, also at the River Moo, and at a place on the Upper Irrawaddy, nearly opposite Mogoung. It is found along with the gold by the gold washers, I cannot say in what quantity, as I don't think they look specially for it, neither do I find that they make any use of it." It does not, however, appear that any specimens of platinum have ever been received, and its actual existence therefore rests on a single analysis of a platina 'button' from Ava, which is certainly remarkable, given by J. Prinsep, in vol. iii. Gleanings of Science, which is as follows :—

Platina	35
Gold	5
Iridium }	40
Osmium }	
Arsenic }	20
Lead }	
	—
	100

Specimens of the metallic substances associated with the gold of the Irrawaddy would be valuable contributions to the Museum in Calcutta, and give certainty to our present vague knowledge of the subject.

IRIDOSMINE.

An alloy of the metals osmium and iridium, only known as occurring in Burma from the above analysis.

SILVER.

Metallie silver is only known to occur in Burma as an alloy of gold, the gold dust of Tavoy containing about 9 per cent. of silver, and that of Shwegyen about 8, according to an analysis by Dr. Oldham.

CARBON. GRAPHITE.

Col. Bogle forwarded specimens of graphite of fair quality from the Tenasserim Provinces, and Dr. Mason records having seen "fine specimens from the Kannee Valley, twenty miles north-east of Toung-ngoo, where the Karens report the substance abundant."

Group II. SULPHIDES, ARSENIDES, ETC.

STIBNITE. SULPHIDE OF ANTIMONY.

This metal seems not uncommon in some parts of Martaban and Amherst. "It is reported as being often met with in the mountains that bound the valley of the Thoungyeen. Mr. O'Riley found it at the sources of the Attaran, and large quantities of the ore have been dug up within seven or eight miles of Maulmain." This mineral is often confounded with the next, the term 'surma' being applied to both, and both being used in powder as a 'collyrium.'

GALENA. SULPHIDE OF LEAD.

This ore of lead is common in Burma, and is invariably argentiferous. The mean of three samples from Martaban gave over six ounces of silver to the ton, another sample nineteen ounces, one from Tavoy sixteen ounces, one from Toung-ngoo twenty ounces, and the mean of three samples from Bhamo over seventy-eight ounces,—which shows the variability of the result from small specimens, and the necessity of taking a large number of samples for averaging the value of the ores of any locality it is proposed to work. The ore would seem generally to occur in limestone. It is not however much worked in Burma, most of the metal used in Upper Burma being brought from the Shan states.

O'RILEYITE (Waldie, J.A.S.B. Proc. 1870, p. 279).

This mineral, which seems an arsenide of iron and copper, was obtained from some spot in the Yoonzalin River by Mr. O'Riley, and may be considered as an ore of arsenic containing some thirty-eight per cent. of that metal, and about the same amount of iron. It was also estimated to contain over thirty ounces of silver to the ton, but nothing is known of its mode of occurrence.

PYRITE. BISULPHIDE OF IRON. IRON PYRITES. MARCASITE.

This universally distributed mineral is common in Burma, but is nowhere plentiful or put to any use. Some of the Tenasserim coals have it, whilst others are free from its objectionable presence.

CHALCOPYRITE. SULPHIDE OF COPPER AND IRON. COPPER PYLITES.

This ore appears to have been obtained by Mr. O'Riley in the Attaran, and Major Bogle forwarded from the Tenasserim Provinces to Dr. Oldham, "a specimen of finely crystalline copper pyrites, imbedded in quartz, part of a vein which if of any size would be a valuable source of this ore. The ore is good, could be very easily dressed, and might yield even with inferior management twelve to fifteen per cent. of metal." The locality does not however, unfortunately, appear to be known.

TETRAHEDRITE. SULPHANTIMONITE OF COPPER. GREY COPPER ORE.

According to Mr. O'Riley, this ore occurs on several islands of the Mergni Archipelago, and possibly in Martaban, but nothing certain is known regarding the localities it is found in. Bournonite, sulphantimonite of lead and copper has been obtained near Maulmain.

Group III. CHLORINE COMPOUNDS, ETC.

HALITE. SODIUM CHLORIDE. COMMON SALT.

Salt is manufactured on a small scale in Pegu from sea-water. The concentration is effected in thick earthen pots ranged in scores round a circular oven, pierced with rows of holes into which the pots fit, and are so subjected to the heat of a fire within. English salt and rock salt from India are also imported.

Group IV. FLUORINE COMPOUNDS.

FLUORITE. CALCIUM FLUORIDE. FLUOR OR DERBYSHIRE SPAR.

"I have a small specimen of bluish crystals of fluor-spar which the Burman who brought it said was found in the northern part of Province Amherst. As the mineral is often found in connexion with lead, it is probable they will be found together in these provinces." This discovery of Dr. Mason's is still uncorroborated.

Group V. OXYGEN COMPOUNDS.

A. BINARY COMPOUNDS.

CORUNDUM. NATIVE ALUMINA.

Crystallized alumina, when transparent, constitutes according to its colour sapphire, oriental ruby, oriental topaz, or oriental emerald, etc. When opaque, or massive and granular, it is termed corundum (*karand*), and emery when the mass is partly composed of hematite and magnetite. Crystallized alumina is the hardest substance after the diamond.

"The red sapphire (writes Dr. Mason) is usually denominated the oriental ruby. Dana says, 'The best ruby sapphires occur in the Capelan Mountains near Syriam, a city of Pegu.' This is an advance on Phillips, who made 'Pegu a city in Ceylon.' Still the mineralogists make slow progress in Geography. In 1833, a letter from a Roman Catholic priest, D. Amata, was published in the Journal of the Asiatic Society of Bengal, which showed that the Capelan Mountains are about seventy miles north of Ava, instead of being in the vicinity of Rangoon, as they would be if 'near Syriam.'"

The Capelan Mountains of Dana are doubtless a corrupt form of *Kyat-pen*, the name of a village near the mines, and the mines themselves are simply pits sunk in the ruby-producing gravel. Mr. Emanuel in his work on precious stones remarks, "The most valuable tint is that particular shade called by jewellers the 'pigeon's blood,' which is of a pure deep rich red without any admixture of blue or yellow. The stones called spinel, and balas rubies are not rubies at all, but belong to the class of spinels, a stone of an entirely different nature and form of crystallization." Mr. Emanuel also gives the prices of rubies as follows, that is, for the finest and purest stones: 1 carat, £14 to £20; 2 carats, £70 to £80; 3 carats, £200 to £250; 4 carats, £100 to £450. But all depends on colour, and a ruby of 4 carats might, if it missed the true tint, be not worth £12.¹

¹ 1 carat = 4 grains; 151½ carats = 1 oz. Troy.

HEMATITE. SESQUIOXIDE OF IRON.

To this species belong specular iron, micaceous iron, fibrous hematite, etc. A deposit of specular iron ore occurs on one of the branches of the Palouk River. "The natives think it an ore of silver, and call it 'the silver stone.'"

The same ore occurs in many places east of the Tsittoung River.

MAGNETITE. PROTOSSESQUIOXIDE OF IRON. NATIVE LOADSTONE.

A valuable ore, similar to the last, but containing a mixture of protoxide as well; hence its effect on the magnet. It sometimes possesses 'polarity' also, one end of a fragment attracting the north pole of a magnetic needle, whilst the other end repels it. A large deposit of this ore occurs some three miles north-west of Tavoy. Two specimens gave, on analysis by Dr. Ure, over 60 per cent. of metallic iron. Two other specimens were even richer, and none of them contained either manganese or titanium.

LIMONITE. HYDROUS OXIDE OF IRON. CONCRETIONARY IRON ORE.

This is a valuable ore, but alloyed with clay usually. It is the ore which was formerly smelted in the Prome district, where it forms hollow concretions and nodular masses in some Tertiary sandstones in the district. Under this head may be classed the yellow ochraceous and bog iron ores. Mason says these ores are common in the provinces, but does not specify localities. These ores are not now smelted, as English iron is imported more cheaply.

SPINEL. ALUMINATE OF MAGNESIUM.

The red transparent varieties constitute the 'spinel' or 'balas' ruby, which differs from the oriental or precious ruby in composition, hardness and form. The 'sapphire' or ruby crystallizing in hexagonal prisms, the 'spinel' in dodecahedrons, which are often 'twinned' or maced. It forms the bulk of the green sand brought down from Ava, and the residue is mainly composed of small sapphires. The component of a handful, Dr. Mason describes as comprising every shade, "black, blue, violet, scarlet, rose, orange, amber-yellow, wine-yellow, brown and white."

CASSITERITE. BINOXIDE OF TIN. TINSTONE.

This mineral is abundant in Burma, and in association with the granite, previously described as forming a belt through the Tenasserim provinces, is found in a variety of spots from the Karen-ni country north-east of Young-ngoo to the Pakchan River in Southern Tenasserim. The works at Malee-won, however, on the Pakchan River in north latitude $10^{\circ} 10'$, are the only ones which are regularly carried on in British territory. "The richest locality in the province of Tavoy is nearly opposite the city of Tavoy on the eastern side of the mountains. Capt. Tremeneheere found the richest deposit of tin in the province of Kahau on Mergui Island, about eleven miles above the town, and near the Tenasserim River. According to Capt. Tremeneheere, large scales of chlorite occur with it, and as they are generally found where the tin is most abundant, the natives call it 'the mother of tin' (query mica?). The face of the hill is in one spot covered over with these, which appear to have been brought down from the vein with other matter, from which the tin has been separated by the usual mode of washing. This vein is described as consisting of decomposed granite three feet wide, in white sandstone, and dipping with a high angle. No tin has been raised since the country came into our possession, but it was worked during the Burmese rule, and valued as supplying the richest ore of tin. At Kay-mah-lipyoo, east of Young-ngoo, and on the eastern slopes of the Pounglong range, a few miles beyond the British boundary, tin is largely worked by the Karen-ni, or Red Karens, who cast the metal into small pigs of a 'viss' each, which circulate as rupees. According to Mr. O'Riley, the tin ore is not confined to the eastern slopes, but is found on the western side of the mountains, also in British

territory. The following is the list of stages between Toung-ngoo and Kay-mah-hpyoo :

Toung-ngoo to Khoung-mouk-kwa.	miles 18
Khoung-mouk-kwa to Paylawá.	„ 8
Paylawá to Bo-galay	„ 8
Bo-galay to Nathedo.	„ 10
Nathedo to Mohwaydo.	„ 10
Mohwaydo to Tounbo.	„ 6
Tounbo to Kadowbo.	„ 16
Kadowbo to Kay-mah-hpyoo.	„ 15

The British boundary is crossed about the fourth mile on the last march.

PSILOMELANE. BLACK OXIDE OF MANGANESE. WAD.

This ore is of doubtful occurrence in Burma, though Dr. Mason says it occurs on some islands of the Mergui Archipelago. The bed of “Wad” reported by Capt. Tremenheere on the Tenasserim was found by Mr. Piddington to contain no trace of manganese, but to consist of a peculiar graphitous substance, between coal and graphite, which he named “Tremenheerite,” but its claim to be regarded as a mineral species is very doubtful. The paragraph therefore recording the existence of manganese, at p. 64 of the British Burma Gazetteer, should be expunged.

QUARTZ. SILICA.

Besides the ordinary varieties of quartz, green and yellow quartz are stated by Dr. Mason to be found in the Tenasserim Provinces, and carnelian called by the Burmese *Kyat-thwe* ‘fowl’s blood.’ As the red colour, however, is artificially induced by burning or baking, it may be questioned if the stone is found originally in the Province. The carnelian of commerce is derived from the trap rocks of Western India, and the carnelian mines at Rajpipla are simply gravel-pits. The rough carnelians are placed in earthen pots, and baked, and the “red” carnelians which result are then sold. Dr. Mason also records agates as found at Mopoon and Mergui, but their occurrence requires confirmation, also amethyst. “Pebbles of amethyst, or violet quartz, are brought from the mines in Burma, where they are regarded as a variety of the sapphire; the Burmese name signifying ‘egg-plant sapphire,’ or, as they are sometimes called, ‘egg-plant flower stone,’ from the blue flower of the egg-plant.”

Agates may be divided into two classes, banded agates, to which class onyx and sardonyx may be referred, and “Moss” agates, which are sponges or other organisms preserved in flint, and are of course confined to sedimentary rocks. Mocha stones are banded agates with the appearance of filaments of moss between the layers. These filaments are however inorganic, and merely dendritic crystals of iron and manganese. Some chalcedonies closely resemble true “moss” agates when clouded with red protoxide of iron or green earth. It is doubtful if either class of agates occur in Burma.

B. TERNARY COMPOUNDS.

PYROXENE OR AUGITE.

A constituent of the volcanic rocks of Puppadoung, etc.

AMPHIBOLE OR HORNBLÉNDE.

A constituent of some metamorphic rocks of Burma. Under this head are included tremolite, actinolite, asbestos, and jade. This last is an important article of export from Upper Burma. Its colours (Burmese or precious jade) vary from pearly grey or whitish to light muddy or leek green or dark green. Rolled pebbles of this are exteriorly rusty-coloured. A highly-prized variety is a pale grey with

spots, clouds and veins, of a bright apple green. A block, considerably under a cubic yard, was some years since, in Rangoon, valued at £10,000, but found no buyers, though it is said £8,000 were offered by the Chinese for it.

GARNET.

A subordinate constituent of some metamorphic rocks.

BERYL. SILICATE OF ALUMINUM AND GLUCINUM.

Common beryls are the "aqua-marine" of jewellers. The emerald is a more valuable variety coloured by chrome. Both aqua-marines and emeralds are said to be brought from Upper Burma.

CHONDRODITE.

In granular limestone near Mandalay.

TOURMALINE.

Schorl, or black tourmaline, occurs not rarely in the metamorphic rocks east of the Tsittoung. Red tourmaline also occurs in Upper Burma, and Symes, the British Envoy to the King of Burma, was presented with a superb red tourmaline valued in England at £500.

GYPSUM. HYDROUS CALCIUM SULPHATE.

The only form of gypsum in Burma is in the shape of thin veins traversing some of the Tertiary clays of the province. When transparent, it is termed selenite.

CALCITE. CALCIUM CARBONATE. CALCAREOUS SPAR.

Crystalline carbonate of lime usually occurs as a vein traversing limestone or other rocks, or occupying cavities. It also occurs in the form of "stalactite," depending from limestone caves, being deposited gradually by the water trickling from the roofs. That which accumulates on the floor is termed "stalagmite." It is usually mixed with a proportion of iron and alumina, but when crystalline, forms a handsome and ornamental building stone (as in the grand mosque at Cairo), and is then termed oriental alabaster. It is abundant in the limestone caves of Burma. An impure earthy form occurs in travertin or calcareous tuffa, deposited on the surface of rocks by running water, and which is a valuable source of lime when, as is usually the case, it is plentifully developed. Arragonite is of the same chemical composition.

NATRON. SODIUM CARBONATE (impure).

"Natron is said to be abundant in some localities above Ava, where the Burmese use it for soap, and call it 'earth-soap.' This is the material of which Jeremiah speaks, 'Though thou wash thee with nitre,' and to whose effervescing property with acids allusion is made in Proverbs, 'as vinegar upon nitre.' In both instances the translation ought to be 'natron,' which abounded in Egypt, and was well known to the Jews."

Group VI. HYDROCARBON COMPOUNDS.

PETROLEUM. NAPHTHA. EARTH OIL.

The commercial Rangoon oil is mainly derived from wells in Upper Burma, but a little has been obtained in the Thayet-myo district from wells sunk in the Tertiary sandstones, which are younger than the Nummulitic rocks of the district. An entirely different-looking oil to the thick "Rangoon" oil is procured from rocks of similar age as those which yield petroleum in Pegu, on the Arakan coast and some of the

adjoining islands. The Arakan oil is a clear thin liquid resembling sherry in colour, and with a peculiar epaline tinge, and this limpid oil would seem to be confined to the country near the coast and west of the Arakan range, as the darker oil is to the valley of the Irrawaddy and the country east of the same range.

AMBER.

This mineral is not found in Pegu, but Upper Burma "has long been famed for its amber mines, which are near the sources of the Kyen-dwen, where the district is called 'Payen-dwen' from *payen*, amber, and *dwen*, a pit." The mines however were even in 1837 approaching exhaustion, and Dr. Griffith only found about a dozen men employed in them. Anderson remarks that "the amber most valued at Momien is perfectly clear, and of the colour of very dark sherry, and is sold by its weight. A triangular piece of this kind, about one inch long, and one inch in its greatest diameter, cost about five rupees at Momien."

ZOOLOGY.

THE zoological arrangement in the present Edition is a natural one, the lower forms being considered first and the chain of animated Nature being regarded as terminating in Man. The arrangement of the different divisions follows in the main the valuable little text-book entitled 'Zoological Classification,' by F. P. Pascoe, from which considerable extracts have been made. Pope, though profoundly ignorant of the scope and method of scientific zoology, yet formed through his innate strong sense a very just idea of its aims and results.

"See, through this Air, this Ocean, and this Earth
 All matter quick and bursting into birth.
 Above, how high, progressive life may go!
 Around how wide; how deep extend below!
 Vast chain of being! which from God began
 Natures ethereal, human, angel, man,
 Beast, Bird, Fish, Insect, what no eye can see,
 No glass can reach, from Infinite to thee;
 From thee to Nothing.

* * * * *

All are but parts of one stupendous whole,
 Whose body nature is, and God the soul;
 That changed through all, and yet in all the same;
 Great in the Earth, as in the ethereal frame;
 Warms in the sun, refreshes in the breeze,
 Glows in the stars, and blossoms in the trees,
 Lives through all life, extends through all extent,
 Spreads undivided, operates unspent;
 As full, as perfect, in vile man that mourns,
 As the rapt seraph, that adores and burns."

Sub-Kingdom I. PROTOZOA.

Class RHIZOPODA.

Order FORAMINIFERA.

To this order belong the beautiful little organisms (resembling *Nammulites*), which abound on many sandy beaches along the Arakan Coast, and look like some very white and flat pulse, less in size than a mustard seed. These shells are exquisite and complex structures, but as found on the shore are only dead and bleached. When alive, the chambers are filled with a gelatinous substance called 'sarcode' or 'protoplasm' endowed with life, as evinced by the power it possesses of assimilation and secretion, and to the operation of which, the varied forms of shell, both siliceous and calcareous, are due. To this order belongs one of the oldest

forms of life, *Eozoon* (though the claim of *Eozoon* to be regarded as an animal has been disputed), and both the white chalk of Old England and the Nummulitic limestone of Europe and Asia (extensively developed in Afghanistan) are largely made up of these organisms. A living species too is now filling up the Atlantic depths with the *Globigerina* ooze as it is called, and it is known that they are capable of existing alive at even such enormous depths as 2000 fathoms or more.

Sub-Kingdom II. CŒLENTERATA.

Class SPONGIA.

The sponges of Burma both marine and freshwater await investigation. They are "fixed aquatic organisms composed of an aggregate of amœbiform bodies, each provided with a mouth and numerous pores, and including a fibrous framework strengthened by horny, calcareous, or siliceous spicules. Larvæ free swimming" (Pascoc). Saville Kent describes them as "colony building, collar-bearing flagellate monads, exhibiting neither in their embryological nor in their adult condition phenomena that do not find their parallel among the simple unicellular protozoa." The spicules imbedded in the sarcodæ of sponges are beautiful objects under a microscope. Sponges are divided into three orders: *Myxospongiae*, gelatinous sponges, without skeleton; *Fibrospongiae*, with siliceous or horny skeletons; *Calcospongiae*, with calcareous skeletons.

The second order embraces the family *Hexactinellidæ*, to which belongs that marvellous form *Euplectella*, or 'Venus flower-basket,' as it is called, a cornucopia-like structure of interlacing glassy threads; and the curious *Hyalonema* or glass rope sponge, so well described and figured in his 'Depths of the Sea,' by C. Wyville Thomson, allied forms to both of which may not improbably be met with in Burmese waters when the dredge has forced them to reveal some of their buried treasures.

Class HYDROZOA.

Simple or compound organisms, the individual polypite consisting of a sac, composed of an outer and inner membrane inclosing a stomach, not differentiated from the general body-cavity, the opening furnished with tentacles. Reproduction takes place by ova or zooids, partially independent organs produced by gemmation. In this class alternation of generations occurs, that is, after some agamic generations, sexual organs are developed exterior to the body-cavity.

Sub-class HYDROIDA.

Order ELEUTHEROBLASTEÆ.

To this order belongs the common freshwater '*polypus*' (*Hydra viridis*) of Europe.

Order GYMNOBLASTEÆ.

Family Eudendriidæ.

EUDENDRIUM RAMOSUM, Armstrong. Arakan Coast, 10 to 70 fathoms.

Order CALYPTOBLASTEÆ.

LAFOËA ELONGATA, Armstrong.	Diamond I. between tidemarks.
HALICORNARIA SETOSA, Armstrong.	Cape Negrais and Cheduba, the Terribles, in 8 to 25 fathoms.
II. PLUMOSA, Armstrong.	Cheduba, 10 to 15 fathoms.
SERTULARELLA RIGOSA, Armstrong.	Arakan Coast, 10 to 15 fathoms.
THIMARIA COMPRESSA, Armstrong.	Diamond I. between tidemarks.
ANTENNELLA ALLMANNI, Armstrong.	Cheduba, 8 to 10 fathoms.

For descriptions of the above Hydroid zoophytes see Dr. Armstrong's Paper in Journal As. Soc. Beng. 1879, p. 98.

These animals are usually delicate plant-like forms, composed of colonies of social zoophytes attached to fixed objects, and their development is by 'buds' which on maturity are detached and float away, and are in their free stage of existence known as *Medusa*. "The Medusoid '*gonophore*' is composed of a swimming-bell (nectocalyx) with its inner margin produced into a delicate membrane called the 'velum,' its outer margin bearing the tentacles. From the centre hangs a tubular body, the manubrium, containing the body-cavity and acting as a polypite. The body-cavity is connected with four or more canals radiating to the circumference, and giving rise with their branches to a circular canal." (Pascoc.)

I quote so much of the life history of these animals as is probably not generally known, showing that many of the elegant free-swimming *Medusæ* are merely the early stage of a fixed hydroid zoophyte.

Order HAPLOMORPHIA.

These are the true *Medusæ* or *Acalophæ* of Cuvier, the embryos being developed from the parent, similia similibus, without passing through an intermediate stage of Medusoid '*gonophore*,' as in the last order.

Class ACTINOZOA.

The stomach is separated from the exterior wall by an intervening space, radiately divided into compartments by membranous partitions, wherein the reproductive organs are lodged. The ova develop into free germs with vibratile cilia (*Planula*). Reproduction is also effected by 'budding,' or by the separation of portions from the edge of the base (*Gosse*). Sexes either united or distinct.

Sub-class ZOANTHARIA.

Polyps with simple or occasionally branched tentacles, six in number, or a multiple of six.

Order MALACODERMATA.

To this order belong the 'sea anemones' which form so beautiful a feature in a well kept aquarium, but the Indian forms have as yet received little attention. They have no skeleton, and are mostly solitary—the *Zoanthida* only being united by a common stem.

Order SCLEROBASICA.

This order embraces the branching horny 'corals' devoid of a rigid skeleton.

Order SCLERODERMATA.

These are the stony corals, including those species which in tropical seas form coral reefs. The animal of the coral is of a gelatinous consistency, the 'coral' being the common skeleton of countless thousands of the coral animals, to which the 'coral' owes the vivid hues it presents during life. No attempt has as yet been made to catalogue the corals on the coast of Burma, though a few species procured by myself are in the Indian Museum at Calcutta.

Sub-class ALCYONARIA.

Polype with eight pinnately fringed tentacles in one series.

Order ALCYONIACEÆ.

Ectoderm leathery with calcareous spicules imbedded. No sclerobasis. Permanently rooted.

Family Alcyoniidæ.

NEPHTHYA, sp.

Arakan.

A single specimen (which Dr. Gunther was unable to determine specifically) was obtained by me on the coast (W. T.).

Order GORGONACEÆ.

To this order belongs the 'red coral' of commerce, a species found in the Mediterranean Sea only, and which has no relation to those lumps of red coral in the form of aggregated pipes (*tubipora musica*), which one sees in all collections of shells and miscellaneous curiosities from tropical ports.

Order TUBIPORACEÆ.

Coral in the form of tubes, bound together by horizontal plates. No septa. Polypes completely retractile, those of the common red organ-pipe coral (*tubipora musica*) being of a violet or grass-green colour during life.

Sub-Kingdom III. ECHINODERMATA.

"All echinoderms have a calcareous skeleton, and many are provided with moveable spines. A characteristic apparatus of vessels termed the ambulacral or water-vascular system is present. It is composed of a ring round the pharynx, from which proceed a number of radiating canals commonly giving off cæcal appendages, as well as branches, which enter the retractile tube-feet, often furnished with a terminal disk or sucker, which with the spines are the organs of locomotion." (Paseoe.)

Class CRINOIDEA.

To this class belong the 'sea-lilies,' so numerous in *Palæozoic* and *Mesozoic* seas, and whose joints form no inconsiderable portion of some ornamental marbles. The *Comatulidæ* of the present seas belong to the same class, the immature *Comatula* being fixed on a stalk like the old 'sea-lilies,' but the adult animal becoming free and capable of locomotion.

Class STELLARIDÆ.

Order OPHIUROIDEA.

The disk is entire and contains the viscera. The arms are attached to, but are not prolongations of the disk, and are formed of four rows of calcareous plates. The arms are devoid of suckers, and are themselves the organs of locomotion. The arms are extremely brittle and are spontaneously detached, if the animal is molested, whence the popular name of '*Brittle stars*' which they have received. Some species of these '*Brittle stars*' abound under stones at low water on the coast of Burma, but have not been specifically identified.

Order ASTEROIDEA:

The disk is more or less lobed, the lobes being prolonged into arms which are channelled below, and contain prolongations of the viscera. The arms are freely provided below with suckers, which constitute organs of locomotion. This order embraces the common star-fish of the British coast, which is such a pest to the oyster-banks, that mollusk forming its favourite food, and no doubt the pearl-oyster suffers in a similar manner. Imaginative people have supposed that the '*star-fish*' watches its opportunity and adroitly inserts a stone between the valves of the oyster to prevent it closing its shell, but this is not credible—the particular inducement, however, which the *star-fish* employs, when desirous of putting himself in communication with the oyster, is not very evident.

Class ECHINOIDEA.

This class embraces the multitudinous forms of ordinary echinoderms, *sea-urchins*, *sea-eggs*, *sea-pancakes*, etc., numbers of which occur on the coast, but none of which have been specifically identified. The flesh of the larger species is esteemed for food. Many species secrete themselves in holes in rocks, and once fairly in its hole, it is a matter of the extremest difficulty to extract the recalcitrant animal without damage, so tightly does it grip the sides of the cavity with its spines.

Class HOLOTHURIOIDEA.

Body cylindrical or vermiform, with a coriaceous skin, in which granular particles are scattered, and usually with five longitudinal rows of ambulacral suckers.

There are two orders: *Apneumona*, which are hermaphrodite, and possess no special organs of respiration; and *Pneumonophora*, with the sexes distinct and possessing internal arborescent branchiæ.

Order PNEUMONOPHORA.

Family **Holothuriidæ**.

HOLOTHURIA.

This genus embraces the sea-cucumbers, '*Trepang*' or '*béeh de mare*,' as they are called, very repulsive-looking animals, but valuable in an economic point of view, as vast numbers are collected for export to China, where they are highly esteemed as food. Some species of *Holothuria* attain three feet in length, and they possess the extraordinary power of ejecting their own bowels if molested. This strange act, however, does not seem to interfere with the comfort or health of the animal, which in some three months will reproduce a new set.

Sub-Kingdom IV. VERMES.

Body generally elongate or vermiform, soft, bilaterally symmetrical. Feet if present never jointed.

Class PLATYELMINTHIA.

Order TURBELLARIA.

Non-parasitic and mostly aquatic animals. Some species are 'commensals' or non-parasitic lodgers in *Holothurias* or in the respiratory cavities of *ascidian tunicaries*, claiming shelter only from their hosts, and a few reside in moist earth.

Family **Planariidæ**.

The *Planarias* are found under stones in damp places, and resemble an elongated or vermiform slug with a T-shaped head, but may be discriminated from mollusca by wanting tentacles. Some species occur in Burma.

Family **Amphiporidæ**.

To this family belongs the singular *Nemertes*, a marine worm of slender diameter, but some species of which attain 200 feet in length. These predatory worms harbour under stones, and so entangle their labyrinthine folds among the gravel wherein they reside, that it is next to impossible to capture a perfect specimen.

Order TREMATODA.

External or internal parasites on *mollusca*, *crustacea*, and various organs and parts of all species of *Vertebrata*. The common and destructive *Distoma hepaticum*, or 'Liver fluke' of the sheep, is an example of a *Trematode* worm.

Order CESTODA.

The order of *Cestoid* worms embraces the most repulsive parasites of man and animals, often endangering health by their presence, but which yield to no animals perhaps in the curious and chequered career which they undergo during their existence.

"In the more typical forms these parasites are composed of a head, which is the true animal, the joints being the hermaphrodite reproductive organs, developed by a process of gemmation from the head. The joints are called 'proglottides,' and are organically connected by the water-vascular system. There is only one proglottis in *Caryophyllidæ*, but in *Tenia solium* there are sometimes as many as 800.

“Although the ‘proglottides’ are only produced in the alimentary canal of man, or some other warm-blooded animal, it is necessary for the evolution of an embryo, that the ovum should be swallowed by some other animal than the one inhabited by the mature worm. When the fecundated ‘proglottides’ therefore are expelled, the ova are liberated, and should an ovum get into the alimentary canal of a vertebrate, the embryo (now called a ‘proscœlex’), set free from its covering, proceeds to bore with its spines through the tissues of its ‘host’ until it finds a resting-place, then it surrounds itself with a cyst, and a vesicle containing a fluid is developed; it is now called a ‘scœlex.’ These cysts were also known as ‘hydatids.’

“When ova of the pork tape-worm (*Tenia solium*) gains access to the alimentary canal of a pig, their shells become digested, and the inclosed six-hooked embryos escape, and bore their way into the circulation. Thence they proceed to the cellular tissue and become transformed into ‘measles’ (*Cysticercus cellulosa*). In the sheep the cystic worm of the brain (*Cœnurus cerebri*), which causes the ‘gid’ or ‘staggers,’ becomes the *Tenia canurus* of the dog. The *Cysticercus pisiformis*, or ‘pea-measle’ of the rabbit, is the ‘scœlex’ of *Tenia serrata* infesting the dog. The *Cysticercus fasciolaris* of the mouse becomes the *Tenia crassicolis* of the cat. The common hydatid (*Echinococcus veterinarum*) becomes the *Tenia echinococcus* of the dog. The slender-necked hydatid (*Cysticercus tenuicollis*) of the sheep becomes the *Tenia marginata* of the dog. The *Cysticercus talpæ* and *C. longicollis* infesting moles become respectively the *Tenia tenuicollis* and *T. crassiceps* of the fox. Lastly a ‘scœlex’ called *Staphylocystis micracanthus*, which is found in a myriapod (*Glomeris*), is the larval stage of *Tenia pistillum* infesting shrews (*Sorex*).” (Cobbold, quoted by Pascoe, op. cit. p. 53.)

The risk a man runs of eating the ‘scœlex’ of a tœnia in a piece of pork or beef, and thereby introducing a tapeworm into his alimentary canal, is far less than that which arises from swallowing its ‘ovum.’ This latter is hatched in his stomach, whence it bores its way into his tissues, as it would into those of a pig, causing the man to be ‘measly,’ vice the pig. Van Beneden describes one possible and highly painful result: “We have lately read an account of the effects produced by one of these wandering worms on a man who died after suffering from a peculiar disturbance of the mind. Two spirits seemed to haunt and speak to him, the one a German, the other a Pole. Filthy images were called up before his imagination. At the *post-mortem* examination ‘cysticerci’ were found to occupy the ‘*sella turcica*’ near the commissure of the optic nerves. One of these was alive, the others were calcified. Two others in a similar condition occupied a lobe of the brain.” What a lesson of caution and forbearance in our judgment of our afflicted brethren does not this teach us. Doubtless many who knew this poor man put down his sufferings as the result of an immoral and wicked frame of mind, while all the time the poor wretch was helplessly suffering from a wandering ‘scœlex,’ which had established itself in his *cerebellum*. Immoral ideas are often the direct result of injury to or disease of the *cerebellum*, and who shall say in such sad cases that a wandering ‘scœlex’ imbedded in that organ is not the truly responsible cause?

In the tape-worm (*Tenia*) each new joint is formed between the head and the next joint, so that the maturity of the joints bears some proportion to their distance from the head. The dislodgement and expulsion of these creatures from their intestinal abode is extremely difficult, and the best mode of guarding against their invasion is to eat no raw or underdone meat, as thorough cooking is destructive to the ‘scœlex,’ but no meat is safe in this respect which when cut displays a sanguineous hue in its juices. The ‘Cysticercus’ of beef, it may be added, produces the *Tenia medio-canallata* in man. Of the ‘gid’ in sheep a few remarks by Van Beneden are worth quoting. A sheep in pasturing swallows an egg of the *Tenia canurus* dropped by some passing dog. The ‘scœlex’ finds its way to the brain, and in fifteen days the first symptoms of ‘gid’ appear. The sheep necessarily dies at last, unless the parasite is removed by the ‘trepan.’ To arrest the spread of the disease only one thing is necessary, to destroy by fire the head of every sheep attacked by the ‘gid,’ so as to prevent its ‘cysticercus’ passing into the stomach of any carnivorous animal; as the mischief may be indefinitely propagated by such

neglect. The head abstracted and burned, the rest of the animal may be eaten with impunity, as the dire pest is confined to the cerebral region alone.

Class NEMATHELMINTHA.

Order NEMATODA.

Worm-like or filiform parasites with no segments, and neither circulatory nor respiratory organs. Sexes separate.

The common *Gordius* or 'thread-worm' of stagnant water is a familiar example of this order. So too are the *Anguillula* or vinegar and paste 'eels,' and the formidable 'Guinea worm.' In its young state this worm resides in water, and was once supposed to be able to penetrate the skin of the bather, sportsman, or water-carrier by means of one of the sudorific pores. It is now, however, believed that it enters the system in drink, and the use of filtered water is our best protection against its invasion. Once however, located in the body, it develops to a length varying from six inches to twelve feet (Pascoe), but of no greater thickness than two-thirds of a line.

Another curious 'Nematode' is *Sphærulearia bombi* infesting the humble bee. The pregnant womb of a female of this species is 28000 times larger than the animal to which it belongs, and as this prodigious development has obliterated every original passage, parturition is only possible by the literal falling to pieces of the unhappy mother. Two most fearful parasites also belong to this order. *Strongylus gigas*, the great kidney-worm, which grows to three feet in length, and selects for its abode the kidneys of dogs, wolves, and man, and the terrible *Trichina spiralis*, which resides in the muscles of its victim, 700,000 having been counted in one pound of the flesh of a man! The original source of this pest is said to be the rat, but it is received into the human frame by means of pork, and unfortunately neither salting nor cooking would seem to destroy the vitality of the germs. The utmost care should therefore be used in the selection of pork for food, and as a precautionary measure especial care should be used to prevent pigs eating rats; indeed, the more cleanly in its house the pig is kept, and the cleaner its food and water, the safer will be its flesh for man's consumption. Other noteworthy *Nematodes* are the common *Ascaris lumbricoides*, the *Syngamus trachealis*, whose presence in the windpipe causes the 'gapes' in poultry, and the *Dochmius duodenalis*, which, according to Pascoe, infests a fourth of the entire population of Egypt. As an example of the life history of a *Nematode*, the following account may be quoted (from Van Beneden's 'Animal Parasites') of *Ascaris nigro-venosa*, whose abode is alternately the lungs and the rectum of a frog. This *Ascaris* is a true parasite, which, when it arrives at its destination (the frog), where it finds lodging and food, leaves the lungs, to go and inhabit another organ. Here we have decided changes of abode in the same animal; that which shows besides that it is not a simple accident, is that the animal is of a different sex according to the apartment (lungs or rectum) which it occupies; here it is hermaphrodite, there it is male and female. In the lungs it is very small and viviparous, and produces young ones, which become stronger than their parents. The generation which live in the lungs are hermaphrodite: the others are dioecious, that is to say, the males and females have hermaphrodites for their parents. We have thus a mother, a simple female or hermaphrodite, very small, which produces *not* eggs, but young ones fully formed, and instead of living like the mother, in the lungs and breathing there with greater or less facility, they go and lodge in the rectum, and become *not* like their mother, viviparous and hermaphrodite, but oviparous and of separate sexes. They produce in their turn a race, which instead of following the example of their father and mother, all go off and take up their abode in the lungs like their grandmother.

Class ANNELIDA.

Body segmented, legs none or rudimentary.

Order HIRUDINEA.

A suctorial disk at one or both ends, by which progression is effected. Most species are aquatic, and many parasitical.

Leeches both land and water are tolerably numerous in Burma, but have not been specifically determined, and the same remark applies to the next order.

Order OLIGOCHÆTA.

To this order belongs the family *Lumbricidæ*, embracing the common earth worms.

Order CHÆTOPODA.

To this order belongs the family *Arenicolidæ* or common sea worms, as the *Arenicola piscatorum*, so useful for bait, which dwells in sand and sandy mud between tidemarks on the English coast, and is doubtless represented by allied forms in Burma.

Order CEPHALOBRANCHIA.

To this order belongs the family *Serpulitæ* or marine worms, protected by a shelly tube. These worms respire by branchiæ attached to the head, and the tubes wherein they reside are either secreted by them, or built by the animal agglutinating grains of sand together to form the tube wall. Many of them were formerly regarded as mollusks.

Order ROTIFERA.

Minute aquatic animals which undergo no metamorphosis, are rarely parasitical, and have the sexes distinct. The name 'wheel animalcules' is applied to them, from the anterior end being furnished with one or more retractile disks bearing cilia, which when vibrated produces the appearance of a wheel rotating. The Burmese species are entirely uninvestigated.

Class POLYZOA.

This class, more commonly known as *Bryozoa* or Corallines, are marine organisms found in social colonies, some of which are often taken for seaweed, whilst others spread over or encrust submerged objects.

Sub-Kingdom V. ARTHROPODA.

Segmented animals with distinctly jointed legs. Nervous system ganglionic. Sexes usually separate.

Class CRUSTACEA.

Crustacea are remarkable for the metamorphoses through which they pass, and it was long before the connexion was discovered between some of these larval forms and the adult animal into which they developed. "Some of the lower forms of Crustacea retrograde after passing the embryonic stage, but an advancing and gradual metamorphosis is more general. Three larval forms may be distinguished. 1. *Nauplius*. Oval, unsegmented, one eye, three pairs of appendages, which are converted into antennæ and gnathites (masticatory organs). 2. *Zoëa*. Elongate, segmented; thorax with a dorsal spine, two sessile eyes, abdomen as long as the body, legs rudimentary. 3. *Megalopa*. Flattened, segmented, no dorsal spine, two pedunculate eyes, abdomen much diminished, partially bent under the body; five pairs of legs" (Pascoe, op. cit.). The lower crustacea do not pass the *Zoëa*-stage, and some go through the *Nauplius*-stage in the egg.

Sub-class CIRRIPEDIA.

Body inclosed in a carapace formed of many pieces. Feet in the form of cirri. Sexes usually united in the same individual, but when distinct, the males are of minute size and are epizoic or live on the bodies of the females.

Order THORACICA.

Family **Lepadidæ.**

This family embraces the pedunculate cirripeds, the *stalked Barnacles*, or 'goose barnacles' as they were sometimes called, from the absurd idea that they produced the 'barnacle Goose.' The leathery stalk or 'peduncle' by which they adhere to ships' bottoms or floating timber, is formed by "a modification of the larval antennæ."

Family **Balanidæ.**

The sessile cirriped, or *common Barnacles* are contained within a conical multi-valve shell, closed by an operculum, composed of four pieces. The whole shell has a cellular and organized texture, and by the chambered structure of its walls, is said to have given the idea to shipbuilders of the double skin or cellular arrangement of iron plates in a ship's hull or a bridge girder, which so materially adds to their strength, with a minimum amount of material. The cement by which the animal fixes itself to its selected site, is secreted by an organ, which Darwin has shown to be a modified portion of the ovarian tube.

Sub-class **EPIZOA.**

These animals are external parasites of grotesque form, on fish and other marine and freshwater animals. Their mouth is suctorial, they possess no respiratory organ, and the females carry two external and pendant ovisacs. There are two orders, Siphonostoma and Lernæodea.

Sub-class **ENTOMOSTRACA.**

Body protected by a carapace composed of one, two or more plates or valves. Limbs jointed, setiferous. Sexes separate, but agamic reproduction (*Parthenogenesis*) is "not uncommon" (Pascoc). They are mostly freshwater animals of minute size. There are five orders, *Copepoda*, *Ostracoda*, *Cladocera*, *Phyllopoda*, and *Xiphura*, besides the extinct order of *Trilobites*, which so swarmed in Palæozoic seas.

The order *Xiphura* embraces the king crabs (*Limulus*), one or two species of which are common on the Arakan coast (*L. rotundicaudatus*, Edw., and *L. Moluccanus*, Edw.).

Sub-class **EDRIOPHTHALMA.**

This sub-class comprises three orders, Læmodipoda, Amphipoda, and Isopoda.

The common 'wood louse,' *monkey pea*, or sow-bug (*Oniscus*) is an example of a terrestrial *Isopod*. *Egæ spongiophila* resides inside the beautiful siliceous sponge *Euplectella aspergillum*, within which its exuvie may generally be noticed. "*Bopyrus squillarum* is found commonly under the skin of prawns, *Liriope* is a parasite on *Peltogaster*, itself a parasite!" (Pascoc).

Numberless animals of this interesting sub-class occur in Burma, but they all await the coming "vates sacer," who is to bring them to notice and record their manners and development and names. A fund of curious information regarding them is contained in Van Beneden's "Animal Parasites."

Sub-class **PODOPHTHALMA.**

Order STOMATOPODA.

Branchiæ external, either beneath the abdomen, or attached to the thoracic legs. Rarely rudimentary or wanting. Carapace generally thin, and covering the whole (or part) of the thorax. Abdomen elongate and ending in a "natatory tail." The 'gnathites' are confined to a pair of mandibles, two pairs of maxillæ, and a pair of foot-jaws which are sometimes rudimentary, or are connected, as well as the seven succeeding pairs of limbs, with natatory feet (Pascoc).

Some species of this order are important as food, as *Squilla*, or the 'sea mantis' which is an excellent article of diet, and sold in the Bazaar of Akyab and other places. It is a pretty sight to see these elegant creatures gliding with indescribable ease and grace through the rock pools left by the tide, but woe be to the hand that attempts their capture. With a 'click' made by suddenly releasing from some catch one of their sharp anterior limbs (as I presume) they inflict a severe wound, a very small specimen once cutting me to the bone, and I have little doubt that a large individual would be almost capable of amputating a man's hand at the wrist, or at least of severing the sinews and arteries, and causing dangerous hæmorrhage.¹

Family Squillidæ.

SQUILLA NIGRA.	Akyab.
„ RAPHIDEA.	Rangoon.
„ SCORPIO.	
The Karens, says Dr. Mason, term <i>Squilla</i> 'the water centipede.'	
GONODACTYLUS CHIRAGRA.	
„ TRISPINOSUS.	

Order DECAPODA.

Branchiæ inclosed in a special cavity on each side of the thorax. Five pair of legs, the first being didactyle or clawed. The growth of these animals is provided for by a 'moult,' at which time the shell splits up and the naked animal, invested merely with a soft 'pellicle,' emerges, and during the next four days increases rapidly in size, after which time the carapace hardens and there is an arrest of growth till the next 'moult.' These 'soft crabs' are much sought for as bait, but before the time comes they usually retire to holes to be safe in their unprotected state from their many enemies. Sometimes, too, one of a couple will during this trying time take charge of his or her mate, and I have seen the utmost care and solicitude evinced by an ordinary crab, for a helpless and shell-less individual whom he was carrying about in his arms.

Tribe MACRURA.

The abdomen well developed; the first five segments bearing natatory limbs, and the sixth forming (except in Paguridæ) a terminal quinque-partite fin. To this section belong the lobsters (*Homarus*), *Nephropsis*, a curious deep-water form from the Bay of Bengal, the shrimps (*Crangon*), the prawns (*Palæmon*), the sea crawfish (*Pulcinurus*), the river crawfish (*Astacus*), and the 'hermits' (*Pagurus*).

¹ The present list of crustacea is less perfect than I had once hoped would have been the case. On two different occasions I presented the whole of the Marine crustacea collected by myself on the Arakan coast to the Indian Museum, with the sole but distinct proviso that I should have a single named set returned to me. This not unreasonable request of mine was never complied with, and was at last practically repudiated. I was furnished (at my request) with a list of Burmese Crustacea drawn up by Mr. Wood-Mason under orders of the Trustees. This list embraces thirty-six marine species arranged *alphabetically*. To have arranged them thus must have cost some little pains, and could only have been so done in order to give embarrassment and to diminish as far as possible its value to myself scientifically. Any errors therefore in distributing these species in the families they are ranged under in the present list, must be regarded as due to myself, and not to Mr. Wood-Mason. An independent application was also made by the Chief Commissioner of British Burma to the Curator of the Indian Museum for lists of Burmese invertebrates contained in its collections, but the application was refused by the Trustees on the following ground: "Until the collections are distributed and catalogues completed, the preparation of special lists such as those required involves more time and labour than can be spared in justice to more urgent duties." Now it may be very safely assumed that the above sentence was not intended by the Honorary Secretary of the Trustees of the Indian Museum as an unseemly joke, but such it certainly must be regarded by any one who possesses slightly clearer conceptions of a Curator's duty than those entertained by the Trustees. The officers of the Indian Museum can find plenty of time to contribute papers to scientific periodicals on subjects interesting to themselves, but shrink from the drudgery (as they seem to deem it) of one of the first and most obvious duties of a Curator, the cataloguing of the collections under his charge. The species marked * are not included in Mr. Wood-Mason's list. (W. T.)

Family Galatheidæ.

GALATHEA ELEGANS.

Family Alpheidæ.

ALPHEUS, sp.

Arakan.

Family Thalassinidæ.

THALASSINA SCORPIONOIDES.

This is a remarkable form, very elongate, and a redoubted burrower, classed by Milne-Edwards in his tribe of *Cryptobranchides Fouisseurs*. Whoever has walked through mangrove swamps must have remarked, in spots where the ground was rather sandy and elevated, great heaps of dark sandy mud, ejected by some animal from its burrow, the material brought up being moulded into rude balls, of sizes proportionate to the occupant of each hole, some heaps being composed of balls the size of walnuts, others of various smaller dimensions. It is wonderful to think how so friable a material as this sandy mud often is, can be moulded into such forms, and still more when it is found that the animal which brings up these incoherent balls of sand is a crab, whose hard claws (if they are the organs employed) seem but ill adapted for such work. The burrows of these crustaceans are a couple of feet or more deep, and rather difficult to follow, and would seem to be carried down to a depth at which water is met with at any state of the tide. The animal resembles a small, very elongated, lobster more than anything else, of a ruddy brown colour, with two narrow and unequal claws, and when extracted from its burrow is somewhat sluggish and helpless, and its habits would doubtless well repay a careful study.

Family Astacidæ.

NEPHROPSIS, Wood-Mason.

Differs from *Nephrops* in wanting the antennal scale.

Mr. Wood-Mason thus writes of this interesting form: "The discovery in these warm seas of a very near, of the nearest ally in fact, of so characteristic a cold-water species (*Nephrops*), remarkable though it is, will not appear so surprising when I mention the fact that my crustacean lived and burrowed in the mud of the sea-bed at a depth of nearly 300 fathoms in a temperature not certainly exceeding 50° Fahr.

"One of the chief points of interest attaching to this new form lies in the loss of its organs of vision by disuse, as in *Calocaris MacAndrewæ*, Bell, and *Cambarus pellucidus*—a member of the same family as that to which *Nephropsis* belongs—and in the other crustaceans and animals inhabiting the caves of Carniola and Kentucky. I not only agree with Mr. Darwin in attributing the loss of the eyes to disuse, but I also regard the great length and delicacy of the antennæ, and the great development of the auditory organs as modifications effected by natural selection in compensation for blindness."—J. A. S. B., 1873.

*N. STEWART, Wood-Mason.

Dredged off the Andamans.

The type was a female. Length of body 4 inches, of antennæ 7.25 inches.

EUTRICHOCHELES MODESTUS.

A small crustacean which Mason terms the "mangrove-swamp prawn," burrows in considerable numbers in the banks of tidal creeks intersecting the mangrove swamps. It is some two inches in length, with very unequal claws, one being very stout. It is, I think, this creature which produces the curious metallic 'click' one often hears when gliding in a canoe at low tide through these narrow channels.

Tribe ANOMURA.

Family Paguridæ.

	CENOBITA	RUGOSA,	Herbst.
	„	SPINOSA.	
*	„	CLYPEATA.	
*	„	OLIVIERI.	

How these crabs swarm on the Nicobars may be judged from the following account by Mr. Hume of what he saw on landing in Galatea Bay. "The whole beach was coated with a layer of dead shells, and every other shell, big and little, contained a 'hermit crab.' These crabs were of all sizes—there were millions of them—their numbers were alike incredible and bewildering; from the water's edge well into the jungle and in and about every hole and cranny in all the outermost trees, up to the height of at least 20 feet, it was Crabs, Crabs, Crabs. A few of *Diogenes* and *Pagurides* at the water's edge, but practically all of them *Cenobitas*. *Olivieri*, a bright scarlet, brighter than that of any boiled lobster. *Rugosa*, a beautiful purple, and *Clypeata*, mauve, with a blue or brown spot on the big claw. I was perfectly fascinated with these crabs, their omnipresence to begin with was overwhelming. They were so amusing, everywhere were little breakfast parties. A great Barringtonia fruit as a pièce de resistance, surrounded by a small family circle, individuals of all sizes, all eating away as if their lives depended on getting down the greatest quantity in the smallest possible time. Between my very feet as I stood motionless, watching the busy crowd, a large red fellow came along in a most disreputable shell clearly too small for him, and meeting a small purple chap in an eminently desirable residence, he pounced upon him and had him out of it in a jiffy, and slipped into it himself, while the evicted tenant had in another minute suited himself with a new abode, and straightway toddled off as lively as if nothing had happened. Now how did this big crab get the smaller one out? You may haul away from the outside and pull the things to pieces, you can never get him out, and I want to know how the other crab managed it? If you have a lighted cheroot the thing is easy. You apply the lighted extremity to the upper end of the shell and pull vigorously. The crab begins to show signs of uneasiness, he looks out and feels about with his claws, sees something hideous (yourself), concludes that the sun is rather hot, and retreats to continue his siesta. After another minute or so he decides that the sun is really getting unbearably hot, and that he will go off and finish his nap in the shade. Out again come the claws and legs. 'Hullo,' he says, 'nothing to be touched; very odd this; something up,' and pops back again. Then you bend slowly down till the shell just touches the beach, and by this time he has come to the conclusion that his house is certainly on fire, and he scuttles away shell-less, dragging his slug-like posterior extremity after him without much difficulty for about a yard, after which he sits down, having wriggled his tail between some stones and shells, to consider the position of affairs; presently legs and claws are all extended, feeling here, there and everywhere for a shell, then a shell is drawn nearer, closely examined and rejected, then another and another, but none suit, and he drags himself away another foot, and as usual immediately collapses and remains motionless in a doubled-up position for a minute before he resumes his search for a suitable lodging. At last Eureka, he has pleased himself, he places the shell conveniently, turns round and pops in."—Stray Feathers, vol. ii. p. 75.

*BIRGUS LATRO. Leach.

The great Cocoa-nut Crab.

According to Mr. Cumming this species feeds on the fruits of the *Pandanus*, as well as the cocoa-nut, and is prized as food by the natives of the South Pacific Islands.

In the Nicobars, however, it is very different, and a Nicobar man would as soon think of eating his grandmother as one of these crabs. The following is Mr. Hume's description of the capture of a specimen of this crab on Meroe, one of the Nicobar group, and the circumstance which led to it. "It had been a very trying day, every

one had been working in the breathless heat of a dense tropical jungle the whole day from early morning till evening, except during the short time it took us to run from Treis to Meroe. The sun was now near setting, and the Captain, who did not like our position, and who had strictly ordered that all boats were to be aboard by sunset, fired a gun for the remaining boat. One or two lascars and one European made their appearance on the beach; but after loitering there opposite the boat for some time, turned back again and disappeared. The sun had now set, a second gun was fired, of which no one took the smallest notice. By the waning light we could still make out with our glasses the boat anchored outside the heavy surf, and the canoe hauled up upon the beach. We heard several shots fired from time to time. Then we fired a third gun, but the rising moon showed boat and canoe 'as you was,' and that no sort of attempt was being made to acknowledge our summons. The Captain (liking, as most captains do, to have his orders attended to) began to get angry. A boat was now launched, and the second officer sent off to order the immediate return of the boat. The Captain expressed his intention of favouring the chief officer when *he* did come with a piece of his mind, and was very wrath. We watched our messenger boat anxiously, the wind was against her and the sea rather rough; at last we made out that a landing had been effected. Then for a long time was silence and darkness, for clouds veiled the moon. We waited, waited, waited, at last out came the moon, and we saw our boat with sail up gliding rapidly towards us. With a fair and steady breeze and a first-rate sailor at the helm, that boat could not have been very long making the ship, but seemed to us an age. When it did come, D. was up the companion-ladder in a moment, and in another was on the poop. He brushed through us without a word, and walked straight to the Captain, who stood quietly by the binnacle, touched his cap, and made the usual report, 'Come on board, Sir.' The Captain on his part had never moved an inch; he merely said, 'Why is the cutter detained?' Again the touch of the cap, '*Dr. Stoliczka is lost, Sir!*' Then D. told us that towards sunset the chief officer and Mackay (the executive engineer at Port Blair, who had joined our party), though already fairly worn out, had started in opposite directions to round the island, a work of inconceivable difficulty, cruel thorny jungle plunging down into the surf, alternating with knife edge reefs of coral and deep pools, and that they had only succeeded in making their way back to the landing-place after D.'s arrival, their shoes and clothes cut to pieces, and that he had left them exhausted on the beach.

It was at once decided to send out the strongest expedition we could muster. Every one that could be spared, though most of these were dead beat, volunteered, even Dr. Dougall, who never would be bothered landing anywhere, with the true instinct of his profession, now that there was real hard work to do, was one of the first in the boats. It was past ten before the expedition got off, and near eleven before the first signal rang out 'all landed safely'—welcome enough in its way, considering the surf through which no English boat could live a moment, and the necessity of landing two at a time in a frail canoe.

It was half-past one, when suddenly a faint flickering light glimmered out towards the end of the jungle, like a star struggling through a thick cloud; then it grew a little brighter, then a second light appeared, and we saw men coming to the water's edge. Three guns were now fired, the signal of 'all well,' followed by three ringing cheers, and the Philosopher was found. It seems that in working his way back to the landing-place he had become involved in a cane jungle, in which, after struggling for some hours, he had sunk exhausted till rescued by the party despatched in search of him, and even they would probably have failed to make their way through the terrible thickets, but for the aid rendered them by a couple of Nicobarese well used to the work, armed with axes and cutlasses to clear a way by a union of skill and force. In so doing, they had it seems caught occasional glimpses of what looked like big spiders scuttling past; and when the Philosopher was found, and they were all on their way back to the boat, the 'Geologist' with a rush put his foot on one, and, despite its vehement struggles, held it till a light was brought. Then it appeared that the supposed spider was a gigantic crustacean of the most dangerous and pugnacious nature. After many attempts he was secured with creepers,

and was being borne along in triumph, when Davison, approaching him too nearly, had his coat seized and literally torn off his back. However, at last his claws were wedged, and though in coming off the canoe was upset, and some of the party had to swim for it, the crab came safely on board. The delight of *our* Crustacean, when this near relative of his was presented to him, may be imagined, since he turned out to be by far the finest and largest known specimen of the great robber crab, *Birgus latro*. Wherever we had landed on the Nicobars, we had found hundreds and thousands of coconuts, each with a large neat circular hole cut into the centre of one side, right through husk (often $2\frac{1}{2}$ inches thick) and shell, and with the whole contents scooped clean out. This the Nicobarese declared was the work of an objectionable sort of devil or scaly dragon, as it was described to us, which ascended the trees at night, and cutting off the finest nuts, devoured them on the ground. Here then was the Devil or Dragon! No sooner was it caught, however, than the Nicobarese were very anxious that it should be released, assuring us that it was a dangerous demon to meddle with, and if hurt would bring fire and death into their homes. The upshot was, however, that he was consigned to a tub of spirits, where," as Hume adds, "his mortal remains will long I hope continue an ornament and attraction to the Indian Museum, where they are deposited."—*Stray Feathers*, vol. ii. p. 91.¹

Tribe BRACHYURA.

Abdomen reduced to a small 'apron,' or tail, lodged in repose in a depression in the breast, and without any fin. In the male this 'apron' is triangular, in the female it is broad and rounded, whereby the sexes may be easily distinguished.

Family Leucosiidæ.

IPHIS SEPTEMSPINOSA.

MYRA ELEGANS.

MATUTA VICTOR.

Family Parthenopidæ.

PARTHENOPE CALAPPOIDES.

Family Grapsidæ.

GRAPSUS STRIGOSUS.

Akyab.

GONIOGRAPSUS THUKUJAR.

SESARMA TUBERCULIMANA.

Maulmain.

Family Gecarcinidæ.

Land Crabs.

CARDISOMA CARNIFEX.

HYLEOCARCINUS HUMEI, Wood-Mason. Nicobars and Narkondam.

This genus is intermediate in its characters between *Pelocarcinus* and *Gecarcinus*. It is a notable fact, Mr. Wood-Mason adds, that *Gecarcinus ruricola*, *Pelocarcinus Lalandei*, and *Hyleocarcinus Humei*, have all shallow yellow scars situated in all three, on each side of the eye, and on other parts of the carapace, tell-tale marks of their descent from a common ancestor (J.A.S.B. 1873, Part II. p. 258).

Family Thelphusidæ.

The freshwater crabs are ranged in a family by themselves, of which two genera are represented in Burma. The banks of every stream on the mountains, the fields where rice is grown, and the banks of tanks are alike perforated by their burrows, but the animals are nocturnal, and save in the rainy season, are not often seen out of their holes. They produce large eggs, and the female hatches and carries her young about her, sheltered by her 'apron.'

¹ The Philosopher, Geologist and Crustacean were respectively Ferdinand Stoliczka, Valentino Ball and James Wood-Mason.

THELPHUSA	EDWARDSI, Wood-Mason.	Khakyen Hills.	Hotha.
„	ANDERSONIANA, Wood-Mason.	Khakyen Hills.	Momien, 3500-5000.
„	HISPIDA, Wood-Mason.	Khakyen Hills.	Ponsee.
„	TUMIDA, Wood-Mason.	Khakyen Hills.	Hotha.
*	ATKINSONIANA, Wood-Mason.	Arakan.	
PARATHELPHUSA	DAYANA, Wood-Mason.	Prome.	Mandalay.
„	CRENULIFERA.		
„	SINENSIS.		

Family Ocypodidæ.

Dr. Mason gives **Ocypoda eeratophthalma*, as found on the coast, apparently on Mr. Blyth's authority, but the species is not included in Mr. Wood-Mason's list. Either this, or an allied species, is one of the most striking objects seen, when strolling by moonlight on a firm sandy beach, though they are by no means solely nocturnal animals. These crabs are of a bright-red colour, with eyes supported on pedunculated porcellaneous cylinders. As the intruder approaches over the sands, the assemblage of these animals opens out to allow him to pass, or if his movements are suspicious, they betake themselves, each to the immediate entrance to his own hole in the firm sand, and if their alarm is raised, the whole of them will disappear as if by magic, leaving a clear beach, where scores of active crabs were the previous instant seen moving about. When watched from a distance, however, the motions of these crabs are very interesting, as the whole body wheels this way and that, somewhat like troops manœuvring at a review.

The following interesting remarks are from the pen of the Rev. C. Parish, and are contained in "Science-Gossip," No. 92, of 1872. It would seem to matter little to the crab whether he burrows in stiff clay or loose sand, both which substances he equally contrives to mould into pellets or balls when excavating his burrow on the beach:—"As I was walking with a friend, some ten years ago, along the sandy shore of the Tenasserim coast, I was surprised to see in one place a large number of apparently rolled pebbles or stones extending along the beach for some distance, just above high-water mark. The reason for my surprise was that such a thing as a pebbly beach is nowhere met with (as far as my experience goes) on this coast. The entire coast-line of Tenasserim, from Amherst on the north to the Pakchan River on the south, consists of alternating bold granite bluffs, which jut out into the sea, and semicircular sandy bays, with here and there an extensive mud-flat and mangrove swamp at the mouths of creeks and rivers. It is very hard to find a stone anywhere on any of the sandy beaches. Granite boulders of various sizes are frequently met with on the sand, but that is all. The very unusual appearance, therefore, of a number of stones, resembling shingle, collected together in one place, surprised me. After my companion and I had amused ourselves with throwing about some of these stones, which were so hard as to have required a hammer to break them, we found that others (those nearest to the sea) were soft—of a firm cheesy consistency—so that the end of a walking-stick could be forced into or through them. This naturally increased our surprise; we therefore set ourselves to discover, if possible, the cause of this strange phenomenon. We were not long in doing this. The actual process of manufacture was witnessed. It may be stated here that the part of the coast spoken of is not far from the mouth of the Tavoy River, which expands into a broad estuary several miles across. This river carries down towards the sea a vast quantity of mud, the greater part of which is distributed along the coast-bottom to the south, owing to the direction of the river, which flows from north to south, the run of the coast-line being the same. At Mergui, also, only sixty miles to the south, another large river, the Tenasserim, pours down its quota of mud, and this also is confined near the coast by the islands of the Mergui Archipelago, which stretch from near the mouth of the Tavoy River on the north, to near Junk-Selung on the south. I have dredged the bottom at intervals between Tavoy and Mergui, and found it to be mud the whole way inside the islands. The consequence of this is, that although some of the reaches of sand on this part of the coast are very fine, the sand is, nevertheless, comparatively shallow, and

it fines off rapidly to seaward, until, a little way out, pure mud is reached. In some parts, at low water, a very thin layer of sand covers the mud below. This mud is exceedingly stiff, and of the colour of the well-known blue lias. To come now to the manufacture of these stones. The crabs, which abound on tropical seashores, were here, although too small to be worth catching for the pot, considerably larger than I had seen in similar situations elsewhere; and, as the tide was low, we saw numbers of them running about the wet sands, and, as we approached them, they would dive rapidly down into the small round holes which it is their habit to burrow for themselves. In making these holes the crabs (as is, no doubt, known to many) throw out the soil in small round pellets or balls. I had frequently noticed at Amherst the tiny round balls of sand strewed about the holes which the smaller crabs there make. When the ejected material is sand, these balls are, of course, at once dissolved at return of each tide. But here, as the sand was only in a superficial layer, and the crabs were larger, in making their holes they penetrated through the sand and reached the mud; consequently the material thrown up was stiff clay, and the balls were larger in proportion to the size of the workers. Looking at these balls of clay as the tide was turning to flood, we soon perceived how our stones were made. The ripple of an advancing wave would first roll two of the smaller balls into one, then another wave would do the same with two larger ones, until, by a repetition of this very simple process, rounded balls of various sizes were formed, and ultimately, as the tide advanced, flung up high and dry upon the sand, out of the farther reach of the waves. Here they lay and hardened, until, in form, in weight, and in general appearance, they resembled *bona-fide* water-worn fragments of blue lias. There was a long line of these stones on the sand just above high-water mark, and they must have been numbered by thousands."

An equally common crab, a species of *Gelasinus*, is mentioned by Dr. Mason. It especially affects tidal creeks and mud banks, and the males are provided with one huge claw, which they hold up as though threatening or beckoning to some one. They are very agile, and despite their defiant attitude, quickly disappear down a hole if an effort is made to catch them.

Family Portunidæ.

GONISOMA	HOPLITES,	Wood-Mason.	Bay of Bengal.
"	CRUCIFERUM.		Akyab.
"	ORNATUM.		
"	sp.		Akyab.
NEPTUNUS	GLADIATOR.		
"	GRACILIMANUS.		
"	PELAGICUS.		
"	SANGUINOLENTUS.		
"	sp.		
THALAMITA	SQUAMIFERA.		
ACHELOUS	WHITEI.		

Family Cancridæ.

CANCER	STRIGATUS,	Herbst.	
ZOYMYUS	ÆNEUS.		
EPIXANTHUS	FRONTALIS.		
OZIUS	RUGULOSUS,	Stimpson.	Nicobars.
LYOTODIUS	SANGUINEUS.		
UTERGATIS	DILATATUS.		

Family Eriphidæ.

QUADRELLA	CORONATA.
ERIPHIA	LEVIMANA.

Family Parthenopidæ.

LAMBRUS	CARINATUS.
SCYLLA	SERRATA.

Family Inachidæ.

CHORINUS LONGISPINUS.

Sub-class *PODOSOMATA.*

This is an aberrant group without respiratory organs, the abdomen rudimentary and unsegmented. The thorax in four segments, each carrying a pair of many-jointed legs. Sexes distinct. They are marine spider-like animals, mostly parasitical, furnished with a rostrate head and four ocelli.

RHOPALORHYNCHUS KRÖYERI, Wood-Mason.

Andamans.

This remarkable new generic form is described by its discoverer (J.A.S.B. 1873, Part II. p. 171), who dredged it in 25 fathoms off Port Blair, "at which depth the bottom was clothed with a dense tangle of filamentous algæ, so closely resembling the animal in point of colour and form, that the latter was with difficulty distinguishable."

Class MYRIAPODA.

Head distinct. Thorax and abdomen not differentiated, but divided into segments. Two antennæ. Feet always more than eight pairs in the adult. No metamorphosis. The young have four segments and four legs, but at each successive moult their number is increased.

Order CHILOGNATHA.

Body more or less cylindrical and chitinous or shelly. Two pairs of legs on each segment (*somite*), except the first five or six.

Family Iulidæ.

The Millipedes (*Iulus*) are very harmless and sluggish animals, feeding on decayed wood and vegetable substances, and when touched roll themselves into a flat coil. In moving, a series of undulations or waves passes along the whole line of legs in a very regular and pleasing manner. In the eyes of the ignorant these harmless animals are often confounded with the formidable members of the next order.

Order CHILOPODA.

Body depressed, submembranous, one pair of legs on each segment. Two anterior pair of legs modified into foot-jaws, whereof the second pair is perforated for the discharge of a poisonous secretion. Animal feeders.

Family Cermatiidæ.

CERMATIA NOBILIS, Templeton.

Maulmain.

Family Scolopendridæ.

The Centipedes (*Scolopendra*) are active animals which harbour in cracks and under stones, for which their flattened form is well suited. They are eminently raptorial, and will seize any living creature they are capable of overpowering. The bite of their venomous jaws is very painful, and the larger species can inflict a severe wound on a tender skin by the grasp of their legs. Many species are phosphorescent. Dr. Mason observes, "A specimen now before me, that fell from the thatch-roof upon a lady's shoulder, measures nine inches in length, and one inch and a quarter in circumference," and adds, "A small centipede (*Scolopendra phosphorica*), which emits a strong phosphorescent light, is very common. It does not, however, appear to give out its light until it is wounded, or at least attacked, when the whole of the part that has been touched suddenly becomes a living blaze, in no way dependent on the respiration, as in the fire-flies. There is a small dark line down the back and indications of the joints of the body, but each lobe glows like a mass of phosphorus."

SCOLOPENDRA INERMIS, Newport.

Tenasserim.

Class ARACHNIDA.

Head united with the thorax (*Cephalothorax*). Abdomen not segmented in the typical forms, and never provided with limbs. Legs never more than four pairs. No antennæ. Eyes simple, generally more than two, and often of unequal size. Like *Crustacea* the *Arachnida* moult and possess the power of reproducing lost limbs. Sexes distinct.

Order SCORPIOIDEA.

Abdomen indistinctly separated from the cephalothorax, and having a 'post abdomen' or tail of six joints, the terminal one of which bears a perforated claw communicating with a poison gland. The maxillary palpi longer than the feet and terminating in a didactyle claw or 'pincers,' with which animals are held whilst being pierced and killed by the caudal sting. The scorpions are viviparous, the very young being carried about on the mother's body.

Order CHELIFERIDEA.

These Arachnoids, or False Scorpions as they are called, are minute and harmless creatures, armed with pincers like the scorpions, but devoid of jointed tail and sting.

Order ACARIDEA.

Head, thorax, and abdomen united. Mouth either masticatory or suctorial.

This order embraces the *Mites*, both Marine, Freshwater, and Terrestrial, and their variety is astonishing. *Aearus domesticus* is the cheese mite. *Leptus autumnalis* the harvest-bug, which fixing on the skin, gives rise to intolerable itching. *Gamasus coleopterorum* is the mite, seen clustering round the legs of the common dung beetle, from which little pest the strong beetle is helplessly unable to free himself. *Atax* lives in the branchiæ of bivalves, whilst *Demodex folliculorum* lives in the sebaceous follicles of man. *Sarcoptes scabiei* burrowing beneath the skin, causes the itch in man, and another mite causes the mange in dogs. The vegetable kingdom suffers too from the attacks of mites no less than the animal.

Order ARANEIDEA.

This order embraces the spiders proper, possessing a distinctly separated abdomen, eight legs, with seven joints each. Eyes simple, four to eight (two in a Cuban species). A pair of poison fangs (palpi) and abdominal glands for the secretion of a glutinous substance and spinning apparatus for constructing thread for forming a snare or net. There is often extreme disparity in the size of males and females, the former being sometimes so minute as to be almost parasitic on the person of their huge spouse. The eggs are deposited in a silken cocoon, which in some species is carefully carried about by the female beneath her abdomen, and is most carefully guarded till the young spiders emerge. The young spiders 'moult' as they grow, but undergo no metamorphosis. A long treatise would be required to describe the various forms, habits, modes of life, dwellings, and the life history of these animals; but so far as regards Burmese species next to nothing is known. But some idea of their probable number may be formed from the fact that some 500 species inhabit the British Isles, with its far poorer insect fauna than an equal area within the tropics. Dr. Stoliczka makes the following remarks on spiders:—

"It is strange that not only dislike, but a real enmity and ill-feeling against Arachnoids, seems to have taken hold of men's minds. No doubt, the few species which secrete a poisonous fluid in special glands, and through its use occasionally become dangerous, are the source of all this ill-feeling which has been extended to the most useful animals. Harmless they certainly are on the whole, and as regards usefulness, scarcely surpassed by any other class of animals. They wholly live on insects and destroy a large number of those which often create great damage to either animal or vegetable life. Thus they are important agents in sustaining a proper balance in the economy of nature, and their usefulness actually increases, by their not being dangerous in such a way, as insects often are.

“These are, however, not the only reasons which entitle the ARACHNOIDEA to a fair share of attention on the part of every observer of nature. Their instinct is often higher developed, than we find it in insects. This instinct not only shows itself in the way in which they obtain their living, but also in the art of weaving, in which they may be said to have been the teachers of man. Actually, almost their whole life is nothing but a carrying out of clever arrangements, resulting from a certain amount of thought and deliberation. The beauties of colour, the curiosities of form, etc., which they exhibit, are equally remarkable and interesting. It is, therefore, only natural that some of our oldest classic writers have expressed their admiration of the works and talent, exhibited by Arachnoids, in the most inspiring language, and many a beautiful idea in the mythology of the Greeks and Romans is interwoven with their mode of life.”

The above remarks of Dr. F. Stoliczka are very judicious and true; but my late esteemed friend has, I think, overlooked the main reason for the dislike entertained for these useful animals, and that is their predatory and sanguinary natures. The poet says:—

“Odimus accipitrem quia vivit semper in armis,
Sed caret insidiis hominum quia mitis hirundo est,”

and the same feeling that led the Romans to hate the hawk, leads us to hate spiders, as we are so often witnesses of its cruel ferocity to the helpless victim, pouring out its last gasp in a subdued ‘buzz,’ before its captor finally buries his fangs in its body.

Family Epeiridæ.

EPEIRA (ARGYOPES) MAMMILLARIS, Stoliczka. Burma.

This species, writes Stoliczka, may be considered as the eastern representative of *Epeira sericea*, which is found in Egypt, and almost through the whole of Northern and Western Africa; the former differs from the latter by a shorter thorax and the want of numerous bands on the feet; the abdomen is also not emargined in front, and the anterior lateral edges are not serrated, which they always appear to be in the African form.

NEPHILA CHRYSOGASTER, Walck.

Adult female 20·24 lines. Adult male 2·25 lines.

Either this, or a closely-allied spider, is common in Burma, where it forms a large snare with a yellow silk of considerable strength. The females are so enormously larger than the males that the latter were supposed to belong to a small species, which frequented the snares of the larger spider for the purpose of picking up a stray insect. From specimens, however, received from Dr. Collingwood from Labuan, and from Mr. Thwaites from Ceylon, the Rev. O. P. Cambridge was enabled to describe the previously undiscovered male (Proc. Zool. Soc. Lond. 1871, p. 621), adding the following interesting remarks:—“Perhaps few points of sexual dissimilarity are more curious than this extreme difference in size between the males and females of this genus, the male being scarcely (in the present instance) more than one-tenth of the length of the female; it seems to me fairly accounted for by an application of a branch of the principle of sexual selection. It is the well-known habit of the female in some *Epeirids* to endeavour to destroy or devour the male, and M. Vinson, in his work on the spiders of the Mauritius, speaks of this habit in reference to a species of this genus. M. Vinson gives a very graphic account of the agile way in which the diminutive male escapes from the ferocity of the female by gliding about and playing hide and seek over her body and along her gigantic limbs: in such a pursuit it is evident the chances of escape would be in favour of the smallest males, while the larger ones would fall early victims; thus gradually a diminutive race of males would be selected, until at last they would dwindle to the smallest possible size compatible with the exercise of their generative functions, in fact probably to the size we now see them, *i.e.* so small as to be a sort of parasite upon the female, and either beneath her notice, or too agile and too small for her to catch without great difficulty.”

Such is the ferocity indeed of the female spider, that she has been known to seize and devour the male in the act of making his loving overtures to her; and after their brief union, nothing but flight and the utmost address on his part saves the male from being devoured by his heartless consort. This is an extreme instance of the economy of nature, though a partially similar practice of 'maricide' rules among the social hymenoptera.

Family Mygalidæ.

Dr. Mason says, "A large, black, hairy spider, with tusks like a centipede, and very poisonous, is occasionally seen. The Karens call it the bear-spider. It is of the genus *Mygale*, famous for the questionable habit of devouring birds; but the natives say that it kills cobras and other large snakes, and eats their brains."

Cobracidal spiders have certainly no existence, but that large spiders can kill and suck the juices of small helpless birds or mammals I quite believe.

Order PHALANGIDEA.

These animals differ from spiders in possessing neither poison glands nor spinning apparatus. Eyes two only. Many species are highly gregarious, congregating together in masses.

Order PHRYNIDEA.

This order embraces two families: *Phrynidæ*, with a rounded abdomen and the maxillary palpi with a single claw; and *Thelyphonidæ*, with the abdomen terminating in a jointed setiform appendage, and the maxillary palpi didactylous or clawed. They are slender-legged, active creatures, and despite their somewhat repulsive appearance, quite harmless.

Family Thelyphonidæ.

Stoliczka gives the following species in his paper in the J. As. Soc. Bengal, 1873, Part II. p. 126, and points out how nearly the range in India of *Thelyphonus* corresponds with that of the *Passalidæ*, and is confined to those portions of the country marked by a strong Malayan infusion.

THELYPHONUS SCABRINUS, Stol.	Sikkim. Assam. Khasi hills.
„ ASSAMENSIS, Stol.	Sikkim. Assam.
„ ANGUSTUS, Lucas.	Sikkim. Martaban. Pinang.
„ FORMOSUS, Butler.	Martaban.
„ INDICUS, Stol.	South India. Bengal. Johore.

Order SOLIFUGIDEA.

Abdomen segmented, distinct from the cephalothorax, palpi filiform. Eyes two only. Mandibles large and powerful, but without a poison gland.

To this order belongs the repulsive *Galeodes*, a spider-like animal, covered with hair, which harbours under stones. These animals can be domesticated, and when caged will devour raw beef greedily, but they are too savage and repulsive to become general favourites.

Order PENTASTOMIDEA.

This degraded order has but one genus, *Pentastoma*—a worm-like entozoic parasite, but in the larval stage possessing four legs. The sexes are distinct. The asexual young, analogous to the 'scolex' of the 'Cestoda,' is found in the lungs and livers of herbivorous mammals and reptiles, and the perfect adult becomes developed in the lungs and respiratory passages of carnivorous mammals and reptiles. The lungs of large snakes are commonly infested by these creatures, which firmly attach themselves by four cephalic hooks, which they bury in the tissues of their host, allowing their bodies to dangle in the respiratory cavity.

ENTOMOLOGY.

DR. MASON thus prefaces his chapter on this subject: "With the exception of the beetles, Burma presents an untrodden field to the entomologist. A few insects have been collected, but none, with a solitary exception, have been described or noticed in any work to which I have access. Still they form by no means the least important portion of our natural productions. The lac insect, the blister fly, the honey bee and the silk moth are important for their utility; the green beetles, the fire-flies and the butterflies for their beauty; the white ants, the blights and the caterpillars for their predatory habits; and the gnats, the mosquitoes, the gad flies, the ticks, the bugs, the fleas, the scorpions and centipedes for their annoyance to man."

Class INSECTA.

This great class, which embraces some of the loveliest forms of invertebrate life, is thus characterized. Wings generally present. Head, thorax, and abdomen distinct. Two antennæ. Three pairs of legs, neither more nor less, though the anterior ones may be rudimentary. Respiration by means of tracheæ, or tubes communicating with the surface by lateral openings (*stigmata*) or spiracles. Sexes distinct. Agamic reproduction (*Parthenogenesis*) occurs in some orders, and may be regarded as a process of cell development analogous to 'budding.'

Order THYSANURA.

The most noteworthy member of this order is the common apterous Fish-insect (*Lepisma*), which harbours in and destroys our books, a soft active creature, covered with fine scales (which are beautiful objects under a microscope), and with a tail composed of three divergent setiform appendages.

Order HEMIPTERA.

Four wings, more or less membranous. Mouth armed with a suctorial proboscis (*haustellum*). Larva wingless. One of the latest contributions to our knowledge of Burmese Hemiptera is a list by Mr. W. L. Distant, of Tenasserim species, published in the Journal of the Asiatic Society of Bengal for 1879, Part II. No. 1, p. 37. This list and the British Museum Catalogues have been mainly used in the present catalogue. The members of this order are both animal and vegetable feeders, some of the latter being of considerable commercial importance. The *Coccus cacti*, or cochineal insect of Mexico, is the best known, and in 1850, according to Balfour (Cyclopædia of India), 1122 tons were imported into England of the value of £440,000, and representing the astonishing number of 175,929,600,000 individuals, 70,000 of which, when dried, go to the pound. The red-flowered 'cactus' (*Opuntia*), or prickly pear, seems best suited for the insect; but there are probably several species, of which the Mexican species is by far the most valuable as a dye producer, and which seems capable of being domesticated in India. The 'dye' is nothing more than the dried body of the female insect, detached, during life, from the plant to which it adheres parasitically, dipped in boiling water to kill it and dried in the sun.

Sub-order *PHYOPHTHIRIA*.

Mostly parasitic on trees and shrubs. The larvæ are often covered with flocculent cottony threads.

*Family Coccidæ.**Coccus LACCA.*

The lac insect is the most important member of this family. The male has two wings, and flies freely; but the female is apterous and parasitical (so to say) at all ages. The body is a mass of red-coloured paste, which is simply the lac dye of commerce, and from the sides of her body exudes a resin in such quantities as gradually to encase her in a sort of cell; this resin is the 'shell lac' of commerce. The crude lac, as brought to market, consists of the twigs whereon the resinous cells are attached, in which the female lac insects are contained. The whole mass is pounded up and steeped in water, which dissolves out the coloured matter formed of the insect's body. This is subsequently precipitated and formed into cakes, after which the refuse is heated, and the resin melted out. This process is conducted in canvas bags, which are subjected to pressure, and the pure resin as it exudes is scraped off in flakes, which are termed 'shell lac,' being faintly orange-tinged. Dr. Mason says, "The Karens think the lac is produced by an ant, and call it the lac ant." The insect is parasitical on several species of trees, as *Ficus religiosa* and other figs, *Butea frondosa*, *Zizyphus jujuba*, etc., and is sometimes so crowded on the stems that they are seen incrustated, as it were, with a pipe-like mass half an inch in diameter or more, made up of the closely-packed cells of the 'lac insect.' The finest 'lac' comes from Siam and the Shan states via Rangoon, and much is also collected in Assam and some parts of Bengal. In 1850-51, according to Balfour (*op. cit.*), 3757 tons of lac and lac dye were exported from Calcutta, and 1670 tons from Bombay, or in all 5427 tons in one year of this insect, worth over £200,000. Some species of this order secrete waxy filaments, and 'Manna' is said to be an exudation caused by the puncture of the *Coccus manniferus*.

Family Aphididæ.

Aphides are mostly viviparous in summer, and oviparous in winter, and in the former case the females are winged. Agamic reproduction (*Parthenogenesis*) may be carried on through many generations, a fact as singular as it is well ascertained. The members of this family constitute those familiar pests of the gardener, Plant lice, including the more formidable *Phylloxera*, which in some years has almost ruined the grape harvests in some parts of Europe.

The *Aphis*, or plant louse, exudes a nectareous or saccharine fluid, familiarly called honey-dew, and of which ants are particularly fond. Groups of ants may be often seen surrounding the *Aphides* and gently stroking them with their antennæ, to induce them to yield the coveted juice, which from time to time the *Aphis* does, by ejecting a pellucid drop from its anal siphuncle, which drop is at once consumed by the nearest ant with evident signs of gastronomic approval. Ants, too, are said to carry off some species of *Aphides* into their nests, where they are carefully tended, precisely as cows are by men, for the sake of their potable secretions. Van Beneden thus writes of these insects in his entertaining and popular work on animal parasites¹:—"Who does not know those small green bodies, of the size of a pin's head, coming like a cloud upon the buds and leaves of the rose bushes, which shrivel and wither immediately? There are green ones on certain plants, and black ones on others; but whatever their colour, they are living pearls which form garlands round the stalk. . . . Let us examine with a magnifying lens these walking grains of sand, each grain will reveal to us a charming insect, whose head is adorned with two little antennæ, and has globular projecting eyes, glistening with the richest colours; behind these are two reservoirs of liquid sugar, elegantly mounted on a polished stalk and always full.

¹ Animal Parasites, International Scientific Series, Vol. XX. by P. J. Van Beneden.

. . . . Much has been written about these small sugar manufactories, so well known by ants, that they have procured for the 'Aphis' the name of the 'ant-cow.' The viviparous Aphis not only produces a mature insect at birth, but the new-born daughter is herself gravid with a similarly-matured and perfect offspring, an example of compound Parthenogenesis which is marvellous to contemplate. Viewed as some writers love to represent it, as a 'Teleological' arrangement, to prevent the exuberant development of the 'rose,' it seems a clumsy and not very loudly called-for contrivance, for the rose is not one of those noxious or pestilent plants, like some weeds, which overtax man's efforts to keep in check; but viewed as one of the varied and countless developments of creative energy, it affords us solid grounds of thankfulness that our place in nature is what it is, and enables us to contemplate, and realize (darkly it may be, and with wholesome limitations touching the ways of 'Madame Why') the grandeur, the magnificence, the beauty, alike of Nature's greatest and smallest works.

Family Psyllidæ.

Woolly blights are thus described by Dr. Mason:—"Some species which do not secrete honey-dew are of a large size, clothed with a white, cotton-like covering, and when disturbed they have the habit of leaping to a considerable distance. PSYLLA, sp."

Sub-order HOMOPTERA.

Tarsi three-jointed. Wings membranous, deflected. Proboscis inferior.

The females of the *Homoptera* are often furnished with an ovipositor, composed of a bivalve sheath, inclosing a cylindrical boring organ, whereby they are enabled to deposit their eggs at some distance from the surface of the ground. The *Cicadidæ* are remarkable for their loud and piercing song. This music is confined to the males, and is produced by a peculiar mechanism of membranous drums, with their appropriate muscles placed in a cavity at the base of the abdomen, and covered outwardly by the dilated sides of the metasternum.

Family Ledridæ.

LEDRA SCUTELLATA, Walk.	Burma.
„ CULOBATA, Walk.	Burma.
EPICLINES PLANATA, Amyot et Serv.	Tenasserim.

Family Tettigoniidæ.

TETTIGONIA OBSCURA, Walk.	Burma.
„ FERRUGINEA, Fabr.	Tenasserim.

Family Cercopidæ.

PTYELUS CONIFER, Walk.	Burma.
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P. spumarius is the common 'cuckoo spit,' the frothy fluid being the nidus wherein the insect is concealed.

CERCOPIS NIGRIPENNIS, Fabr.
„ SEPTEMPUNCTATA, Walk.

"Plant lice," says Dr. Mason, "are often very destructive to our gardens, especially to sickly plants. They are not usually, I think, the Aphidæ of Europe, but the Cercopidæ. The ants, however, manifest the same affection for them, and make like efforts to obtain their honey-dew. One species may be seen covered with a frothy secretion like the common 'frog-hopper,' *P. spumaria*."

COSMOCARTA MASONI, Dist.	Tenasserim.
„ MEGAMERA, Butler.	Tenasserim.
„ TRICOLOR, St. F. and Serv.	Tenasserim.

Family Membracidæ.

CENTROTUS REPONENS, Walker.	Tenasserim.
„ VARIUS, Walker.	Burma.
„ FLEXUOSUS, Fabr.	Tenasserim.
„ <i>anchorago</i> , Guér.	
CENTROTYPUS ASSAMENSIS, Fairu.	Tenasserim.

Family Cicadellinidæ.

SPHENORRHINA BRACONOIDES, Walker.	Burma.
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Family Cicadellidæ.

UROPIORA HARDWICKI, Gray.	
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Family Issidæ.

EURYRACHYS (?) PUNCTIFERA, Walk.	
ANCYRA APPENDICULATA, Westwood.	Martaban

Family Ricaniidæ.

RICANIA GUTTIGERA, Walk.	
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Family Flatidæ.

CERYNIA MARIA, White. var.	
„ TENELLA, Walk.	
FLATA LIMBATA, Fabr. (white wax insect).	Burma.
„ TENELLA, Walker.	Burma.
„ INORNATA, Walker.	Tenasserim.
COLOBESTHES CONSPERSA, Walker.	Burma.
„ ALBIPLANA, Walker.	Burma.

Family Fulgoridæ.

DYCTIOPHORA LEPTORHINA, Walker.	Burma.
CIXIUS MEANDER, Walker.	Burma.
HEMISPHERIUS RUFOVARIUS, Walker.	Burma.

The following list of species of *Fulgora* is drawn up from Butler's list of the species of that genus in Proc. Zool. Soc. Lond. 1874, p. 97:

a. Wings orange (when dead).

FULGORA CANDELARIA, L.	Hong Kong.	Cambodia.
„ VIRIDIROSTRIS, Westw.	Assam.	
„ NIGRIROSTRIS, Walk.	Pachebone.	
„ SPINOLE, Westw.	Silhet.	
„ LATHBURI, Kirby.	Hong Kong.	

b. Wings white.

„ CLAVATA, Westw.	Silhet.
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The rostrum of this species has a ludicrous resemblance to a 'vesuvian' cigar light.

c. Wings blue-green.

„ DUCALIS, Stål.	Cambodia.
„ CŒLESTINA, Stål.	Cambodia.

(Sub-genus *Pyrops*, rostrum much compressed.)

„ GEMMATA, Westw.	Darjiling.
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d. Wings sub-hyaline, pale greenish.

„ VIRESCENS, Westw.	Cherra.
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Family Cicadidæ.

DENDUBIA	IMMACULATA, Walker.	Tenasserim.
„	MANNIFERA, L.	Tenasserim.
„	CRANIA, Walker.	Burma.
„	CINCTIMANUS, Walk.	
„	INTEMERATA, Walker.	Tenasserim.
CICADA	GUTTULARIS, Walker.	Burma.

Of this class of insects Dr. Mason remarks:—"Those famous singers, the Cicadæ, celebrated by Homer, Virgil, and from the ancients down to the present time, are numerous both in individuals and species. One of the first objects that attracts the attention of an observer in some localities of the Karen jungles is, a clay tube several inches high, raised over a shaft sunk two or three feet in the ground, over which may be often see a Karen, bending and inserting the extremity of a long branch of thorny rattan, which after a few twists is withdrawn, bringing with it a grub that is deemed a great luxury. The natives have a distinct name for this grub, and seem to be ignorant that it is the larva of the Cicada. This I was able to verify, on one occasion, by observing the exuviae of many of their pupæ adhering by claws to the serrated bark of trees, with rents in their backs, out of which the perfect insect had escaped. The Karens, it may be observed, are no more barbarous in their taste than the civilized Greek, for Aristotle testifies that they were an article of diet, both in their larval and perfect state, and one species is still eaten by the American Indians. A cicada, gilden with a bright yellow transverse band on its wings, is occasionally seen. The Karens say its call is *Kan-wee, Kan-wee*, and this is the name by which it is known to them. I was one evening serenaded by one, that poured out its vesper song from a jack tree before my door, in strains loud enough to have startled one unacquainted with the musician. Its sounds were full, shrill, and continuous, swelling up like an Æolian harp so as to fill all the air around.

"The instrument on which this gay minstrel performs is a unique piece of mechanism,—a perfect melodeon possessed only by the male, and which he carries about between his abdomen and hind legs. It consists of two pairs of plates composing a shield for the box concealed beneath. Under these plates is a delicate iridescent covering, tensely stretched over the cavity, like the head of a drum; and attached to its inner surface are several muscular strings, secured at their opposite extremities to another membrane at the posterior end of the box. The music is produced by the alternate contraction and expansion of these strings, which draw the tense concave covering downwards, with a rapid receding, the sounds issuing from two key-holes of the instrument, strikingly analogous to the action of the melodeon."

PLATYPLEURA	NOBILIS, Germ.	Tenasserim.
„	INSIGNIS, Dist.	Tenasserim.
CEPHALONYS	TERPSICHORE, Walker.	Burma.
HUECHYS	PHILEMATA, Amyot et Serv.	Burma.
„	SPLENDIDULA, Fabr.	Burma.
„	SANGUINEA, De Géer.	Tenasserim.
„	THORACIA, Dist.	Tenasserim.
SCIROPTERA	SPLENDIDULA, Fab.	Tenasserim.
POMPONIA	TIGROIDES, Walker.	Tenasserim.
CRYPTOTYMPANA	RECTA, Walker.	Tenasserim.

Sub-order HETEROPTERA.

Tarsi three-jointed. Wings horizontal. Proboscis anterior.

To this sub-order belong the common bug (*Cimex lectularius*), the aquatic 'water-boatman' (*Notonecta glauca*), and the genus *Reduvius*, a bug capable of inflicting excruciating pain by the puncture of its proboscis, if rashly handled, the puncture of one species found in Hungary being occasionally said to terminate fatally. Dr. Mason writes:—"There are several species of the same tribe that furnishes the common bed-bug in the Provinces, with precisely the same disagreeable odour, but

much stronger. A single insect crossing the path will infect a stratum of air of several feet in width, which remains for a considerable period. A small black species sometimes comes on the table around the lights at evening, which is very disagreeable, though its scent is not so strong as some others. In smaller numbers a grey species is an occasional visitor.

"A large greenish species is very injurious to fruit. I have observed individuals repose for hours on the oranges that were nearly ripe, sucking their juices through the skin; and when the oranges were plucked, they had large scars on the places where the insects had rested, and the orange within was injured in those places.

"I examined a species in Tavoy which proved to belong to Westwood's *Tingidæ*. Rostrum three-jointed, tarsi three-jointed. Scutellum two-thirds the length of the insect. Two small thorns on each shoulder, with a small brass-coloured patch behind on the margin. Edge of the wing-cases with six black thorns on each side, six black spots on the abdomen, general colour of the insect deep green above and light green beneath.

"The Karens near Rangoon describe a similar insect as some years effecting much injury to the paddy by absorbing its juices, before the kernel has become hard. Whole fields of rice are sometimes abandoned in consequence of the devastation of the paddy-bug. The offensive odour which some of these insects emit appears to be done in self-defence. Some, the grey species especially, will come about the table and not the slightest disagreeable scent be discovered, but no sooner has one come in contact with it, than it emits an intolerable effluviaum."

Family **Belostomidæ**.

"A large water insect, as denominated by the natives, resembling a gigantic cockroach, is not uncommon. The perfect insect has the tarsi two-jointed, but quite incorporated with the extremity of the tibiæ, and terminated by a long slender and acute unguis characteristic of the genus *Belostoma*. A specimen before me measures two inches and three-quarters in length. From some brief remarks on the Asiatic species of this genus by Dr. Leidy in the Journal of the Academy of Natural Sciences of Philadelphia, the Tenasserim species is, I judge, *B. indica*, St. F. and S."

Family **Gerridæ**.

"A long-legged insect may be frequently seen stalking haughtily about, on the surface of our inland streams, like a Burman king on the shoulders of his human horse. It has obtained the appropriate name of water-skipper. The Burmese call it the 'marine officer.' *Gerris*, sp."

PTILOMERA LATICAUDA, Hard.

Family **Nepidæ**.

RANATRA GROSSA, Fabr.

Tenasserim.

Family **Reduviidæ**.

EUAGORAS PLAGIATUS, Burm.

VELINUS MALAYUS, Stål.

REDUVIUS MENDICUS, Stål, var.

VESBIUS SANGUINOSUS, Stål.

To this family belongs the natural and appropriate enemy of the common bug, of which Van Beneden thus writes (*op. cit.* p. 267): "Happily for us, another hemipterous insect, the masked reduvius (*Reduvius personatus*), penetrates like the preceding one into our apartments, and covers itself with dust in order the more readily to fall upon its enemy; but man is not sufficiently acquainted with its habits to make war in common with it on this miserable parasite (the Bug). We ought for this purpose to place the masked *Reduvius* under the protection of the law, and offer premiums for the most vigorous races." Many people may often have noticed a repulsive-looking insect on trees, covered over with loose rubbish or filth. This

is a species of *Reduvius*, which, under concealment of a heap of loosely attached extraneous matters, makes his approach towards his unsuspecting prey.

Family Tingidæ.

ACANTHIA (CIMEX) LECTULARIA, the common bed-bug, belongs to this family.

Family Aradidæ.

BRACHYRHYNCHUS MEMBRANACEUS, Fabr.

Family Acanthaspididæ.

TIARODES VERSICOLOR, Lap.

SMINTHUS MARGINELLUS, Dist.

VELITRA RUBRO-PICTA, A. and S.

Family Pyrrhocoridæ.

LOHITA GRANDIS, Gray.

IPHITA LIMBATA, Stål.

PHYSOPELTA GUTTA, Burm.

ANTILOCHUS RUSSUS, Stål.

„ COGUEBERTII, Fab.

ODONTOPUS NIGRICORNIS, Stål.

DINDYMUS RUBIGINOSUS, Fab.

DYODERCUS CINGULATUS, Fab.

Family Coreidæ.

ACANTHOCORIS SCABRATOR, Fab. Tenasserim.

MACROCHERAIIA GRANDIS, Gray.

DYSDERCUS KÖENIGI, Fabr.

SERINETHA AUGUR.

PHYSOPELTA GUTTA, Burm.

Family Homœoceridæ.

HOMŒOCERUS JAVANICUS, Dallas. Tenasserim.

„ MARGINELLUS, H. S. Tenasserim.

Family Anisoscelidæ.

SERINETHA AUGUR, Fab. Tenasserim.

„ ABDOMINALIS, Fab. Tenasserim.

Family Alydidæ.

RIPTORIUS PEDESTRIIS, Fab. Tenasserim.

Family Edessidæ.

ASPONGOPUS OBSCURUS, Fabr. Burma.

„ MARGINALIS, Dallas. Tenasserim.

„ NIGRIVENTRIS, Hope.

EUSTHENES.

CYCLOPELTA OBSCURA, St. F. and Serv. Tenasserim.

Family Mictidæ.

DALADER PLANIVENTRIS, Hope.

„ ACUTICOSTA, A. and S. Tenasserim.

MICTIS TENEBRÖSA, Fabr. Tenasserim.

„ GALLINA, Dallas. Tenasserim.

PHYSOMELUS CALCAR, Fabr. Tenasserim.

„ PARVULUS, Dallas. Tenasserim.

Family Pentatomidæ.

EUSARCORIS DUBIUS, Dallas.	
PENTATOMA LATIPES, Dallas.	Tenasserim.
„ CRUCIATA, Fabr.	Tenasserim.
„ PULCHRA, Dallas.	Burma.
ANTESTIA ANCHORA, Thunb.	Tenasserim.
PRIONACA LATA, Dallas.	Tenasserim.
STRACHIA CRUCIGERA, Hahn.	Tenasserim.
CATACANTHUS INCARNATUS, Drury.	Tenasserim.
RHAPHIGASTER VARIPENNIS, Hope.	Tenasserim.

Family Eurygastridæ.

PODOPS OBSCURUS, Dallas.	Tenasserim.
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Family Plastaspidæ.

BRACHYPLATYS SUBLENEA, Hope.	Tenasserim.
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Family Asopidæ.

CANTHECONA PURCELLATA, Wolf.	Tenasserim.
ZICRONA CERULEA, L.	Tenasserim.

Family Halydidæ.

DALPADA CLAVATA, Fabr.	
„ OCLATA, Fabr.	
„ VARIA, Dallas.	Tenasserim.
AGEUS TESSELLATUS, Dallas.	Burma.

Family Pachycoridæ.

CHRYSOCORIS GRANDIS, Thunb.	Tenasserim.
„ PORPHYRICOLUS, Walk.	Tenasserim.
HOTEA CURCULIONIDES, H. S.	Tenasserim.
CANTAO OCELLATUS, Thunb.	
SOLENOTHEDRUM RUBROPUNCTATUM, Guér.	
SCUTELLERA NOBILIS, Fabr.	Maulmain.
CALLIDEA STOLLII, Wolf.	Tenasserim.
„ DILATICOLLIS, Guér.	Maulmain.

Sub-order *THYSANOPTERA.*

The best-known representative is the destructive Turnip-fly (*Thrips*).

Sub-order *MALLOPHAGA.*

This order embraces the parasitic hemiptera whose development has been (as it were) arrested at an early stage. They are the lice which live on the skin, hair and feathers of mammals and birds, an example of which is the common louse.

Order *ORTHOPTERA.*

The Orthoptera are amongst the most highly organized insects. They have four wings—the anterior pair coriaceous or submembranous, the posterior membranous and folded. Jaws mandibulate. Many species are apterous, especially the females. The members of the curious Family *Mantidæ* are highly predatory and carnivorous; the *Blattidæ* are omnivorous, the rest of the order are herbivorous, and an invasion of locusts causes more destruction than a hostile army, or than any number of wild beasts.

Sub-order *CURSORIA*.

Body ovate, depressed. Head retracted into the prothorax. Legs slender. Tarsi with an accessory joint between the claws. The antennæ usually long and slender. Females commonly, males occasionally, apterous.

Family Blattidæ.

To this order belongs the common cockroach of English kitchens (*Periplaneta*). The egg cases of members of this family are little oval capsular bodies, with one side serrated along a line, which opens to permit the young when hatched to escape. The ova are ranged in tiers within the capsule, which is affixed by the female in dry secluded spots to fixed bodies, as furniture or the like.

PANESTHIA FLAVIPENNIS, Wood-Mason.	Naga hills.
„ SAUSSURII, Wood-Mason	Sikkim.
(J. A. S. B. 1876, Part II. p. 190).	

Sub-order *GRESSORIA*.

Body long, narrow. Head exerted. Legs slender, and the posterior femora not thickened.

This sub-order embraces the carnivorous *Mantidæ* and the herbivorous *Phasmidæ*, commonly known respectively as the 'walking leaf' and 'stick' insects.

Family Mantidæ.

The anterior legs serrated, and used as prehensile organs, with the femora grooved for the reception of the tibiæ. The head very versatile. These insects are very watchful, and when intent on their prey, or suspicious of danger, often assume grotesque attitudes, and avail themselves of their mimetic forms to avoid observation.

PHYLLIUM CELEBICUM, De Haan.	Toungnoo.
„ WESTWOODII, Wood-Mason.	South Andamans. Pahpoon. Malewoon.
HIERODULA (RHOMBODERA) BUTLERI, Wood-Mason (P.Z.S.L. 1878, p. 580).	Naga Hills.
ÆTHALOCHROA ASHMOLLANA, Westw.	Calcutta.
HYMENOPUS BICORNIS, Stoll.	Assam. Java.

Family Phasmidæ.

These insects, even more than the Mantidæ, which possess superior powers of flight, rely on their resemblance to inanimate objects to avoid their enemies, and are adepts at mimicking the grass or sticks to which they cling, whence their name of 'stick insects.'

MENAKA SCABRIUSCULA, Wood-Mason (J. A. S. B. 1873, p. 55).	Silhet. Assam. Naga hills.
BACILLUS HISPIDULUS, Wood-Mason (l.c. p. 47).	South Andaman.
„ OXYTENES, Wood-Mason (l.c. p. 48).	Pegu.
„ LEVIGATUS.	Naga hills.
„ ARTEMIS, Westw.	Sikkim. Assam.
„ INSIGNIS, Wood-Mason.	Assam. Sikkim. Cherra.
LONGIODES CUNICULUS, Westw.	
„ VERRUCIFER, Wood-Mason.	South Andamans.
„ WESTWOODI, Wood-Mason.	South Andamans.
„ STILPNUS, Westw.	
„ AUSTENI, Wood-Mason.	Dikrang Valley. Assam.
„ CRAWANGENSIS, De Haan.	Martaban.
PHIBALOSOMA WESTWOODI.	Samaguting, Assam.
LOPAPHUS PORES, Westw.	Upper Tenasserim.

LOPAPHUS BOOTANICUS, Westw.	Naga hills.
„ BAUCIS, Westw.	Sibsagur.
BACTERIA SHIVA, Westw.	Khasi hills.
NECROSCIA HILARIS, Westw.	Sikkim. Assam.
„ MENAKA, Wood-Mason.	Khasi hills.
„ SIPYLUS, Westw.	Burma.
„ MACULICOLLIS, Westw.	Burma.

Mr. Wood-Mason was the first to point out (*J. A. S. B.* 1875, Part II. p. 220) that the last dorsal abdominal segment in the males of this orthopterous family (except *Phyllium*) is modified to serve as a more or less efficient clasping apparatus. Frequently the whole segment is so profoundly modified as to constitute a regular forceps, whereby their brides may be held fast. These organs in *Lonchodes*, *Phibalosoma*, *Podacanthus*, etc., have been often figured, but their precise function and their relation to the sex of the insect had not before been assigned and interpreted.

Sub-order *SALTATORIA*.

Body generally slender. Hind-legs thickened and saltatorial.

a. Antennæ long and setaceous.

Family **Gryllidæ**.

This family embraces the Crickets (*Gryllus*), and that curious insect the Mole Cricket (*Gryllotalpa*), and in both this and the next family the ovipositor is often of great length, to enable the female safely to deposit her eggs in the ground at a safe distance from the surface.

GRYLLOTALPA VULGARIS, Geoffr.

GRYLLUS CONSIMILIS, Walker.

Family **Locustidæ**.

PHANEROPTERA DIVERSA, Walk.

To this family too belongs *Schizodaactylus*, a great cricket-like insect of a brown colour, which burrows in sandy soil, and is remarkable for its curled membranous wings.

b. Antennæ short. Ovipositor none.

Family **Acrididæ**.

PYRGMORPHA CRENULATA, Fabr.

OPOMALA TENEBROSA, Walk.

PHYMATEUS MILIARIS, L.

CYRTACANTHACRIS FERRINA, Walk.

„ PUNCTIPENNIS, Walk.

ACRIDIDIUM VIRESCENS, Walk.

„ ANGUSTIFRONS, Walk.

EPEROMIA VULNERATA, De Haan.

„ VARIA, Walk.

MASTAX INNOTATA, Walker.

ICTRIX EXULTANS, Stål.

OXVA DIMINUTA, Walk.

CALOPTINUS INCOMPTUS, Walk.

„ INAMENUS, Walk.

Sub-order *EUPLEXOPTERA*.

Anal segment provided with a moveable forceps. This sub-order embraces one family—the *Forficulidæ* or earwigs.

Order NEUROPTERA.

This is a somewhat heterogeneous order, embracing insects, displaying exceptions to all its leading characters, which may be summed up thus. Wings four, more or less equal, membranous, reticulate, and rarely folded. Jaws mandibulate. Pupa incomplete. Larva with six articulated legs.

Sub-order ISOPTERA.

Antennæ short, many-jointed. Wings large, equal, deciduous.

Family Termitidæ.

Termites or '*white ants*' are social Neuroptera, and are undoubtedly the greatest pests of any insects within the tropics. They are subterranean and nocturnal in their habits, and their industry is matchless. They present points of resemblance and dissimilarity to Bees, swarming like them and having the majority of the community made up of neuters, or sexually imperfect females, but differing from them in the (asserted) presence of more than one queen in the community. The males and females are fully winged—and they alone issue in dense swarms from the nest to found new colonies. This swarming takes place in humid weather, generally, but not always, towards evening, and the perfect insects at such times may be seen rising into the air like a steadily ascending column of smoke. The fact is soon made known by the activity of all birds in the neighbourhood, and even such large birds as Kites do not disdain to hawk at the fluttering termites in the air, whilst many small quadrupeds and reptiles in the neighbourhood are on the look-out for such as fall to the earth. These countless thousands are all males and females bent on their nuptial tour, and the pairing once over, the female never again quits the abode she selects, but devotes herself solely to replenishing the race, a single female producing, it is said, 80,000 eggs in twenty-four hours.

The bulk of the community is composed of the so-called '*neuters*,' and these are of two sorts, the common '*labourer*' and the '*soldier*,' which last is provided with an enormous head and formidable pincers. The courage and tenacity of these little creatures is remarkable, and they will rather be torn in half than relax their grip of their opponent's flesh or body. Dr. Mason makes the following remarks on them:—

"The traveller in British Burma is frequently treading over mines of white ants or termites, as they have colonized almost every part of the provinces; but their depredations are perhaps not as incessant as might be anticipated from their bad reputation of being 'the most absolute pests of mankind.' My study-table stood for several years within a few inches of a post tenanted by myriads, yet they never disturbed it. Occasionally I made a small incision in the post, when, on listening, I could immediately hear a thousand little taps within—the battle-roll of sentinels beating to arms, and almost instantaneously, whole regiments would appear with enormous sickle-shaped jaws to defend their fortress. They do not usually, however, remain thus pacific, and unless the timber be impervious, they tunnel their way from room to room, from basement to attic, devouring chests of apparel, linen, books, or whatever impedes their course. On their foraging expeditions they frequently attach themselves to the exterior of a post, and arch their pathway up to the roof, the destruction of which they silently and speedily effect.

"The architectural labours of these social insects display great artistic beauty and variety. A metropolis of theirs was exhumed near my residence in Maulmain, the exterior of which appeared only like a large mound, not more than six feet high, but more than forty feet in circumference, with here and there a small circular vestibule visible through the turf-covered bastions, or a low spiral turret protruding above the oval vault. Within were thousands of edifices with multiform compartments, surrounded and connected by labyrinths, domes, and portals; while beneath, curious stair-cases led down long winding corridors, through innumerable multilocular caverns—the whole series presenting the aspect of continuous stories

one above the other, like city piled on city. Leading from this subterranean town in almost every direction were hunting paths, arched and tunnelled, extending across the road, and to distant parts of the compound."

The noise made by the jaws of these creatures can be often heard during the stillness of the night, in one's tent when encamped in the forest, and till its origin is known is rather puzzling. It is produced apparently by numbers of these creatures simultaneously gnawing or tearing with their mandibles, and ceases if the traveller gets a light to ascertain what can be making this noise in the ground within his very tent, but recommences as soon as his head is again laid on the pillow. The best protection for timber against the ravages of white ants is using seasoned wood, charring its surface and pouring round it coal tar or gas refuse, or watering the ground with a saturated solution of sulphate of copper. It would be worth while, in the case of public buildings, importing gas refuse for this purpose from Europe, when not procurable on the spot.

TERMES MAURITIANUS, Ramb.	Burma.
„ TAPROBANES, Walker.	Burma.
„ FATALIS, L.	

Sub-order *AGNATHI*.

Jaws membranous or obsolete. Posterior wings small or wanting. Abdomen ending in two or three long setæ.

Family *Ephemeridæ*.

The 'May fly' is a representative of this family. These insects lie for two or three years in a larval condition, and the perfect insect then issues in countless numbers, and always in the evening. The perfect insect takes no food, and lives only a day or two.

Sub-order *ODONATA*.

Wings sub-equal, reticulate. Jaws strong. The eyes very large and complex. The larvæ and pupæ are aquatic, and the insects are in all their stages highly predatory and voracious, and a terror to the insect world.

Family *Agrionidæ*.

LIBELLAGO BLANDEN, Walk.	Nicobars.
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Family *Libellulidæ*.

Speaking of the Dragon-fly, Dr. Mason says, "This is one of the few insects which the Karens recognize in its larval state, and they often point out the larva in the water, which bears a distant resemblance to the perfect insect, but the body is shorter and thicker, and their wings are only rudimentary."

MATRONA BASILARIS, De Selys.
NEUROBASIS CHINENSIS, L.
NEUROTHEMIS SOPHRONIA, Drury.
„ EQUESTRIS, Fabr.
VESTALIS GRACILIS, Rambur.
BRACHYBASIS COROMANDELIANA, Fabr.
LEDES NODALIS, De Selys.
LEPTHEMIS SABINA, Drury.
LIBELLULA DALEI, De Selys.
PANTALA FLAVESCENS.
RHYOTHEMIS VARIEGATA, L.
RHINOCYPHA CUNEATA, De Selys.
PALPOPLEURA SEXMACULATA, Fabr.
MN AIS ANDERSONI, McLachlan.

Sub-order *PLANIPENNIA*.

Wings nearly equal. Antennæ long, many-jointed. Jaws distinct. The larvæ are voracious insect feeders, but the perfect insects are mostly herbivorous.

Family **Hemerobidæ**.

OSMYLUS CONSPERSUS, Walker.	Burma.
,, TUBERCLATUS, Walker.	Burma.

Family **Myrmeleonidæ**.

MYRMELEON INCLUSUS, Walker.	Burma.
,, LENTUS, Walker.	Burma.
,, TACITUS, Walker.	Burma.

The habits of the '*ant lion*,' which is the larval form of *Myrmeleon*, are too well known to need recapitulation here. They are common in Burma in suitable localities, and are well deserving of more attention than is usually paid them.

Family **Panorpidæ**.

BITTACUS INDICUS, Walker.	Burma.
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Sub-order *TRICHOPTERA*.

Wings four, membranous, the anterior generally hairy. Mandibles rudimentary. The larvæ are six-footed and aquatic, and construct cases wherein they reside, of various available materials, sticks, stones or shells. In these '*caddis*' cases the pupa stage is assumed. Some Indian species of probably this order very closely simulate spiral shells, and exactly resemble a small '*Phorus*.'

STENOPSYCHE GRISEIPENNIS, McLachlan.

Order DIPTERA.

Wings two, membranous, never folded. A suctorial proboscis (*haustellum*). Metamorphosis complete. Larvæ apodal. The mouth in this order is often armed with lancet-like organs, with which the cuticle of animals is pierced for the purpose of suction. Their bite in consequence is often severe, but none of them are provided with a sting. The feet are two-clawed, and provided with adhesive cushions as well, whereby they are able to walk on the smoothest surfaces. In the larval state (maggots) they are of use, by consuming filth and decaying animal matter, but some species are injurious to crops (*Cecidomyia destructor* attacking wheat) and tormenting to man, especially certain minute species, by their bites and persistent attacks. Their fecundity is very great, and agamic reproduction sometimes takes place in this order, as the larvæ of *Miastor metrolous* are found to contain other larvæ identical, save in size, with themselves, and these larvæ produce successive generations of larvæ which ultimately develop into perfect insects.

Sub-order *PUPIPARA*.

Parasitic *Diptera*. The larvæ and pupæ developed within the body of the mother. Antennæ within a cavity in the head. This sub-order embraces three families: *Brandidae* or Bee lice, *Nycteribiidæ*, spider-like parasites on bats, and *Hippoboscidæ*, including '*Bots*,' which are the larvæ of the "forest Fly."

Sub-order *BRACHYCERA*.

Oviparous. Antennæ short.

The number of pieces composing the *haustellum* varies from two to six, and this character has been used in arranging the families into *Hexachetæ*, *Tetrachetæ*, and *Dichetæ*.

*Heracheta.*Family **Tabanidæ.**

This family embraces the Gad flies.

*Tetracheta.*Family **Asilidæ.**

Of this family, species of *Dasyppogon*, *Nasa*, and *Laphria* have been recorded from Burma. *Asilus* is the fly which Virgil describes as terrifying cattle in Italy, and to escape which he recommends pasturing the herds in the early morning and in the evening only—

“Est lucos Silari circa, ilicibusque vircentem
Plurimus Alburnum volitans, cui nomen *Asilo*
Romanum est (*Œstrum Graii* vertere vocantes),
Asper, acerba sonans; quo tota exterrita silvis
Diffugiunt armenta; furit mugitibus æther
Concussus, silvæque et sicci ripa Tanagri.
Hunc quoque (nam mediis terroribus acrior instat)
Arcbis gravido pecori, armenta que pasces
Sole recens orto, aut noctem ducentibus astris.”

The description applies also to the alarm caused to horses, cattle, and ruminants in general by various *Œstridæ*.

Family **Bombyliidæ.**

ANTHRAX SEMISCITA.
TRICHOPHTHALMIA, sp.
DISCOCEPHALA, sp.

Family **Syrphidæ.**

ERISTALIS ANDREMON, Walk.
,, AMPHICRATES, Walk.

*Dicheta.*Family **Muscidæ.**

TACHINA FUSIFORMIS, Walk.

Sub-order *NEMOCERA.*

To this sub-order belong the harmless ‘Daddy Long Legs’ (*Tipula*) and the gnats and mosquitoes (*Culex*, *Simulium*, etc.) which are as troublesome in Norway or Canada, as in the tropics, each zone of the earth seeming to be abundantly provided with its own appropriate pests. Of mosquitoes, Dr. Mason writes: “We have at least two species, one of which is banded with white stripes, and is more voracious than the other; as soon as it begins to taste blood, the hand may be brought slowly upon it, and it chooses death rather than flight.

“The larvæ of gnats and mosquitoes may be always seen in water that has stood for a few days, where they are readily discovered by their active motions, often diving and rising again to the surface. To avoid taking these insects in drinking, and thus destroying animal life, the Burmese priests strain their water, like the Pharisees of old, and it was these gnats in the larval state to which the Saviour referred, and not the gnat, properly so called, as the word is often rendered.”

People who keep orchid houses are much troubled by the quantities of mosquitoes which breed in the pans of water placed to maintain by their evaporation the humidity of the atmosphere. This annoyance may be cured by placing a

handful of salt in each pan, which does not interfere with the desired evaporation, but renders the water or brine unfit for the development of the larvæ. If, too, all bath rooms about a house had the water tubs and pans emptied every day, the mosquito plague would be greatly reduced, as no stagnant water, no mosquitoes.

Family Tipulidæ.

PTEROCOSMUS VELUTINUS, Walk.

Family Cecidomyiidæ.

To this family belongs the '*Hessian Fly*,' so destructive to wheat.

Family Culicidæ.

Sub-order *APHANIPTERA*.

This is an aberrant group embracing a single family, *Pulicidæ*, to which the common flea belongs (*Pulex irritans*).

Order LEPIDOPTERA.

Dr. Mason thus prefaced the subject of Butterflies, of which, however, his original list was meagre in the extreme:—"When a person dies, the Burmese say, the soul or sentient principle leaves the body in the form of a butterfly. This too was the faith of the Greeks, more than two thousand years ago. Among the ancients, when a man expired, a butterfly appeared fluttering above as if rising from the mouth of the deceased. The coincidence is the more remarkable the closer it is examined. The '*Psyche*' or soul of the Greeks represented by the butterfly, was the Life, the perceptive principle, and not the *Pneuma* or spiritual nature. So the Burmans regard the butterfly in man, as that principle of his nature which perceives, but not that of which moral actions are predicated. If a person is startled or frightened so as to be astounded for the moment, they say, '*His butterfly has departed*.' When a person is unconscious of all that is passing around him in sleep, the butterfly is supposed to be absent; but on its return the person awakes, and what the butterfly has seen in its wanderings constitutes dreams.

"The Greeks and the Burmese undoubtedly derived these ideas from a common origin. In the Buddhist legends of the creation of man, which originated in Central Asia, it is stated that when man was formed, a caterpillar or worm was introduced into the body, which, after remaining ten lunar months, brought forth the living man, and hence the reason why a butterfly is supposed to leave the body at death. Thus the caterpillar or larva state, the pupa or chrysalis, and the imago or perfect insect, are, to the Buddhist, representatives of man in his origin from the earth, in his subsequent conception in the womb, and in his perfect state as a sentient being, while the successive changes typify his endless transmigrations. This is a wonderful land for butterflies. Birds of passage are common in most countries, but butterflies of passage are nowhere on record. Yet such are sometimes seen in Burma. Westwood says, 'Various species of butterflies are remarkable for their periodical or irregular appearance; of these, the species of *Colias* or 'clouded yellows' are pre-eminent.' It is remarkable that butterflies of this same tribe of 'yellows' often appear in clouds in Burma and pass over the country in flocks, like the pigeons that annually migrate over Kentucky and other Western States of America."

In these days, when the value of the economic study of insects is fully recognized, and the elevating character of the study of even the humblest branches of Zoology not less so, it is curious to call to mind the change of feeling in this respect which a century has wrought. All Englishmen will remember the ridiculous light in which the florist and entomologist are depicted in the '*Dunciad*': as representatives of naturalists in general; but the feeling was that of the age rather than of the Twickenham satirist personally, and is equally displayed by a contemporary poet,

Vincent Bourne, in his lines on butterfly collecting, which are so good as to deserve to be better known than they are :

“ Ut genera et species dignoscat papilionum,
 Sitque quibus maculis quisque, quibusque notis ;
 Quotquot agris volitant, studiosè hinc colligit illinc,
 Musei ut servet Fulvius inter opes.
 Thesaurum egregium ! si quis foret usus habendi ;
 At cuiam hæc servit eura laborque bono !
 Papilio, ceutum quamvis servatur in annos,
 Nil nisi reliquæ papilionis erit.”

Since Dr. Mason wrote, a vast stride has been made in the study of the insects of Burma, though I think it may safely be asserted of insects as a class, that (excepting the more showy Lepidoptera) far more remain to be discovered than have hitherto been enumerated from that area. Of the Lepidoptera a good many have been collected, but even of these not 10 per cent. have been studied in their metamorphoses, and the life of the individual traced from ovum to imago.

The present list of Lepidoptera is mainly based on the following data:—Catalogues of the British Museum; Catalogue of Lepidopterous Insects in the Museum of the East India Company, by Thomas Horsfield and Frederic Moore; Catalogue of the Lepidopterous Insects of Bengal, by Frederic Moore, P. Z. S. L. 1865, p. 755, and P. Z. S. L. 1867, pp. 44 and 612; The Lepidopterous Fauna of the Andamans and Nicobar Islands, by F. Moore, P. Z. S. L. 1877, p. 580; A List of the Lepidopterous Insects from Upper Tenasserim, by Frederic Moore, P. Z. S. L. 1878, p. 821; List of the diurnal Lepidoptera from Port Blair, etc., by G. J. Wood-Mason and L. de Nicéville, Journal As. Soc. Bengal, 1880, Part II. p. 223; other papers by Messrs. Moore, Westwood, and Butler in P. Z. S. L.; and last, but not least in value, a List of Sikkim Lepidoptera, by Lionel de Nicéville, in the Journal of the Asiatic Soc. of Bengal, 1881, Part II. No. 1, p. 49, wherein some attention is paid to the altitudinal range of a species instead of affixing the never-to-be-too-much-reprobated habitat ‘*Darjiling*,’ with its altitudinal range of 8000 feet, and consequently varied floral and insect zones.

As the compiler has no acquaintance with the profuse literature of the subject, he claims the indulgence of his readers for the numerous errors of nomenclature and arrangement which must have inevitably crept in. The reason, too, why the Lepidopterous insects of Bengal have been incorporated in the Burmese fauna is as follows. Of the species actually captured in Burma we have but a meagre list; but we may safely conclude that insects, which range from Northern Bengal to Ceylon or Java, will certainly be found in Burma likewise. This will enable us to include a large number not actually recorded as captured as yet within the Province. Another considerable number may be included, which, though they may not range to Java or Ceylon, may yet be confidently expected to range from Bengal into Arakan, and thus fall legitimately within the scope of the Burma fauna. A small residue of the insects of Bengal may perhaps not range into our Province; as their *not doing so* rests of course on the negative evidence of their *not being known* to do so, I think I act more safely in adopting the entire list, with the above proviso, than by limiting the selection of Burmese insects to those few only, of which actually *Burma-captured* specimens are known to exist.

The list of the Lepidoptera of Bengal was mainly drawn up from collections made by A. E. Russell, Esq., B.C.S., W. S. Atkinson, Esq., Director of Public Instruction, A. Grote, Esq., B.C.S., and Capt. J. L. Sherwill, and the geographical range embraced by these collections may be collectively described as reaching from Nipal to Assam and the Naga hills. The list of Lepidoptera from the Andamans is mainly based on a collection made by F. A. de Roepstorff, Esq., near Port Blair, and of the Nicobar insects from a collection made by R. Meldola, Esq.

Lepidoptera are characterized by four extended wings, scaly on both sides, and supported by a framework of branching ribs. The mouth is suctorial, the proboscis being curled up like a watch-spring whilst at rest, but capable of being

Family Gelichidæ.

DEPRESSARIA RICINI, Atkinson.	Calcutta.
" ZIZYPHI, Atkinson.	Calcutta.
" RICINELLA, Atkinson.	Calcutta.
GELICHTIA HIBISCI, Atkinson.	Calcutta.
" PUBESCINTELLA, Stainton.	Calcutta.
" SIMPLICIELLA, Stainton.	Calcutta.
PARASIA APICIPUNCTELLA, Stainton.	Calcutta.
ANARZIA CANDIDA, Stainton.	Calcutta.
ECOPHORA SUBGANOMELLA, Stainton.	Calcutta.
BUTALIS TRIOCELLATA, Stainton.	Calcutta.
BINSITTA NIVIFERANA, Walker.	Andamans. Bengal. S. India. Burma.
BLABOPHANES INSULARIS, Feld.	Nicobars.
SYME ORBICULARIS, Feld.	Nicobars.
THISIZIMA CERATELLA, Walker.	
CERVARIA XYLINELLA, Walker.	Burma.

Family Hyponomeutidæ.

ATTEVA NIVEIGUTTA, Walk.	Bengal.
<i>Corinea niveiguttella</i> , Walk.	

The larva feeds on *Ailanthus excellens*, residing in a common very fine web. A perfect pest at times (Dr. Bonavia).

HYPONOMEUTA LINEATONOTELLA, Moore.	Darjiling.
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Family Plutellidæ.

CEROSTOMA RUGOSILLA, Stainton.	Calcutta.
" ALBOFASCIELLA, Stainton.	Calcutta.

Family Tineidæ.

TINEA LONGICORNIS, Stainton.	Calcutta.
PORSICA INGENS, Walk.	Bengal.
ALAVONA BARBARELLA, Walk.	Bengal.

Tribe TORTRICES.

Family Nycteolidæ.

HYLOPHILA FALCATA, Walk.	Darjiling.
" CHLOROLEUCA, Walk.	Darjiling.
TYANA CALLICHLORA, Walk.	Darjiling.
" SUPERBA, Moore.	Darjiling.
APHUSIA SPEIPLINA, Walk.	Bengal.
<i>Micra partita</i> , Walk.	

Family Tortricidæ.

CERACE STIPATANA, Walk.	Bengal.
" ONUSTANA, Walk.	Silhet. Darjiling.
ÆMENE TAPROBANIS, Walk.	Calcutta.
PANDEMIS EDUCTANA, Walker.	Burma.
DICHELIA PRIVATANA, Walker.	Burma.
CONCHYLIS FLAVICOSTANA, Walker.	Burma.
GRAPHOLITHA NOVARANA, Feld.	Nicobars.
CHOREUTES NOVARÆ, Feld.	Nicobars.

Tribe PYRALES.

Family **Botydæ.**

ASTURA PUNCTIFERALIS, Guen.	Bengal.
<i>Botys exazalis</i> , Walk.	
BOTYODES ASIALIS, Guen.	Bengal.
" FLAVIBASALIS, Moore.	Bengal.
BOTYS SCINISALIS, Walk.	Andamans. Bengal. S. India.
" <i>disjunctalis</i> .	
" ILLISALIS, Walk.	Andamans. Darjiling. Ceylon.
" UNITALIS, Guen.	
" <i>megapteralis</i> , Walk.	Tenasserim. Bengal.
" MULTILINEALIS, Guen.	Andamans. Bengal. Ceylon.
<i>Zebronia salomealis</i> , Walk.	
<i>Botys annuligeralis</i> , Walk.	
" DAMOALIS, Walk.	Bengal.
" AMYNTUSALIS, Walk.	Darjiling.
" DAMOALIS, Walk.	Bengal.
" AMYNTUSALIS, Walk.	Darjiling.
" INCISALIS, Walk.	Darjiling.
" PLAGALIS, Moore.	Darjiling.
" INCOLORALIS, Guen.	Silhet.
" MACCALIS, Lederer.	Silhet.
" ZEALIS, Guen.	Silhet.
" TULLALIS, Walk.	Silhet.
" CALETORALIS, Walk.	Silhet.
" PATULALIS, Walk.	Darjiling.
" SUBTESSALALIS, Walk.	Darjiling.
" CONCATENALIS, Walk.	Darjiling.
" JOPASALIS, Walk.	Tenasserim. Bengal. Ceylon.
" CALBUSALIS, Walk.	Tenasserim. Sikkm.
" VINACEALIS, Moore.	Tenasserim. Andamans.
" ARDEALIS, Feld.	Nieobars.
" STULTALIS, Walk.	Andamans. Ceylon.
" THOASALIS, Walk.	Andamans. Bengal.
" ABSTRUSALIS, Walk.	Andamans. Java. Ceylon.
" OPALINALIS, Moore.	Andamans.
" IMMUNDALIS, Walk.	Andamans. Java.
" ASIALIS, Guen.	Burma.
" <i>sellalis</i> , Guen.	
" EURYCLEALIS, Walk.	Burma.
" CLYCESALIS, Walk.	Burma.
DYSALLACTA NEGATALIS, Walk.	Darjiling.
<i>Botys monesusalis</i> , Walk.	
" <i>phanasalis</i> , Walk.	
SCOPULA MARTINALIS, Walk.	Burma.
EBULEA OMPHELTESALIS, Walk.	Burma.

Family **Margaroniidæ.**

GLYPHODES DIURNALIS, Guen.	Darjiling.
" CESALIS, Walk.	Darjiling. Burma. Andamans.
" BIVITRALIS, Guen.	Tenasserim. Calcutta.
" STOLALIS, Guen.	Tenasserim. Darjiling.
" ACTORIONALIS, Walk.	Andamans. Darjiling.
" MARGINALIS, Moore.	Andamans.
" LUCIFERALIS, Walk.	Darjiling.
" LACUSTRALIS, Moore.	Bengal.

GLYPHODES VAGALIS, Walk.	Darjiling.
„ GASTRALIS, Walk.	Darjiling.
MARUCA AQUATILIS, Walk.	Bengal.
SYNCLERA TRADUCALIS, Zeller.	Bengal.
„ <i>retinalis</i> , Leder.	
<i>Glyphodes univocalis</i> , Walk.	
PHAKELLURA INDICA, Saunders.	Bengal. Burma.
„ <i>gazorialis</i> , Guen.	
„ TRANSLUCIDALIS, Guen.	Silhet.
„ SUPERALIS, Guen.	Silhet.
CYDALIMA LATICOSTALIS, Guen.	Silhet. Andamans.
„ CONCUYALIS, Guen.	Tenasserim. Calcutta. S. India.
The larva feeds on <i>Echites antidyenterica</i> (Grote).	
RHODONEURA RETICULARIS, Moore.	Andamans.
„ TETRAONALIS, Moore.	Andamans.
„ MARMOREALIS, Moore.	Andamans.
PYGOSPILA TYRESALIS, Guen.	Burma.
PACHYARCHES AMPHITRITALIS, Guen.	Silhet.
„ PSITTACALIS, Hübn.	Bengal.
„ POMONALIS, Guen.	Bengal.
„ VERTUMNALIS, Guen.	Tenasserim. Bengal. S. India.
„ MARTHEUSALIS, Walker.	Tenasserim. Darjiling. S. India.
„ MALIFERALIS, Walker.	Andamans. Bengal.
„ TIBIALIS, Moore.	Andamans. Bengal.
SISYROPHORA PFEIFFERLE, Lederer.	Tenasserim. Darjiling.
EUGLYPHIS PROCOPIALIS, Gram.	Tenasserim. Bengal. Java.
AUXOMITIA MIRIFICALIS, Lederer.	Nicobars. Bengal.
MARGARONIA TRANSVISALIS, Walk.	Darjiling.
HETERODES CINEREALIS, Moore.	Darjiling.
FILODES FULVIDORSALIS, Geyer.	Bengal.
„ NIGROLINEALIS, Moore.	Bengal.
„ OCTOMACULARIS, Moore.	Darjiling.

Family Spilomedidæ.

LEPYRODES GEOMETRALIS, Guen.	Bengal.
„ LEPIDALIS, Walk.	Bengal.
„ PERSPICUALIS, Walk.	Darjiling.
PHALANGODES NEPTALIS, Hübn.	Burma.
ZEBRONIA JAGUARALIS, Guen.	Darjiling.
„ ABRAXALIS, Walk.	Darjiling.
„ ZEBRALIS, Moore.	Darjiling.
„ VIRGATALIS, Moore.	Bengal.
„ AUROLINEALIS, Walk.	Darjiling.
„ PLUTUSALIS, Walk.	Darjiling. Bengal. Tenasserim.
„ DISTRIGALIS, Walk.	Bengal.
„ DISCERPTALIS, Walk.	Bengal.
„ LACTIFERIALIS, Walk.	Burma.
„ ABDICALIS, Walk.	Burma.
„ MINEUSALIS, Walk.	Burma.

Family Hydrocampidæ.

OLIGOSTIGMA CRASSICORNALIS, Guen.	Bengal.
„ SEX-PUNCTALIS, Moore.	Andamans.
„ PARVALIS, Moore.	Andamans.
HERDONIA OSACESALIS, Moore.	Darjiling. Silhet.

HYDROCAMPA PULCHRALIS, Moore.	Darjiling.
AGASTIA HYBLEOIDES, Moore.	Darjiling.
„ FLAVOMACULATA, Moore.	Darjiling.

Family Asopidæ.

CHINAURA OCTAVIALIS, Walk.	Darjiling.
SAMEA GRATIOSALIS, Walk.	Darjiling.
„ CUPRINALIS, Moore.	Andamans.
„ PURPURASCENS, Moore.	Andamans.
ASOPIA LIMBOLALIS, Moore.	Andamans.
LEUCINODES ORBONALIS, Guen.	Andamans.
TERASTIA DIVERSALIS, Walk.	Darjiling.
COPTOBASIS ANDAMANALIS, Moore.	Andamans.
„ LUNALIS, Guen.	Andamans.
<i>Botys thysalis</i> , Walk.	
„ CUPREALIS, Moore.	Andamans.
PHYSEMATIA CONCORDALIS, Lederer.	Nicobars.
DICHOCHROISIS FRENATALIS, Lederer.	Nicobars.
AGATHODES ORIENTALIS, Walk.	Burma.
DARABA VITELLIALIS, Walk.	Burma.
HYMENIA RECURVALIS, Fabr.	Burma.

Family Eunychidæ.

PYRAUSTA SILHETALIS, Guen.	Silhet.
„ ABSISTALIS, Walk.	Burma.
RHODARIA CONCATENALIS, Walk.	Darjiling.

Family Pyralidæ.

PYRALIS LUCILIALIS, Walk.	Darjiling.
„ SUFFUSALIS, Walk.	Calcutta.
„ TRIFASCIALIS, Moore.	Andamans.
„ OCHREALIS, Moore.	Andamans. S. India.
„ ACACIUSIALIS, Walk.	
„ BASTIALIS, Walk.	
HERCULIA BRACTEALIS, Walk.	Bengal.
AGLOSSA ARGENTALIS, Moore.	Darjiling.

Tribe GEOMETRES.

Family Larentiidæ.

GANDARITES FLAVALA, Moore.	Bengal.
CIDARIA SUBSTITUTA, Walk.	Darjiling.
„ INTERPLAGATA, Guen.	Darjiling.
„ INEXTRICATA, Walk.	Darjiling.
„ ARGENTILINEATA, Moore.	Darjiling.
„ AURANTIARIA, Moore.	Darjiling.
„ SIGNATA, Moore.	Darjiling.
„ IRRIDATA, Moore.	Darjiling.
„ RETICULATA, Moore.	Bengal.
„ CINEREATA, Moore.	Bengal.
„ CALAMISTRATA, Moore.	Bengal.
„ SUBAPICARIA, Moore.	Darjiling.
„ TRISIGNATA, Moore.	Bengal.
„ CHALYBEARIA, Moore.	Darjiling.
„ OBSCURATA, Moore.	Bengal.

CIDARIA CERVINARIA, Moore.	Bengal.
„ AURATA, Moore.	Bengal.
COREMIA MEDIOVITTARIA, Moore.	Darjiling.
SCOTOSIA MINIOSATA, Walk.	Bengal.
„ ATROSTIPATA, Walk.	Bengal.
„ VITREATA, Moore.	Bengal.
„ LATIVITTARIA, Moore.	Darjiling.
„ OBLIQUISIGNATA, Moore.	Darjiling.
„ VENIMACULATA, Moore.	Bengal.
ARCHANNA FLAGIFERA, Walk.	Darjiling.
„ RAMOSA, Walk.	Darjiling.
„ TRAMESATA, Moore.	Bengal.
„ MACULATA, Moore.	Bengal.
„ MARMORATA, Moore.	Bengal.
PSYRA CUNEATA, Walk.	Bengal.
„ ANGULIFERA, Walk.	Darjiling.
„ SIMILARIA, Moore.	Darjiling.
OPORABIA MACULARIA, Moore.	Bengal.
LARENTIA VARIEGATA, Moore.	Bengal.
„ ÆRATA, Moore.	Darjiling.
EUPITHECIA SEMICIRCULATA, Moore.	Darjiling.
„ FERRUGINARIA, Moore.	Darjiling.
„ COSTIPANNARIA, Moore.	Bengal.
SAURIS DECUSATA, Moore.	Bengal.
MELANIPPE CATENARIA, Moore.	Bengal.
„ CAPREATA, Moore.	Bengal.
ANTICLEA CUPREARIA, Moore.	Darjiling.

Family Eubolidæ.

ANAITIS MEDMARIA, Walk.	Darjiling.
<i>Eubolia reciproca</i> , Walk.	

Family Zerenidæ.

RHYPARIA DUCTARIA, Walk.	Bengal.
„ MACULATA, Moore.	Bengal.
„ TRANSECTATA, Walk.	Bengal.
PERCNIA FELINARIA, Guen.	Bengal.
NELCYNDA RECTIFICATA, Walk.	Bengal.
ABRAXAS TIGRATA, Guen.	Bengal.
„ MARTARIA, Guen.	Bengal.
„ LEOPARDINATA, Kollar.	Bengal.
„ PARDARIA, Moore.	Bengal.
„ PICARIA, Moore.	Bengal.
„ IRROBATA, Moore.	Darjiling.
„ LAPSARIATA, Walk.	Bengal.
„ TENEBRARIA, Moore.	Bengal.
VINDUSARA COMPOSITATA, Guen.	Bengal.
„ METACHROMATA, Walk.	Bengal.
POTERA MARGINATA, Moore.	Tenasserim.

Family Fidonidæ.

STERRIA SACRARIA, L.	Bengal.
DOCHRAVA ÆQUILINEATA, Walk.	Bengal.
„ UVARIA, Walk.	Darjiling.
<i>Anaitis vastata</i> , Walk.	

ASPHILATES FALCONARIA, Walk.	Darjiling.
„ OBLIQUARIA, Moore.	Bengal.
CAPRILLA VESICULARIA, Walk.	Cherra. Assam.
„ SPECULARIA, Moore.	Assam.
ZOMIA INCITATA, Walk.	
„ PALLIDA, Moore.	Andamans.
OSICERDA ALIENATA, Walk.	Bengal.
♀ <i>Celesdera schistifuscata</i> , Walk.	
The larva feeds on <i>Leora</i> (Grote).	
„ COSTIMACULATA, Moore.	Bengal.
„ TRINOTARIA, Moore.	Bengal.
NOBILIA TURBATA, Walk.	Bengal.
MARCALA IGNIVORATA, Walk.	Bengal.

Family Macariidæ.

MACARIA METAGONARIA, Walk.	Darjiling.
„ PERSPICUARIA, Moore.	Bengal.
„ EMERSARIA, Walk.	Bengal. Burma.
„ ELEONORA, Cram.	Bengal. Burma.
The larva feeds on <i>Mimosa</i> flowers (Grote).	
„ NORA, Walk.	Andamans. Bengal. Ceylon. Java.
„ STRENIATARIA, Walk.	Bengal.
„ STRENUATARIA, Walk.	Bengal.
„ PERMOTARIA, Walk.	Bengal.
„ INCHOATA, Walk.	Burma.
KRANANDA SEMIDYALINA, Moore.	Bengal.

Family Microniidæ.

MICRONIA GRAMMEARIA, Geyer.	Tenasserim. Bengal. Java.
„ VAGATA, Moore.	Andamans. Tenasserim.
„ ACULEATA, Guen.	Andamans. Silhet. Tenasserim. Java.
„ OBTUSATA, Guen.	Andamans. Java. Ceylon. Bengal.
„ OBLIQUARIA, Moore.	Andamans.
„ GANNATA, Guen.	Calcutta. Silhet.
„ FASCIATA, Cram.	Bengal.
<i>Phalana caudata</i> , Fabr.	
„ OBTUSATA, Guen.	Bengal.
„ SIMPLICIATA, Moore.	Bengal.
„ SPARSARIA, Walk.	Silhet.
„ STRIATARIA, L.	Bengal.
ORUDIZA PROTHECLARIA, Walk.	Burma.
MYRTETA PLANARIA, Walk.	Bengal.
EROSIA CERVINARIA, Moore.	Bengal.

Family Caberidæ.

CABERA PLATYLEUCATA, Walk.	Bengal.
„ MARGARITA, Moore.	Bengal.

Family Acidalidæ.

DRAPETODES MITARIA, Guen.	Bengal.
<i>Anisodes platycerata</i> , Walk.	
TRYGODES DIVISARIA, Walk.	Bengal. Andamans. S. India.
„ VAGATA, Walk.	Bengal.

HYRIA	BICOLORATA, Moore.	Bengal.
"	TRILINEATA, Moore.	Darjiling.
"	ORNATA, Moore.	Bengal.
"	PLURISTRIGATA, Moore.	Bengal.
"	MITIGATA, Walk.	Burma.
ACIDALIA	BICAUDATA, Moore.	Darjiling.
"	NERATA, Moore.	Darjiling.
"	TEPHROSARIA, Moore.	Bengal.
"	GEMMIFERA, Moore.	Bengal.
"	ATTENTATA, Walk.	Tenasserim. Andamans. Ceylon.
"	REMOTATA, Guen.	Andamans.
"	LIGATARIA, Walker.	Burma.
"	EMISSARIA, Walker.	Burma.
"	IMPRIMATA, Walker.	Burma.
"	REGULATA, Walker.	Burma.
BITHIA	EXCLUSA, Walker.	Tenasserim.
	<i>Acidalia imprimata</i> , Walker.	
	<i>Macaria obstataria</i> , Walker.	
	<i>Bithia lignaria</i> , Walker.	
ZANCLOPTERYX	SAPONARIA, H. Schaff.	Andamans.
TIMANDRA	CONVECTARIA, Walk.	Bengal.
"	AVENTIARIA, Guen.	Silhet. Burma.
"	SUBOBLIQUARIA, Moore.	Bengal.
"	SEMICOMPLETA, Walk.	Burma.
SOMATINA	PLURILINEARIA, Moore.	Darjiling.
"	PICTARIA, Moore.	Darjiling.
"	ANTHOPHILATA, Guen.	Burma.
ARGYRIS	MYSTICATA, Walk.	Darjiling.
"	DELIARIA, Walk.	Burma.
"	OCELLATA, Friv.	Bengal.
"	<i>ommatophoraria</i> , Guen.	
"	INSIGNATA, Moore.	Bengal.

Family Ephyridæ.

ANISODES	OBLIVIARIA, Walk.	Bengal.
"	SIMILARIA, Walk.	Burma.
"	MOOREI, Theobald.	Bengal.
	<i>Anisodes similaria</i> , Moore (preoccupied).	
"	PLURISTRARIA, Walk.	Bengal.
"	FLYNSARIA, Walk.	Silhet.
"	HYRIARIA, Walk.	Darjiling.
"	SANGUINARIA, Moore.	Bengal.
"	PALLIVITTATA, Moore.	Bengal.
"	DIFFUSARIA, Moore.	Bengal.
"	VINACEARIA, Moore.	Bengal.

Family Palyadæ.

EUMELEA	ROSALIA, Cram.	Bengal. Burma.
"	FELICIATA, Guen.	Silhet.
"	AURELIATA, Guen.	Bengal.
"	FIMBRIATA, Cram.	Burma.
"	LUDOVICATA, Guen.	Andamans. Ceylon.

Family Geometridæ.

GEOMETRA	AVICULARIA, Guen.	Darjiling.
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<i>Geometra pennisignata</i> , Walk.	
„ VIRIDILINEATA, Walk.	Darjiling.
„ HALIARIA, Walk.	Darjiling.
„ <i>decoraria</i> , Walk.	
„ DENTISIGNATA, Moore.	Darjiling.
„ VITTATA, Moore.	Bengal.
„ PLAGIATA, Walk.	Darjiling.
„ USTA, Walk.	Darjiling.
„ DENTATA, Walk.	Bengal.

The larva feeds on *Zizyphus* and *Leora*, attaching pieces of leaf to itself, apparently for the purpose of hiding its pupa case, but it commences adorning itself for some days before changing (Grote).

„ DISCISSA, Walk.	Burma.
„ LINEATA, Moore.	Sikkim.
THALASSODES INAPTARIA, Walk.	Silhet.
„ MACRURARIA, Walk.	Silhet.
„ MACARIATA, Walk.	Bengal.
„ CELATARIA, Walk.	Bengal. Andamans. Ceylon.
„ DISSIMULATA, Walk.	Bengal. Burma.

The larva feeds on *Terminalia catappa* (Grote).

„ DISTINCTARIA, Walk.	Darjiling.
„ URAPTERARIA, Walk.	Silhet.
„ BISSITA, Walk.	Bengal.
„ OPHTHALMICATA, Moore.	Bengal.
„ SINUATA, Moore.	Bengal.

The larva feeds on *Boswellia serratifolia* (Grote).

„ SISUNAGA, Walk.	Burma.
THALERA BIFASCIATA, Walk.	Silhet.
„ GLAUCARIA, Walk.	Darjiling.
„ ARGUTARIA, Walk.	Bengal.
„ DIREMPTA, Walk.	Burma.
TODIS OPALARIA, Guen.	Burma.

Thalera subtractata, Walk.

BERTA CHRYSOLINEATA, Walk.	Bengal.
COMBLENA DIVAPALA, Walk.	Bengal.

The larva feeds on *Lawsonia inermis* and *Melaleuca cajuputi* (Grote).

„ SANGULINEATA, Moore.	Bengal.
„ HYALINEATA, Moore.	Bengal.
„ MACULATA, Moore.	Bengal.
„ FENESTRARIA, Moore.	Bengal.
„ CHALYBEATA, Moore.	Darjiling.
AGATHIA LYCENARIA, Kellar.	Bengal. Burma.

Geometra albiangularia, Her. Schœff.

♀ *Agathia discriminata*, Walk.

The larva feeds on *Merium odorum* and *Strophanthus dichotomus* (Grote).

„ HEMITHEARIA, Guen.	Silhet.
„ HILARATA, Guen.	Silhet.
„ CATENARIA, Walk.	Bengal.

The larva feeds on *Nerium oleander* (Grote).

„ QUINARIA, Moore.	Bengal.
„ ARCUATA, Moore.	Bengal.

Family **Boarmiidae.**

AMBLYCHIA ANGERONARIA, Guen.	Bengal.
" TORRIDA, Moore.	Andamans.
HEMEROPHILA CREATARIA, Guen.	Darjiling.
" STRIXARIA, Guen.	Silhet. Burma.
" MAURARIA, Guen.	Bengal.
<i>Elphos Parisuathi</i> , Walk.	
" OBJECTARIA, Walk.	Darjiling.
" CUPREARIA, Moore.	Bengal.
" NIGROVITTATA, Moore.	Bengal.
" BASISTRIGARIA, Moore.	Darjiling.
" INTERRUPTARIA, Moore.	Bengal.
" RETRACTARIA, Moore.	Darjiling.
" HUMERARIA, Moore.	Bengal.
" ATROSTIPATA, Walk.	Bengal.
BITHIA EXCLUSA, Walk.	Andamans.
<i>Acidalia imprimata</i> , Walk.	
<i>Macaria obstataria</i> , Walk.	
<i>Bithia lignaria</i> , Walk.	
CLEORA VENUSTULARIA, Walk.	Darjiling.
" DECUSSATA, Moore.	Darjiling.
" RUFOMARGINATA, Moore.	Darjiling.
" FIMBRIATA, Moore.	Bengal.
" MEGASPILARIA, Moore.	Bengal.
" ALBIDENTATA, Moore.	Bengal.
" PANNOSARIA, Moore.	Bengal.
" SEMICLARATA, Walk.	Darjiling.
BOARMIA ALIENARIA, Walk.	Bengal.
" <i>gelidaria</i> , Walk.	
" VICARIA, Walk.	Silhet.
" IMPARATA, Walk.	Darjiling.
" ALBIDARIA, Walk.	Darjiling.
" SUBLAVARIA, Guen.	Bengal. Burma.
" TRISPINARIA, Walk.	Silhet.
" TRANSCISSA, Walk.	Silhet.
" REPARATA, Walk.	Bengal.
" OBLITERATA, Moore.	Bengal.
" PERSPICUATA, Moore.	Bengal.
" CONTIGUATA, Moore.	Bengal.
" COMBUSTARIA, Walk.	Darjiling.
" PROCESSARIA, Walk.	Burma.
" PROCURSARIA, Walk.	Burma.
TEPHROSIA SCRIPTARIA, Walk.	Darjiling.
" COMPARATARIA, Walk.	Darjiling.
" MUCIDARIA, Walk.	Darjiling.
" DENTILINEATA, Moore.	Bengal.
HYPOCHROMA DISPENSATA, Walk.	Balisor.
" BOARMARIA, Guen.	Darjiling.
<i>Boarmia inconclusa</i> , Walk.	
" MUSICOLORARIA, Walk.	Darjiling.
" PERFECTARIA, Walk.	Bengal. Andamans.
" <i>nyctemerata</i> , Walk.	
" VIRIDARIA, Moore.	Bengal.
" IRROROTARIA, Moore.	Silhet.
" BASIFLAVATA, Moore.	Bengal.
" VARICOLORARIA, Moore.	Bengal.
" TENEBROSARIA, Moore.	Bengal.

HYPOCHROMA COSTISTRIGARIA, Moore.	Bengal.
„ LEOPARDINATA, Moore.	Bengal.
„ PARVULA, Walk.	Burma.
BARGOSA FASCIATA, Moore.	Bengal.
XANDRAMES DHOLARIA, Moore.	Darjiling.
„ ALBOFASCIATA, Moore.	Darjiling.
OPHTHALMODES DIURNARIA, Guen.	Bengal.
„ INFUSARIA, Walk.	Silhet.
ELPHOS HYMENARIA, Guen.	Bengal.
„ PARDICELLATA, Walk.	Bengal.
GNOPHOS MUSCOSARIA, Walk.	Darjiling.
„ OBTECTARIA, Walk.	Darjiling.

Family Amphidasidæ.

AMPHIDASYS BENGALIARIA, Guen.	Silhet.
BUZURA MULTIPUNCTARIA, Walk.	Bengal.

The larva feeds on *Citrus* and *Cinamomum* (Grote).

Family Fidonidæ.

CORYMICA ARNEARIA, Walker.	Tenasserim.
TINGOLEUS EBURNEIGUTTA, Walker.	Tenasserim.

Family Ctenochromidæ.

MERGANA EQUILINEARIA, Walk.	Bengal.
<i>Auxima trilineata</i> , Walk.	
„ RESTITUTARIA, Walk.	Bengal.
„ DEBITARIA, Walk.	Bengal.
„ BILINEATA, Moore.	Bengal.
COROTIA CERVINARIA, Moore.	Darjiling.

Family Ennomidæ.

LUXIARIA PHYLLOSARIA, Walk.	Bengal.
DREPANODES CIRCULITARIA, Walk.	Bengal.
„ ARGENTILINEA, Moore.	Bengal.
„ TRILINEARIA, Moore.	Darjiling.
„ QUINARIA, Moore.	Bengal.
„ FENESTRARIA, Moore.	Bengal.
DECETIA CAPETUSARIA, Walk.	Silhet.
AGNIDRA SPECULARIA, Walk.	Bengal.
„ MUSCULARIA, Walk.	Bengal.
„ DISCISPILARIA, Moore.	Bengal.
HYPERYTHRA LUTEA, Cram.	Bengal. Andamans. Java.
„ LIMBOLARIA, Guen. ♀	Tenasserim. Bengal. S. India.
<i>Aspilates suseptaria</i> , Walk.	
<i>Hyperythra penieularia</i> , Guen. ♂	
„ NIGUZARIA, Walk.	Silhet.
„ VITTICOSTATA, Walk.	Silhet.
„ SPURCATARIA, Walk.	Darjiling.
„ CALCEARIA, Walk.	Bengal.
„ TRILINEATA, Moore.	Bengal.
„ ANGULIFASCIA, Moore.	Andamans.
CAUSTOLOMA ENNOMOSARIA, Walk.	Darjiling.
ANGERONA PALLICOSTARIA, Moore.	Bengal.

OMIZA PACHIARIA, Walk.	Bengal.
,, SCHISTACEA, Moore.	Tenasserim.
,, AFFINIS, Moore.	Andamans.
PANISALA TRUNCATARIA, Moore.	Bengal.
ECRYMENE INUSTARIA, Moore.	Bengal.
ODONTOPTERA DISCOSPILATA, Moore.	Bengal.
SELENIA DECORATA, Moore.	Bengal.
ENDROPIA BASIPUNCTA, Moore.	Bengal.
CROCALIS OBLIQUARIA, Moore.	Bengal.
,, BIVITTARIA, Moore.	Bengal.
,, LENTIGINOSARIA, Moore.	Bengal.
,, ANGULARIA, Moore.	Bengal.
ENNOMOS VIRIDATA, Moore.	Bengal.
,, TESTACEARIA, Moore.	Darjiling.
GARLEUS SPECULARIS, Moore.	Darjiling.
LYCIMNA POLYMESATA, Walk.	Silhet.
EREBOMORPHA FULGURITA, Walk.	Bengal.
,, FULGURARIA, Walk.	Bengal.
LITBADA SERICEARIA, Walk.	Silhet.

Family Uraptericidæ.

URAPTERYX PODALIRIATA, Guen.	Tenasserim.
,, CROOPTERATA, Kellar.	Andamans. Bengal.
,, EBULEATA, Guen.	Bengal.
,, MULIISTRIGARIA, Walk.	Bengal.
,, SCITICAUDARIA, Walk.	Darjiling.
,, PODALIRIATA, Guen.	Tenasserim. Calcutta. Sikkim.
,, MARGARITATA, Moore.	Bengal.
,, TRIANGULARIA, Moore.	Bengal.
,, RUFIVINCTATA, Walk.	Darjiling.
,, QUADRIPUNCTATA, Moore.	Bengal.
,, FALCATARIA, Moore.	Darjiling.
EUCHERA SUBSTIGMARIA, Hübn.	Bengal.
<i>Abraxas capitata</i> , Walk.	
CHORODNA EREBUSARIA, Walk.	Darjiling.
,, METAPILEARIA, Walk.	Darjiling.
<i>Erebomorpha semiclusaria</i> , Walk.	
,, PALLIDULARIA, Moore.	Darjiling.
,, VULPINARIA, Moore.	Darjiling.
,, MURICOLARIA, Walk.	Darjiling.
,, PLAGIBOTATA, Walk.	Darjiling.
,, RECTATA, Walk.	Darjiling.
,, PATULATA, Walk.	Darjiling.
DALIMA APICATA, Moore.	Bengal.
,, SCHISTACEARIA, Moore.	Bengal.
CHERODES TESTACEATA, Moore.	Bengal.
LAGYRA DECEPTATURA, Walker.	Burma.
<i>Chizala deceptatura</i> .	
,, MEGASPILA, Moore.	Bengal.
,, RIGUSARIA, Walk.	Bengal.
The larva feeds on the Rose (Grote).	
CIMICODES CASTANEARIA, Moore.	Darjiling.
,, COSTALIS, Moore.	Bengal.
,, CRUENTARIA, Moore.	Bengal.
AUZZEA APICATA, Moore.	Bengal.
,, TORRIDARIA, Moore.	Bengal.

Tribe CRAMBICES.

Family **Galleridæ.**

PROPACHYS NIGRIVENA, Walk.	Darjiling.	
" LINEALIS, Moore.	Darjiling.	Andamans.
" FASCIALIS, Moore.	Bengal.	
TOCCOLOSIDA RUBRICEPS, Walk.	Silhet.	

Family **Crambidæ.**

ESCHATA GELIDA, Walk.	Darjiling.
APURIMA XANTHOGASTRELLA, Walk.	Bengal.
<i>Rupela degenerella</i> , Walk.	
<i>Lithosia cramboides</i> , Walk.	
SCIRPOPHAGA AURIFLUA, Zeller.	Calcutta.
" GILVIBERBIS, Zeller.	Bengal.
BRIHASPA ATROSTIGMELLA, Moore.	Darjiling.
RAMILA MARGINELLA, Moore.	Darjiling.
CRAMBUS CONSOCIELLUS, Walk.	Bengal.
ACARA MOROSELLA, Walk.	Silhet.
SCHÆNOBIUS MINUTELLUS, Zeller.	Calcutta.
" PUNCTELLUS, Zeller.	Calcutta.
CALAMOTROPHIA ATKINSONI, Zeller.	Calcutta.
CHILO ADITELLUS, Walker.	Burma.

Family **Phycidæ.**

NEPHOPTERYX MERIDIONALIS, Wallace.	Burma.
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Tribe DELTOIDES.

Family **Herminiidæ.**

HERMINIA HADENALIS, Moore.	Darjiling.
" OCHRACEALIS, Moore.	Darjiling.
" ALBIRENALIS, Moore.	Darjiling.
MASTYGOPHORA SCOPIGERALIS, Moore.	Bengal.
ECHANA PLICALIS, Moore.	Darjiling.
LOCASTRA PHERECIUSCALIS, Walk.	Silhet.
" CUPROVIRIDALIS, Moore.	Darjiling.
BERTULA HISRONALIS, Walk.	Silhet.
" BREVIVITTALIS, Moore.	Bengal.
" CHALYBEALIS, Moore.	Darjiling.
" STIGMATALIS, Moore.	Bengal.
" ALBINOTALIS, Moore.	Andamans.
" IMPARATALIS, Walk.	Burma.
BOCANA BASALIS, Moore.	Bengal.
" VIRIDALIS, Moore.	Bengal.
" QUADRILINEALIS, Moore.	Darjiling.
" MURINALIS, Moore.	Bengal.
APPHADANA EVULSALIS, Walker.	Andamans.
HYDRILLODES SUBBASALIS, Moore.	Andamans.
" TRANSVERSALIS, Moore.	Andamans.
CYCLOPTERYX CANALIFERALIS, Moore.	Andamans.
RIVULA BIOCULARIS, Moore.	Andamans.
" OCULARIS, Moore.	Andamans.

Family **Hypenidæ.**

DICHROMIA OROSIALIS, Cram.	Bengal.
" TRIPLICALIS, Walk.	Darjiling.

TALAPA CALIGINOSALIS, Walk.	Darjiling.
ANORATHA COSTALIS, Moore.	Darjiling.
HYPENA LESALIS, Walk.	Burma.
„ QUINQUELINEARIS, Moore.	Andamans.
„ DENTILINEARIS, Moore.	Andamans.
„ LACESSALIS, Walk.	Bengal.
„ ABDUCALIS, Walk.	Bengal.
„ CONSCITALIS, Walk.	Cherra.
„ EXTENSA, Walk.	Bengal.
„ TENEBRALIS, Moore.	Bengal.
„ CERVINALIS, Moore.	Bengal.
„ COSTINOTALIS, Moore.	Darjiling.
„ CASTANEALIS, Moore.	Darjiling.
„ RECTIVITALIS, Moore.	Bengal.
„ BASISTRIGALIS, Moore.	Cherra. Darjiling.
„ DIVISALIS, Moore.	Darjiling.
„ LONGIPENNIS, Walk.	Darjiling.

Family **Platydidæ.**

EPISPARIS VARIABILIS, Walk.	Andamans. Bengal. Ceylon.
„ <i>signata</i> , Walk.	
„ SEJUNCTALIS, Walk.	Bengal.
<i>Pradiota sejunctaria</i> , Walk.	
„ <i>ennomocoides</i> , Walk.	
„ TORTUOSALIS, Moore.	Bengal.

Tribe PSEUDO-DELTOIDES.

Family **Amphigonidæ.**

LACERA CAPELLA, Guen.	Bengal. Burma.
AMPHIGONIA HEPATIZANS, Guen.	Burma.
„ COMPRIMENS, Walk.	Silhet.

Family **Focillidæ.**

ZETHES XYLOCHROMA, Walk.	Silhet.
„ PERTURBANS, Walk.	Silhet.
„ HLESTANS, Walk.	Burma.
PHALACRA METAGONARIA, Walk.	Bengal.
THYRIDOSPILA SPILERIPHORA, Moore.	Bengal.
PHURYS OBLIQUA, Moore.	Bengal.
„ STRIGATA, Moore.	Bengal.
EGNASIA EPHYRODALIS, Walk.	Bengal.
„ TRIMANTESALIS, Walk.	Darjiling.
„ VAGA, Walk.	Silhet.
„ TALUSALIS, Walker.	Burma.
„ REDUPLICATIONALIS, Walker.	Burma.
MARMORINIA SINGHA, Guen.	Silhet.
„ SHIVULA, Guen.	Silhet.
MECODINA LANCEOLA, Guen.	Silhet.
SINGARA DIVERSALIS, Walk.	Silhet.
HYPERNARIA DISCISTRIGA, Moore.	Bengal.
FASCELLINA CHROMALARIA, Walk.	Bengal.
„ VIRIDIS, Moore.	Bengal.
„ CASTANEA, Moore.	Andamans.
PLEURONA FALCATA, Walk.	Andamans.
CAPNODES RUFESCENS, Moore.	Andamans.
„ TRIFASCIATA, Moore.	Andamans.

Family **Thermesiidæ.**

SYMPIS RUFIBASIS, Guen.	Silhet.
The larva feeds on the 'Lichi,' <i>Nephelium litchi</i> (Grote).	
„ TURBIDA, Moore.	Andamans.
ThERMESIA CREBERRIMA, Walk.	Silhet.
„ PRECIPUA, Walk.	Silhet.
„ ARENACEA, Walk.	Silhet.
„ CONSOCIATA, Walk.	Silhet.
„ RETICULATA, Walk.	Darjiling. Andamans. Ceylon.
<i>Drepanodes scitaria</i> , Walk.	
<i>Anisodes pyriniata</i> , Walk.	
The larva feeds on <i>Elæocarpus serratus</i> (Grote).	
AZAZIA RUBRICANS, Boisd.	Andamans. Java. Bengal. Burma. Ceylon.
<i>Thermesia transducta</i> , Walk.	
SELENIS IRRECTA, Walk.	Bengal. Burma.
„ <i>niviapex</i> , Walk.	
„ ABRUPTA, Walk.	Bengal.
The larva feeds on the flowers of <i>Zizyphus</i> (Grote).	
„ (<i>Mestleta</i>) DUFLEXA, Moore.	Andamans.
„ LONGIPALPIS, Walker.	Burma.
BALLATHA LETA, Walker.	Burma.

Tribe NOCTUES.

Family **Poaphilidæ.**

ILUZA PYRALINA, Moore.	Andamans.
POAPHILA MARGINATA, Walker.	Burma.
BANIANA LUTEICEPS, Walker.	Burma.
NAHARA CLAVIFERA, Walker.	Burma.

Family **Remigiidæ.**

REMIGIA ARCHESTA, Cram.	Andamans. Java. Ceylon. Bengal.
<i>Ph.-noctua virbiæ</i> , Cram.	
„ <i>bifasciata</i> , Walk.	
„ FRUGALIS, Fabr.	Bengal. Burma.
<i>Chalciope lycopodia</i> , Geyer.	
„ OPTATURA, Walker.	Burma.
„ GREGALIS, Guen.	Andamans. Java.
FELINIA TERMINIGERA, Walk.	Burma.
„ SPISSA, Guen.	Silhet.

Family **Euclididæ.**

TRIGONODES HYPPASIA, Cram.	Bengal. Burma.
„ CEPHISE.	Burma.
„ MAXIMA, Guen.	Burma.

Family **Ophiusidæ.**

SPHINGOMORPHA CHLOREA, Cram.	Bengal.
<i>Sphingomorpha sipyla</i> , Guen.	
TONTIA UMBRINA, Doubl.	Silhet.
LAGOPTERA HONESTA, Hübn.	Balasar. Burma. Andamans. Ceylon.
„ CORONATA, Fabr.	Andamans. Manthura. Burma. Ceylon.
„ <i>leonina</i> , Fabr.	

<i>Lagoptera magica</i> , Hübn.	
„ DOTATA, Fabr.	Bengal. Burma.
OPHIODES TRAPEZIUM, Guen.	Bengal.
„ SEPERANS, Walk.	Bengal.
„ CUPREA, Moore.	Bengal.
OPHISMA GRAVATA, Guen.	Bengal.
„ MATURESCENS, Walk.	Bengal.
„ CERTIOR, Walk.	Burma.
„ CONTENTA, Walk.	Burma.
COTUZA UMMINIA, Cram.	Bengal.
♀ <i>Sympis subunita</i> , Guen.	
♀ <i>Ginea remorens</i> , Walk.	
♂ <i>Cotuza drepanoides</i> , Walk.	
„ DEFICIENS, Walk.	Bengal.
<i>Remigia perfidissa</i> , Walk.	
<i>Ophisma cuculifera</i> , Walk.	
HEMEROBLEMMA PEROPACA, Hübn.	Bengal.
<i>Ophisma latabilis</i> , Guen.	
ACHLEA MELICERTE, Drury.	Andamans. Java. India. Ceylon.
„ <i>tigrina</i> , Fabr.	
„ NUBIFERA, Moore.	Andamans.
„ MERCATORIA, Fabr.	Bengal.
„ CYLLOTA, Guen.	Burma.
SERRODES CAMPANA, Guen.	Bengal.
NAXIA CIRCUMSIGNATA, Guen.	Silhet.
„ ONELIA, Guen.	Bengal.
<i>Ophiusa obumbrata</i> , Walk.	
„ <i>umbrosa</i> , Walk.	
„ CALEFACIENS, Walk.	Bengal.
„ CALORIFICA, Walk.	Silhet.
CALESIA COMOSA, Guen.	Bengal. Burma.
„ GASTROPACHOIDES, Guen.	Sikkim. Tenasserim. Java.
„ STIGMOLEUCA, Koll.	Burma.
„ FLABELLIFERA, Moore.	Tenasserim.
HYLETRA NOCTTOIDES, Guen.	Silhet. Burma.
„ GAMMOIDES, Walk.	Bengal.
<i>Poaphila hamata</i> , Walk.	
„ STIGMATA, Moore.	Andamans.
ATHYRMA POLYSPIA, Walk.	Silhet. Burma.
„ DIVULSA, Walk.	Silhet.
„ TESSALATA, Moore.	Bengal.
OPHIUSA MYOPS, Guen.	Bengal. Burma.
„ ANALIS, Guen.	Burma.
„ ACHIATINA, Sulz.	Bengal. Burma.
„ FULVOTENIA, Guen.	Silhet. Burma.
„ ARCUATA, Moore.	Andamans. Bengal. Burma.
„ <i>joviana</i> , Cram. apud Guen.	
„ ALBIVITTA, Guen.	Bengal.
„ ARCTOTENIA, Guen.	Silhet.
„ STUPOSA, Fabr.	Silhet.
GRAMMODES STOLIDA, Fabr.	Bengal.
„ AMMONIA, Cram.	Bengal. Burma.
„ MYGDON, Cram.	Bengal. Burma.
„ NOTATA, Fabr.	Bengal.
FODINA ORIOLUS, Guen.	Bengal.
„ PULLULA, Guen.	Bengal.
„ STOLA, Guen.	Tenasserim. Sikkim. S. India.
ARTENA SUBMIRA, Walk.	Tenasserim.

Family **Bendidæ.**

HEULODES	CARANEA, Cram.	Bengal.	Burma.
,,	SATURNIOIDES, Guen.	Burma.	
,,	PALUMBA, Guen.	Bengal.	Burma.
	<i>Remigia alligons</i> , Walk.		
,,	RESTORANS, Walker.	Bengal.	Burma.
,,	INANGULATA, Guen.	Bengal.	

Family **Hypopyridæ.**

SPIRAMA	HELICINA, Hübn.	Bengal.	Tenasserim.	Ceylon.
,,	COHEREENS, Walk.	Andamans.	N.E. Bengal.	Ceylon.
,,	TRILOBA, Guen.	Bengal.		
	<i>Hypopyra mollis</i> , Guen.			
,,	RETORTA, L.	Burma.		
HYPOPYRA	VESPERTILIO, Fabr.	Bengal.	Burma.	
,,	FENTSECA, Guen.	Silhet.		
,,	OSSIGERA, Guen.	Bengal.		
,,	ENISTRIGATA, Guen.	Bengal.	Burma.	
	<i>Marula idonea</i> , Walk.			
	<i>Augeronia poeusaria</i> , Walk.			
,,	PERSIMILIS, Moore.	Andamans.		
HAMODES	ACRANTIACA, Guen.	Bengal.		
,,	DISCISTRIGA, Moore.	Andamans.	N.E. Bengal.	
ENTOMOGRAMMA	FAUTRIX, Guen.	Andamans.	Java.	N.E. Bengal.
BEREGRA	REPLENENS, Walk.	Bengal.		

Family **Ommatophoridæ.**

SPEIREDONIA	FEDUCIA, Stoll.	Silhet.		
,,	CONSPICUA, Feld.	Andamans.		
,,	ZANIES, Stoll.	Silhet.		
,,	RETRAIENS, Walk.	Andamans.	Java.	S. India.
	<i>Sericca parcipennis</i> , Walk.			Ceylon.
PATULA	MACROPS, L.	Bengal.		
	<i>Noctua bubo</i> , Fabr.			
ARGIVA	HIEROGLYPHICA, Drury.	Tenasserim.	Andamans.	Bengal.
	<i>Phalana mygdonia</i> , Cram.			
,,	<i>harmonia</i> , Cram.			
,,	CAPRIMULGUS, Fabr.	Tenasserim.	Bengal.	
NYCTIPAO	CREPUSCULARIS, L.	Tenasserim.	Bengal.	Java.
,,	GEMMANS, Guen.	Silhet.		
,,	GLAUCOPIS, Walk.	Silhet.		
,,	OBLITERANS, Walk.	Bengal.		
,,	<i>exterior</i> , Walk.			
,,	TRUNCATA, Moore.	Andamans.		
HETEROBLEMMA	PEROPACA, Hübn.	Burma.		
	<i>Ophisma latabilis</i> , Guen.			
OMMATOPHORA	LUMINOSA, Cram.	Bengal.		

Family **Erebidæ.**

OXYODES	CLYTIA, Cram.	Burma.	
SYNA	ALBILINEA, Walk.	Silhet.	
,,	CÆLISPARS, Walk.	Assam.	
,,	CURVILINEA, Moore.	Bengal.	
,,	RECTILINEA, Moore.	Bengal.	
,,	CYANIVITTA, Moore.	Bengal.	

TAVIA SUBSTRUENS, Walk.	Andamans. N.E. Bengal.
,, PUNCTOSA, Walk.	Bengal.
,, DUBITARIA, Walk.	Bengal.
,, CALIGINOSA, Walk.	Bengal.
,, ALBILINEA, Walk.	Bengal.
,, SUBMARGINATA, Walk.	Bengal.
,, BIOTULARIS, Moore.	Bengal.
,, CATOCALOIDES, Moore.	Bengal.
ANISONIURA SALEBROSA, Guen.	Silhet.
,, HYPOCYANA, Guen.	Silhet.

Family Phyllodidæ.

PHYLLODES CONSOBRINA, Westw.	Andamans. Bengal.
,, UNTULATA, Westw.	Bengal.
,, FASCIATA, Moore.	Bengal.
POTAMOPHORA MANLIA, Cram.	Bengal. Burma.
LYGNIODES HYPOLEUCA, Guen.	Bengal. Burma.
,, CILIATA, Moore.	Bengal.

Family Catocalidæ.

CATOCALA NEPCHA, Moore.	Darjiling.
,, ALBIFASCIA, Walk.	Burma.
,, DOTATA, Walk.	Bengal.
BLENINA LICHENOSA, Moore.	Andamans.
,, GRISEA, Moore.	Andamans.
OPHIDORES MATERNA, L.	Bengal.
,, FULLONICA, L.	Andamans. Sumatra. N.E. Bengal. Ceylon.
<i>Noctua dioscureæ</i> , Fabr.	
<i>Phalæna-noctua pomona</i> , Cram.	
,, HYPERMNESTRA, Cram.	Andamans. Sumatra. N.E. Bengal. Ceylon.
,, CAIETA, Hübn.	Bengal. Burma.
,, SALAMINIA, Cram.	Bengal.
,, PLANA, Walk.	Bengal.
,, AURANTIA, Moore.	Andamans.

Family Hypocalidæ.

HYPOCALA DEFLORATA, Fabr.	Bengal.
,, EFFLORESCENS, Guen.	Bengal.
,, ROSTRATA, Fabr.	Bengal.
,, SUBSATURA, Guen.	Bengal.
,, LATIVITTA, Moore.	Andamans.

Family Catephiidæ.

COCYTODES CÆRULEA, Guen.	Silhet.
,, MODESTA, Van der Hoeven.	Bengal.
,, <i>immodesta</i> , Guen.	
CATEPHIA LINTEOLA, Guen.	Bengal.
ANOPHIA OLIVASCENS, Guen.	Andamans. N.E. Bengal. Java. Ceylon.
,, LATERALIS, Walk.	Burma.
,, ACRONYCTOIDES, Guen.	Bengal.
ERYGIA APICALIS, Guen.	Bengal. Burma.
<i>Culicula exempta</i> , Walk.	
ODONTODES BOLINOIDES, Walk.	Bengal. Burma.
<i>Steiria subfasciata</i> , Walk.	
,, <i>quadristrigata</i> , Walk.	

STRICTOPTERA ILLUCIDA, Walk.	Calcutta.
„ GRISEA, Moore.	Darjiling.
„ DENTICULATA, Walk.	Burma.

Family Hypogrammidæ.

ERCHEIA TENEBROSA, Moore.	Andamans. N.E. Bengal.
BRIADA PRÆCEDENS, Walk.	Bengal.
„ VARIANS, Moore.	Bengal.
„ CERVINA, Walk.	Bengal.
CALLYNA SIDEREA, Guen.	Silhet.
„ MONOLEUCA, Walk.	Darjiling.
DINUMMA MYSTICA, Walk.	Burma.
GADIRTHA INEXACTA, Walk.	Burma.
„ IMPINGENS, Walk.	Burma.

Family Homopteridæ.

ALAMIS ALBICINCTA, Guen.	Bengal.
„ OPTATURA, Walk.	Bengal.
„ CONTINUA, Walk.	Bengal.
„ GLAUCINANS, Guen.	Bengal.
HOMOPTERA INFLIGENS, Walk.	Bengal.
„ SOLITA, Walk.	Burma.

Family Polydesmidæ.

PANDESMA QUENAVADI, Guen.	Silhet.
POLYDESMA BOARMOIDES, Guen.	Andamans. N.E. Bengal. Ceylon.
<i>Alamis brevipalpis</i> , Walk.	
<i>Polydesma mastrucata</i> , Feld.	
„ SCRIPTILIS, Guen.	Silhet.
„ OTIOSA, Guen.	Silhet.

Family Amphipyridæ.

AMPHIPYRA MONOLITHA, Guen.	Bengal.
NÆNIA CUPREA, Moore.	Bengal.
„ CHALYBEATA, Moore.	Bengal.

Family Toxocampidæ.

TOXOCAMPA TETRASPILA, Walk.	Darjiling.
„ COSTIMACULATA, Guen.	Silhet.
<i>Remigia triangulata</i> , Walk.	

Family Gonopteridæ.

ANOMIS FULVIDA, Guen.	Andamans. N.E. Bengal. Java. Ceylon.
„ GUTTANIVIS, Walk.	Bengal.
THALATTA PRÆCEDENS, Walk.	Burma.
GONITIS LATIMARGO, Walk.	Burma.
COSMOPHILA XANTHIDYMA, Boisd.	Bengal.
<i>Cirradia variolosa</i> , Walk.	
The larva feeds on <i>Hibiscus</i> (Grote).	
OSSONOBA TORPIDA, Walk.	Bengal.

Family **Hyblæidæ.**

HYBLEA PTERA, Cram.	Bengal.	Burma.
The larva feeds on <i>Bignonia</i> and <i>Callicarpa</i> (Grote).		
„ CONSTELLATA, Guen.	Bengal.	
„ FIRMAMENTUM, Guen.	Bengal.	
NOLASENA DULCISSIMA, Walk.	Andamans.	Ceylon.
PHYCODES HIRUNDINICORNIS, Guen.	Bengal.	
<i>Tegna hyblæella</i> , Walk.		
The larva feeds on <i>Ficus indica</i> (Grote).		
„ MINOR, Moore.	Bengal.	
„ MACULATA, Moore.	Bengal.	

Family **Plusiidæ.**

ABROSTOLA SUBAPICALIS, Walk.	Calcutta.
<i>Ingura recurrens</i> , Walk.	
PLUSIODONTA ACRIFERA, Hübn.	Bengal.
The larva found on Cabbages.	
„ VERTICILLATA, Walk.	Calcutta.
The larva found on Geranium (Grote).	
„ AGRAMMA, Guen.	Calcutta.
„ <i>inchoata</i> , Walk.	
The larva feeds on the 'Kadu,' <i>Lagenaica vulgaris</i> (Grote).	
„ SIGNATA, Fabr.	Bengal.
„ FURCIFERA, Walk.	Bengal.
„ ORNATISSIMA, Walk.	Bengal.
„ GEMMIFERA, Walk.	Bengal.
„ SEMIVITA, Moore.	Darjiling.
„ VERTICILLATA, Guen.	Burma.

Family **Calpidæ.**

„ CONDUCENS, Walk.	Andamans.	Ceylon.
The larva feeds on <i>Clypea</i> and <i>Cissampelos</i> (Grote).		
ORRESIA PROVOCANS, Walk.	Silhet.	
„ RECTESTRIA, Guen.	Bengal.	
„ EMARGINATA, Fabr.	Bengal.	
CALPE MINUTICORNIS, Guen.	Bengal.	

Family **Hemiceridæ.**

WESTERMANNIA TRIANGULARIS, Moore.	Andamans.
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Family **Eurhipidæ.**

ANUGA CONSTRICTA, Guen.	Bengal.	
„ LUNULATA, Moore.	Bengal.	
INGURA CRISTATRIX, Guen.	Andamans.	Java.
EUTELIA ADULATRIX, Hübn.	Burma.	
<i>Targalia infida</i> , Walker.		
<i>Penicillaria ludatrix</i> .		
„ SICCIFOLIA, Moore.	Darjiling.	
VARNIA IGNITA, Walk.	Silhet.	
„ FENESTRATA, Moore.	Darjiling.	
„ INÆQUALIS, Walk.	Silhet.	

Family Eriopidæ.

CALLOPISTRIA EXOTICA, Guen.	Andamans. Java. Darjiling. Ceylon.
" DUPLICANS, Walk.	Burma.
PHALGA SINUOSA, Moore.	Darjiling.

Family Erastridæ.

ERASTRIA VENULIA, Cram.	Bengal.
" IMBUTA, Walk.	Burma.
" PALLIDISCA, Moore.	Darjiling.
" MARGINATA, Moore.	Darjiling.
PROTHEDES BIPARS, Moore.	Cherra.

Family Palindidæ.

HOMODES CROCEA, Guen.	Andamans. Ceylon. Java.
" DISCISTRIGA, Moore.	Andamans.

Family Acontiidæ.

XANTHODES TRANSVERSA, Guen.	Bengal. Andamans. Java.
" INTERSEPTA, Guen.	Bengal. Burma.
" IMPELLENS, Walk.	Bengal.
" INNOCENS, Walk.	Bengal.
" IMPARATA, Walk.	Bengal.
CANNA PULCHRIPICTA, Walk.	Darjiling.
ACONTIA OLIVEA, Guen.	Bengal.
Larva feeds on the <i>Solanum melongena</i> (Grote).	
" TROPICA, Guen.	Bengal.
" SIGNIFERA, Walk.	Calcutta. N.E. Bengal. Andamans.
CHURIA NIGRISIGNA, Moore.	Calcutta.
" OCHRACEA, Moore.	Calcutta.

Family Heliothidæ.

MASALIA IRRORATA, Moore.	Darjiling.
ADISURA ATKINSONI, Moore.	Darjiling.
" MARGINALIS, Moore.	Calcutta.
" DULCIS, Moore.	Darjiling.
" SIMILIS, Moore.	Calcutta.

Family Anthophilidæ.

ANTHOPHILA HÆMORRHODA, Walk.	Bengal.
<i>Micra hemirhoda</i> , Walk.	
<i>A. roseifascia</i> , Walk.	
HYDRELIA SEMILUGENS, Walk.	Burma.
" CONJUGATA, Moore.	Darjiling.
THALPOCHARES TRIFASCIATA, Moore.	Calcutta.
" QUADRILINEATA, Moore.	Calcutta.
" DIVISA, Moore.	Calcutta. Ceylon.
ACANTHOLIPES HYPENOIDES, Moore.	Darjiling.

Family Xylinidæ.

CUCULLIA TENUIS, Moore.	Darjiling.
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Family **Heliothidæ.**

HELIOTHIS ARMIGERA, Hübn.	Bengal.
„ PELTIGERA, Tröt.	Bengal.

Family **Hamerosidæ.**

AFSARASA FIGURATA, Moore.	Andamans.
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Family **Hadenidæ.**

AGRIOPSIS LEPIDA, Moore.	Bengal.
„ DISCALIS, Moore.	Bengal.
EUPLEXIA ALBOVITTATA, Moore.	Darjiling.
„ DISCISIGNATA, Moore.	Darjiling.
„ STRIATOVIRENS, Moore.	Darjiling.
„ DISTORTA, Moore.	Darjiling.
EUROIS AURIPLENA, Walk.	Bengal.
„ CRASSIPENNIS, Walk.	Silhet.
HADENA CONSTELLATA, Moore.	Darjiling.
„ ATROVIRENS, Moore.	Darjiling.
„ AUROVIRIDIS, Bengal.	Bengal.
„ ALBIDISCA, Moore.	Bengal.
„ LANCEOLA, Moore.	Bengal.
„ SPARGENS, Walk.	Burma.
CHECUTA FORTISSIMA, Moore.	Darjiling.
SARBANISSA INSOCIA, Walk.	Darjiling.
DIANTHICIA CONFLUENS, Moore.	Darjiling.
UPPANA INDICA, Moore.	Darjiling.
BERRILEA AURIGERA, Walk.	Darjiling.
„ MEGASTIGMA, Walk.	Darjiling.
„ ALBINOTA, Moore.	Darjiling.
„ OLIVACEA, Moore.	Darjiling.

Family **Orthosidæ.**

ORTHOSIA CURVIPLANA, Walk.	Darjiling.
„ EXTERNA, Walk.	Darjiling.
„ SINENS, Walk.	Burma.
„ RECTIVITA, Moore.	Darjiling.
DABARITA SUBTILIS, Walk.	Bengal.

The larva feeds on *Eugenia jambolana* (Grote).

Family **Noctuidæ.**

AGROTIS SUFFUSA, Gmel.	Bengal.
„ COSTIGERA, Moore.	Cherra.
EPILECTA PULCHERRIMA, Moore.	Darjiling.
TRIPLENA SEMIHERBIDA, Walk.	Bengal.
GRAPHIPHORA C-NIGRUM, L.	Bengal.
„ CERASTIOIDES, Moore.	Darjiling.
„ FASCIATA, Moore.	Darjiling.
„ BASISTRIGA, Moore.	Darjiling.
„ RUBICILIA, Moore.	Darjiling.
„ FLAVIVENA, Moore.	Darjiling.
„ NIGROSIGNA, Moore.	Tonglu, in Sikkim.
OCHROPLEURA FLAMMATRA, Gmel.	Bengal.
<i>Agrotis basiclavis</i> , Walk.	

OCHROPLEURA	RENALIS, Moore.	Bengal.
„	SPILOTA, Moore.	Bengal.
„	TRIANGULARIS, Moore.	Darjiling.
„	COSTALIS, Moore.	Darjiling.
TIRACOLA	PLAGIATA, Walk.	Darjiling.
MEGASEMA	CINNAMOMEA, Moore.	Darjiling.
HERMONASSA	CHALYBEATA, Moore.	Darjiling.
„	SINUATA, Moore.	Darjiling.
„	CONSIGNATA, Walk.	Darjiling.

Family **Episemidæ.**

HELIOPHOBUS	DISSECTUS, Walk.	Bengal.
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Family **Apamiidæ.**

MAMESTRA	INFAUSTA, Walk.	Bengal.
„	CHALYBEATA, Walk.	Darjiling.
„	METALLICA, Walk.	Darjiling.
„	NIGROCUPREA, Moore.	Bengal.
„	SUFFUSA, Moore.	Bengal.
„	ALBOMACULATA, Moore.	Darjiling.
„	ALBIRENA, Moore.	Calcutta. Darjiling.
„	SIKKIMA, Moore.	Darjiling.
PROSPALTA	LEUCOSPILA, Moore.	Darjiling.
ILATIA	MONILIS, Moore.	Darjiling.
„	CERVINA, Moore.	Darjiling.
„	CALAMISTRATA, Moore.	Khasi hills.
„	CEPHUSALIS, Walk.	Andamans. S. India.
<i>Miana inornata</i> ,	Walk.	
CELENA	SIKKIMENSIS, Moore.	Sikkim.
HYDRECIA	KHASIANA, Moore.	Khasi hills.
PERIGEA	TRICYCLA, Guen.	Silhet.
„	APAMEOIDES, Guen.	Bengal. Andamans. S. India.
♂ „	<i>P. canorufa</i> , Walk.	
♀ „	<i>P. illecta</i> , Walk.	

The larva feeds on *Cereopsis* (Grote).

THALPOPHILA	CUPREA, Moore.	Andamans. N.E. Bengal. S. India.
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Family **Caradrinidæ.**

AMYNA	SELENAMPHA, Guen.	Silhet. Andamans. Java. Ceylon.
	<i>Alamis spoliata</i> , Walk.	
CARADRINA	PAUCRIFERA, Walk.	Burma.
„	ORBICULARIA, Wien.	Burma.
„	ARENACEA, Moore.	Darjiling.
„	DELECTA, Moore.	Darjiling.
ACOSMETIA	NEBULOSA, Moore.	Darjiling.

Family **Gortynidæ.**

GORTYNA	CUPREA, Moore.	Darjiling.
HYDRECIA	NAXIACOIDES, Moore.	Bengal.

Family **Xylophasiidæ.**

XYLOPHASIA	FLAVISTIGMA, Moore.	Bengal.
„	LEUCOSTIGMA, Moore.	Bengal.

SASUNAGA TENEBROSA, Moore.	Darjiling.
NEURIA SIMULATA, Moore.	Darjiling.
APAMEA CUTPRINA, Moore.	Sikkim.
„ MUCRONATA, Moore.	Darjiling.
„ STRIGIDISCA, Moore.	Darjiling.
„ NUBILA, Moore.	Darjiling.

Family **Dipterygiidæ.**

DIPTERYGIA INDICA, Moore.	Darjiling.
SPODOPTERA CILIUM, Guen.	Andamans. Bengal.
„ <i>S. insulsa</i> , Walk.	
„ NUBES, Guen.	Bengal. Andamans. Java.
PRODENIA CILIGERA, Guen.	Andamans. Java. Bengal.
„ <i>P. glaucistriga</i> , Walk.	
The larva very destructive to cabbages (Grote).	
„ DECLINATA, Walk.	Burma.
„ INFECTA, Walk.	Bengal.
„ <i>P. insignata</i> , Walk.	
„ LECTULA, Walk.	Bengal.
CALOGRAMMA FESTIVA, Doh.	Bengal.
„ <i>C. picta</i> , Guen.	

The larva feeds on *Crinum* and *Liliaceous* plants (Grote).

Family **Glottulidæ.**

POLYTELA GLORIOSÆ, Fabr.	
GLOTTULA DOMINICA, Guen.	Bengal. Burma.
The larva feeds on <i>Crinum paneratum</i> , <i>Zephyranthus</i> , etc. (Blyth).	
RAMADASA PAVO, Walk.	Andamans. Ceylon.
CHASMINA CYGNUS, Walk.	Bengal.

Family **Leucaniidæ.**

MYTHIMNA CERVINA, Moore.	Bengal.
LEUCANIA EXTRANEA, Guen.	Calcutta.
„ EXSANGUIS, Guen.	Silhet.
„ CONFUSA, Walk.	Bengal.
„ EXTERIOR, Walk.	Bengal.
„ DESIGNATA, Walk.	Bengal.
„ VENALBA, Moore.	Bengal.
„ PULCHERRIMA, Moore.	Darjiling.
„ DECISSIMA, Walk.	Darjiling.
„ COSTALIS, Moore.	Andamans.
„ PROSCRIPTA, Walk.	Burma.
„ BISTRIGATA, Moore.	Darjiling.
„ MODESTA, Moore.	Darjiling.
„ BIVITTATA, Walker.	Burma.
„ SEJUNCTA, Walker.	Burma.
„ LINEATIPES, Moore.	Cherra.
„ ADUSTA, Moore.	Darjiling. Khasi hills.
„ CONSIMILIS, Moore.	Darjiling.
„ CORUPTA, Moore.	Pudda R.
„ ALBISTIGMA, Moore.	Darjiling.
„ HOWRA, Moore.	Calcutta.
„ ABDOMINALIS, Moore.	Bengal.
„ DHARMA, Moore.	Darjiling.

LEUCANIA ALBICOSTA, Moore.	Darjiling.	
„ PROMINENS, Moore.	Darjiling.	Cherra.
ALETIA DISTINCTA, Moore.	Darjiling.	
BOROLIA FASCIATA, Moore.	Darjiling.	
SIMYRA CONSPERSA, Moore.	Calcutta.	
NONAGRIA IRREGULARIS, Walker.		
ESCHATA GELIDA, Walker.	Burma.	
TYMPANISTES PALLIDA, Moore.	Darjiling.	
„ TESTACEA, Moore.	Darjiling.	
AUCHMIS SIKKIMENSIS, Moore.	Darjiling.	

Family **Bryophilidæ.**

BRIOPHILA ALBOSTIGMA, Moore.	Bengal.
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Family **Bombycoidæ.**

DIPHTERA ATROVIRENS, Walk.	Darjiling.
„ NIGROVIRIDIS, Walk.	Darjiling.
„ PRASINA, Walk.	Darjiling.
„ VIGENS, Walk.	Darjiling.
„ PALLIDA, Moore.	Bengal.
„ DISCIBRUNNEA, Moore.	Bengal.
ACRONYCTA PRUINOSA, Guen.	Silhet.
„ FLAVULA, Moore.	Bengal.
„ INDICA, Moore.	Bengal.
GAURENA FLORENS, Walk.	Darjiling.
„ FLORESCENS, Walk.	Darjiling.

Family **Cymatophoridæ.**

GONOPHORA INDICA, Moore.	Bengal.
OSICA UNDULATA, Moore.	Bengal.
THYATIRA BATIS, L.	Bengal.
„ DECORATA, Moore.	Darjiling.
RISOBA OBSTRUCTA, Moore.	Calcutta.
„ PROMINENS, Moore.	Khasi hills.
KERALA PUNCTILINEATA, Moore.	Darjiling.
SARONAGA ALBICOSTA, Moore.	Darjiling.
PALIMPSESTIS ALTERNATA, Moore.	Darjiling.
„ CUPRINA, Moore.	Darjiling.

Tribe SPHINGES.

Family **Hepialidæ.**

PHASSUS SIGNIFER, Walk.	Bengal.
„ CHALYBEATUS, Moore.	Darjiling.
„ DAMOR, Moore.	Darjiling.
„ ABOE, Moore.	Darjiling.
HEPIALUS NIPALENIS, Steph.	Darjiling.
„ SEX-NOTATUS, Moore.	Darjiling.

Family **Cossidæ.**

COSSUS CADAMBÆ, Atkinson.	Bengal.
The larva bores into the wood of <i>Nauclea cadamba</i> .	
ZEUZERA MINEUS, Cram.	

ZEUZERA INDICA, Boisd.	
„ LEUCONOTA, Steph.	Calcutta.
„ CONFERTA, Walk.	Silhet.
„ PAUCIPUNCTATA, Walk.	Silhet.
„ MULTISTRIGATA, Moore.	Darjiling.

Family Lasiocampidæ.

LEBEDA PLAGIFERA, Walk.	Bengal. Java.
„ NANDA, Moore.	Darjiling.
„ NUDANS, Walk.	Silhet.
„ LATIPENNIS, Walk.	Calcutta.

The larva feeds on *Nyctanthes arbortristis* and *Lagerstræmia indica* (Grote).

„ FERRUGINEA, Walk.	Silhet.
„ <i>L. ampla</i> , Walk.	
„ SOBILIS, Walk.	Silhet.
„ BUDDHA, Lefebvre.	Bengal. Canara. Java.
„ <i>L. plagiata</i> , Walk.	
„ REPANDA, Walk.	
„ VINATA, Moore.	Darjiling.
MUSTILLA FALCIPENNIS, Walk.	Darjiling.
ESTIGENA PARDALE, Walk.	
BHARETTA CINNAMOMEA, Moore.	Darjiling.
ANDRACA BIPUNCTATA, Walk.	Darjiling.
„ TRILCHOIDES, Moore.	Darjiling.
GANGARIDES ROSEA, Moore.	Darjiling.
„ DHARMA, Moore.	Bengal.
TRABALA LETA, Walk.	Bengal.
„ MAHANUNDA, Moore.	Bengal.
ARBELA TESSALATA, Moore.	Darjiling.
„ VISHNU, Lefebvre.	Darjiling. Java.
<i>Amydoma prasina</i> , Walk.	
„ <i>pallida</i> , Walk.	
„ <i>basalis</i> , Walk.	

The larva feeds on the Castor oil plant (*Ricinus communis*), the Sal tree (*Shorea robusta*) and the Pomegranate (*Punica granatum*).

AFONA PALLIDA, Walk.	Darjiling.
TARAGAMA GANESA, Lefebvre.	Bengal. Canara. Java.
<i>Bombyx Sira</i> , Lef.	
<i>Megasoma albicans</i> , Walk.	
„ <i>venustum</i> , Walk.	

The larva feeds on *Hyperanthera moringa* (Grote).

STANA BIMACULATA, Walk.	Bengal. Ceylon. Java.
<i>Lebeda concolor</i> , Walk.	

The larva feeds on a species of *Psidium*.

ALOPRA FERRUGINEA, Moore.	Darjiling.
BRAHMLEA CETHIA, Fab.	Sikkim.
<i>Bombyx Wallichii</i> , Gray.	
„ <i>spectabilis</i> , Hope.	
„ WHITEI, Butler.	Sikkim.
KOSALA SANGUINEA, Moore.	Khasi hills.
LASIOCAMPA VITTATA, Walk.	Bengal.
ODONESTIS BHEROBA, Moore.	Darjiling.
PŒCILOCAMPA UNDULOSA.	Sikkim.
MURLIDA LINEOSA, Walk.	

Family **Limacodidæ.**

SCOPELODES UNICOLOR, Westw.	Bengal.
„ VENOSA, Walk.	Silhet.
MIRESA ALBIPUNCTA, H. Schoeff.	Darjiling.
„ CASTANEIPARS, Moore.	Darjiling.
CANDYRA PUNCTATA, Walk.	Central India. Bengal.
<i>Belgoræa subnotata</i> , Walk.	
LIMACODES RETRACTATA, Walk.	Darjiling.
„ APICALIS, Walk.	Silhet.
TRISULA VARIEGATA, Moore.	Bengal.
The larva feeds on <i>Picus religiosa</i> .	
MIRESA BREVILINEA, Walk.	Darjiling.
CHILENA SIMILIS, Walk.	
NYSSIA HERBIFERA, Walk.	
„ LATIFASCIA, Walk.	
PARASA LEPIDA, Cram.	Bengal.
<i>Limacodes graciosa</i> , Westw.	
The larva feeds on <i>Eugenia</i> and <i>Mangifera</i> (Grote).	
„ PENICA, Boisd.	Silhet.
„ ISABELLA, Moore.	Bengal.
The larva feeds on <i>Shorea robusta</i> .	
„ LULEANA, Moore.	Calcutta.
The larva feeds on <i>Amoora rohituka</i> , <i>Irova longiflora</i> and <i>Mussenda frondosa</i> (Grote).	
„ NARARIA, Moore.	Calcutta.
The larva feeds on a species of <i>Crescentia</i> .	
„ UNICOLOR, Moore.	Calcutta.
The larva feeds on <i>Ochna squamosa</i> (Grote).	

The larvæ of this genus construct their cocoon in the form of a hard smooth oval capsule, affixed to the trunks of mango and other trees, opening at one end by a circular lid or segment. The larvæ are bright coloured and armed with spines, which simulate the adornments of some forms of marine nudibranchiate mollusks. Many (if not all) of them are armed with poisonous organs capable of producing severe pain, and perhaps even dangerous results. Dr. Templeton describes the larva of *P. lepida* as “stinging with such horrible pain, that I sat in the room almost sick with it, and unable to keep the tears from running down my cheeks for more than two hours, applying ammonia all the time.”

I have myself suffered severely from my ignorance of the powers of this handsome caterpillar, and believe that the stinging organs are extremely short black hairs, which are arranged as four velvet-black spots on its posterior extremity, which spots on examination are found to be *brushes* (so to speak) of closely packed hairs. On entering into the chrysalis state these hairs are disposed loosely round the mouth of the cocoon, and retained there by a flimsy web, and doubtless serve as an efficient protection against prying intruders. Examining one of these freshly formed capsules, I got some of these minute hairs on my fingers, where they attracted no notice, but incautiously drawing my fingers across my nose, I was almost prostrated by the sufferings which their contact with a sensitive mucous membrane gave rise to. The effect was a violent running at the nose and eyes, pain in the frontal region, and great irritation and inflammation of the fauces and throat. These symptoms lasted some hours, and I can quite imagine that fatal results might accrue to a child or weakly person, if badly stung. The larvæ of this genus are polyphagous, attacking the leaves of the most diverse plants and trees, e.g. *Eugenia*, *Mangifera*, *Ricinus*, *Ochna*, *Crescentia*, *Bambusa*, *Shorea*, *Annona squamosa*, *Pyrus*, etc.

Family Saturniidæ.

RINACA ZULEIKA, Hope.	Darjiling.
CALIGULA CACHARA, Moore.	N. Cachar.
CRICULA TRIFENESTRATA, Helfer.	Martaban.
SATURNIA ZULEIKA, Westw.	

The larva feeds on the leaves of *Anacardium orientale*, *Protium Jacanum*, *Canarium commune*, etc.

CRICULA DREPANOIDES, Moore.	Darjiling.
SALASSA LOLA, Westw.	Silhet.
ACTIAS IGNESENS, Moore.	Andamans.
„ SELENE, MacLeay.	Andamans.

This moth is recorded by Mr. F. Moore from Port Blair, a most remarkable habitat of a moth, which in the Himalayas is found at from 5000 to 7000 feet. It is not a similar case with insects recorded from "Darjiling," which occur also in Burma, as it is a matter of notoriety that the bulk of Darjiling collections are made in the low, hot and humid valleys. The transformations of this species have been graphically described by Hutton (Trans. Ent. Soc. Lond. iv. p. 221, id. v. pp. 45, 85), who found the larva feeding on *Coriaria Nipalensis*, *Andromeda oralifolia*, *Juglans regia*, and (?) on *Carpinus binana*. The moth, when about to issue from the cocoon, ejects from the mouth a few drops of clear, colourless fluid, using a tuft of down between the eyes as a brush for the application of the solvent. When the fibres are thus sufficiently moistened, it thrusts the point of its wing-spine or 'wing-spur' (as Hutton names it) through the cocoon, drawing the cutting edge across the fibres, until severed sufficiently to enable the moth to come forth.

„ MENAS, Doubl.	Silhet.
„ LETO, Doubl.	Darjiling.
„ ANDAMANA, Moore.	Andamans.

The Andaman 'Tusser' silk moth.

The genus *Antheræa* yields the well-known 'Tusser' silk, and several species, as yet not fully discriminated, occur throughout India. The Andaman race, or species, has been separated by Moore, but whether it is identical with that on the mainland is uncertain. For an interesting account (too long to extract here) of silk, sericulture, and the various silk-yielding moths, reference may be made to Balfour's *Cyclopædia of India*, though the value of that work is lamentably marred by the authorities for the various statements in the text being quoted collectively at the end of each article, instead of individually with reference to particular facts or allegations.

Besides silk, the silk-worm yields the material known to fishermen as 'gut,' which is the dried 'silk-vessel.' The largest caterpillars are selected, and killed by being plunged into strong vinegar, in which they are allowed to remain about twelve hours, when the two silk reservoirs are removed and stretched on a board and dried in the sun. It is worth inquiry if this article could not be largely prepared from many species of caterpillars which do not yield a silk in sufficient quantity or of a sufficiently good quality to render them worth domestication; in which case a new industry might be opened up in a hitherto neglected channel.

SATURNIA GROTEI, Moore.	Darjiling.
„ ANNA, Atkinson.	Darjiling.
„ GUERINI, Moore.	Bengal.
„ IOLE, Westw.	Assam.
„ PYRETORUM, Westw.	Bengal.
„ CIDOSA, Moore.	Darjiling.
„ LINDIA, Moore.	Bengal.
ANTHERÆA FRITHI, Moore.	Darjiling.
„ HELFERI, Moore.	Darjiling.
„ ASSAMA, Helfer.	Assam.
„ MIRANDA, Atkinson.	Bengal.

ANTHREEA ROYLEI, Moore.	Darjiling.
„ SIMLA, Westw.	Darjiling (!).
„ PAPHIA, L.	Bengal. Silhet. Assam. Ceylon. Java.

The Tusseh silk moth, *Munga* of the Mechis, *Kolisurra* of the Deccan.

The Tusseh larva feeds on *Zizyphus jujuba*, *Terminalia alata*, *glabra* and *catappa*, *Bombax heptaphyllum*, *Shorea robusta*, etc. A plain species, not ranging into the higher hills.

ATTACUS ATLAS, L.	Silhet. Java.
„ EDWARDSII, White.	Darjiling.
„ GUERINI, Moore.	Bengal.
„ RICINI, Jones.	Assam. N.E. Bengal. Ceylon.
<i>Sat. arrundi</i> , Milne-Edw.	
<i>Attacus lunula</i> , Walk.	

The Eria silk moth.

The larva feeds on the *Ricinus* or Castor oil plant, and is domesticated in Malta, Piedmont, Tripoli, France, etc. "The cocoons are remarkably soft and white or yellowish, the filament so exceedingly delicate as to render it impracticable to wind off the silk, it is therefore spun like cotton. The yarn when manufactured is woven into a coarse kind of white cloth of a seemingly loose texture, but of incredible durability, the life of one person being seldom sufficient to wear out a garment made of it" (Roxburgh, Trans. Lin. Soc. 1804). The winding difficulty has been since overcome (Journ. Agri.-Hort. Soc. of India, Vol. II, part ii. p. 61).

„ CYNTHIA, Drury.	Assam. Bengal. Java. China.
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The 'Eria' silk moth of Assam.

This species is domesticated in China, and the larva feeds on *Ailanthus glandulosa*. This and the last species have been very often confounded, a remark however which is applicable to many other silk moths, and it is not now precisely known what wild species are indigenous in Burma.

Family Drepanulidæ.

ORETA EXTENSA, Walk.	Bengal. Java.
„ <i>O. suffusa</i> , Walk.	
„ OBTUSA, Walk.	Silhet.
„ PAVACA, Moore.	Darjiling.
„ VATAMA, Moore.	Darjiling.
DUPANA DUPLIXA, Moore.	Darjiling.
„ PATRANA, Moore.	Darjiling.
„ VIRA, Moore.	Darjiling.
„ SADANA, Moore.	Darjiling.
LOEPA KATINKA, Westw.	Bengal. Java.
„ SIKKIMA, Atkinson.	Sikkim.

Family Bombycidæ.

TRILOCHA VARIANS, Moore.	Bengal. Canara.
ARISTHALA SIKKIMA, Moore.	Darjiling.
BOMBYX MORI, L.	

The domestication of this insect dates from the earliest abyss of history, being popularly ascribed in Chinese archives (according to Horsfield) to Se-ling-she, the wife of the Chinese Emperor Hwangté, who lived some 2640 years before Christ. How little the ancients knew of the origin of this material we learn from Virgil, who supposed it to be a vegetable product like cotton.

"Quid tibi odorato referam sudantia ligno
Balsamaque, et baccas semper frondentis acanthi?
Quid memora Æthiopum, molli cautentia lana?
Velleraque ut foliis depectant tenuia Seres?" *Georg. II.* 118.

The *B. mori* has been found wild in England by the Rev. W. Fox feeding on (among other plants) the common bramble, *Rubus fruticosus* (*vide* Athenæum, October 16, 1858), but it may be fairly surmised that the larvæ in question were the brood of an escaped female.

BOMBAX RELIGIOSA, Helfer. Assam.

The Joree or Deo-mooga silkworm.

The larva feeds on *Ficus religiosa*.

„ TEXTOR, Hutton.

The Boro-pooloo silkworm.

„ CRÆSI, Hutton.

The Nistry, or Madrasi silkworm.

„ FORTUNATUS, Hutton.

The 'dasee' ('common') silkworm.

„ SINENSIS, Hutton.

The China silkworm.

THEOPHILA BENGALENSIS, Hutton. Calcutta.

The larva feeds on *Artocarpus lacucha* (Grote).

„ SHERWILLII, Moore.

OCINARIA LACTEA, Hutton.

Family Notodontidæ.

THIACIDAS POSTICA, Walk. Bengal. Canara.

Drymonia denotata, Walk.

Cnethocampa cruvata, Walk.

STAUROPUS SIKKIMENSIS, Moore.

„ INDICUS, Moore.

„ VIRESCENS, Moore.

DAMATA LONGIPENNIS, Walk.

CELEIA PLUSIATA, Walk.

„ AURITRACTA, Moore.

MENAPIA KAMADENA, Moore.

CERURA LITURATA, Walk.

„ PRASANA, Moore.

„ DAMODARA, Moore.

HETEROCAMPA SIKKIMA, Moore.

„ ARGENTIFERA, Moore.

ICHTHYURA FERRUGINEA, Moore.

„ INDICA, Moore.

The larva feeds on *Flacourtia cataphracta* (Grote).

„ FULGURITA, Walk.

NOTODONTA BASALIS, Moore.

PARAVETA DISCINOTA, Moore.

LOPHOPTERYX SATURATA, Walk.

ANODONTA PULCHERRIMA, Moore.

ANTHENA DISCALIS, Walk.

The larva feeds on a species of *Hedysarum*.

ANTIGYRA COMBUSTA, Walk.

Dinara lineata, Walk.

The larva feeds on a species of *Saccharum*.

PHALERA RAYA, Moore.

„ PARIVALA, Moore.

Darjiling.

Darjiling.

PHALERA TENEBROSA, Moore.	Darjiling.
„ GROTEI, Moore.	Bengal.
The larva feeds on <i>Cesalpinia</i> and <i>Cassia fistula</i> (Grote).	
„ SANGANA, Moore.	Darjiling.
„ COSSOIDES, Walk.	Silhet.
NERICE PALLIDA, Walk.	Bengal.
APELA DIVISA, Walk.	Bengal.
GARGETTA COSTIGERA.	Darjiling.
SYBRIDA INORDINATA, Walk.	Darjiling.
DUDUSA SPHINGIFORMIS, Moore.	Sikkim.
SPHETTA APICALIS, Moore.	Darjiling.
GLUPHISIA SINUATA, Moore.	N.E. Bengal.
RACHIA PLUMOSA, Moore.	Darjiling.

Family Arctiidæ.

ALPHENUS BISERIATUS, Moore.	Andamans.
ALOPE OCELLIFERA, Walk.	Bengal. Canara.
ALPHEA FULVOHIRTA, Walk.	Darjiling.
„ ABDOMINALIS, Moore.	Darjiling.
HYPERCOMPA MULTIGUTTATA, Walk.	Darjiling.
„ EQUITALIS, Kellar.	Darjiling.
„ PLAGIATA, Walk.	Darjiling.
„ LONGIPENNIS, Walk.	Silhet.
„ IMPLETA, Walk.	Bengal.
„ IMPERIALIS, Walk.	Bengal.
CREATONOTUS INTERRUPTA, L.	Bengal. Pinang. Java. Ceylon.
„ EMITTENS, Walk.	Bengal. Canara.
RAJENDRA VITATA, Moore.	Darjiling. Burma.
GLANYCUS INSOLITUS, Walk.	Silhet.
ALVA LACTINEA, Cram.	Bengal.
<i>Bombyx sanguinea</i> , Fabr.	
AMERILA ASTREA, Drury.	Bengal.
ARCTIA IMBUTA, Walk.	Bengal.
PHISSIMA TRANSIENS, Walk.	Bengal. Pinang.
AREAS ORIENTALIS, Walk.	Darjiling. Java.
SPILOSOMA MULTIVITTATA, Moore.	Darjiling.
„ RHODOPHILA, Walk.	Bengal.
„ RUBIDORSA, Moore.	Darjiling.
„ SORDIDA, Moore.	Darjiling.
„ RUBITINCTA, Moore.	Darjiling.
„ NIGRIFRONS, Walk.	Darjiling.
„ FLAVALIS, Moore.	Darjiling.
„ LATIVITTA, Moore.	Darjiling.
„ STIGMATA, Moore.	Darjiling.
„ SANGUINALIS, Moore.	Darjiling.
„ RUBILINEA, Moore.	Darjiling.
„ DISCINIGRA, Moore.	Darjiling.
„ DENTILINEA, Moore.	Sikkim.
„ GOPARA, Moore.	Darjiling.
„ SUFFUSA, Walk.	Darjiling.
„ PUNCTATA, Moore.	Darjiling.

Family Zygænidæ.

ERESSA AFFINIS, Moore.	Andamans.
EUCHROMIA POLYMENA, L.	Andamans.

Family **Psychidæ.**

MAHASENA ANDAMANA, Moore.	Andamans.
CRYPTOTHELLA CONSORTA, Templeton.	Bengal.

Family **Liparidæ.**

REDOA FLAVESCENS, Moore.	Andamans.
„ SERICEA, Moore.	Andamans.
„ CLARA, Walk.	Bengal.
„ ARGENTEA, Walk.	Darjiling.
<i>Dasychira ilita</i> , Moore.	
„ SORDIDA, Walk.	Bengal.
<i>Leucoma subvitrea</i> , Walk.	
„ CYGNA, Moore.	N.E. Bengal.
PROCODECA ANGULIFERA, Walk.	Bengal. Java.
<i>Ricine suffusa</i> , Walk.	
PSALIS SECURIS, Hübn.	Bengal.
<i>Arestha antica</i> , Walk. ♂	
<i>Rigema falcata</i> , Walk. ♀	
„ <i>falcatella</i> , Walk. ♀	
<i>Anticyra approximata</i> , Walk. ♀	

The larva feeds on *Oryza sativa* (rice).

NAXA TEXTILIS, Walk.	Bengal.
GENUSA CIRCUMDATA, Walk.	Bengal.
AROA PYRRHOCHROMA, Walk.	Bengal.
ORGYIA PLANA, Walk.	Bengal.
„ ALBIFASCIA, Walk.	Bengal.
„ SUBFASCIA, Moore.	Darjiling.
DASYCHIRA ANTICA, Walk.	Bengal.
„ COMPLICATA, Walk.	Darjiling.
<i>Trisula pustulifera</i> , Walk.	
„ TENEBROSA, Walk.	Darjiling.
„ BRANA, Moore.	Darjiling.
„ FLAVIMACULA, Moore.	Darjiling.
HERACULA DISCIVITTA, Moore.	Darjiling.
MARDARA CALLIGRAMMA, Walk.	Bengal.
SOMERA VIRIDIFUSCA, Walk.	Bengal.
LYMANTRIA OBSOLETA, Walk.	Balador.
„ <i>bhascara</i> , Moore. ♀	
„ SUPERANS, Walk.	Bengal.
„ SIMILIS, Moore.	Calcutta.
„ CONCOLOR, Walk.	Bengal.
„ GRANDIS, Walk.	Bengal.
„ SEMICINCTA, Walk.	Ranceeganj.
„ BASINIGRA, Moore.	Balador.
„ MATHURA, Moore.	N.E. Bengal.
CAVIRA CYGNA, Moore.	Andamans.
LELIA VENOSA, Moore.	Andamans.
EUPROCTIS SUBNIGRA, Moore.	Cherra.
„ POSTINCISA, Moore.	N.E. Bengal.
„ DISCINOTA, Moore.	Andamans.
„ VIRGUNCULA, Walk.	Bengal. Java.

The larva feeds on *Conyza balsamifera* and *Dioscorea oppositifolia*.

„ DIVISA, Walk.	Bengal.
„ LUTESCENS, Walk.	Bengal.
„ ATOMARIA, Walk.	Bengal.

EUPROCTIS PARTITA, Walk.	Darjiling.
„ RANA, Moore.	Silhet.
„ BIGUTTA, Walk.	Canara. Java.
NUMENES INSIGNIS, Moore.	Silhet. Darjiling. Java.
„ <i>Silctti</i> , Walk.	
„ PATRANA, Moore.	Butan.
LEUCOMA LATIFASCIA, Walk.	Bengal.
<i>Euproctis melanophila</i> , Walk.	
ARTAXA VARIANS, Walk.	Tenasserim. China.
„ INCONCISA, Walk.	Bengal.
„ UNIMACULA, Moore.	Khasi Hills.
„ BREVIVITTA, Moore.	Bengal.
„ HOWRA, Moore.	Calcutta.
DREATA UNDATA, Bland.	Bengal. Madras.
„ <i>udifera</i> , Walk.	
„ MUTANS, Walk.	Darjiling.
„ CITRINA, Walk.	Bengal. Dakhan.
„ TAGOENSIS, Moore.	Tenasserim.
ATATHA REGALIS, Moore.	Tenasserim.
JANA LINOSA, Walk.	Darjiling.
„ CERVINA, Moore.	Darjiling.
TAGORA GLAUDESCENS, Walk.	Darjiling.
„ PANDYA, Moore.	N.E. Bengal.
GANISA PLANA, Walk.	Bengal.
The larva feeds on <i>Jasminum</i> .	
PERINA BASALIS, Walk.	Tenasserim.
<i>Euproctis antica</i> , Walk. ♂ var d.	

Family Chalcosiidæ.

HISTIA FLABELLICORNIS, Fabr.	Darjiling.
„ PAPPILLIONARIA, Guér.	Darjiling.
RETINA RUBRIVITTA, Walker.	Tenasserim.
CYCLOSLA NIGRESCENS, Moore.	Andamans.
„ SANGUIFLUA, Drury.	Butan. Cherra.
„ MIDAMA, Boisd.	Cherra.
„ <i>C. venusta</i> , Walk.	
„ PAPPILLIONARIS, Drury.	Darjiling. Java.
EPICOPELA VARUNEA, Moore.	Darjiling.
„ PHILONEXEA, Moore.	Darjiling.
„ DIPHILEA, Moore.	Darjiling.
ERASMA PULCHELLA, Hope.	Darjiling. Cherra.
PHILOPATOR BASIMACULATA, Moore.	Darjiling.
CHELURA GLACIALIS, Moore.	Darjiling.
„ BIFASCIATA, Hope.	Bengal. (Nipal.)
„ BASIFLAVA, Moore.	Darjiling.
MILIONIA LATIVITTA, Moore.	Sikkim.
„ ZONEA, Moore.	N. E. Bengal.
CHATAMBA FLAVESCENS, Moore.	Khasi Hills.
„ NIGRESCENS, Moore.	Darjiling.
CADPHISES MACULATA, Moore.	Darjiling.
CHALCOSIA PECTINICORNIS, L.	Butan.
„ CORUSCA Boisd.	Silhet.
<i>C. zuleika</i> , Walk.	
LAERION GEMINA, Walk.	Bengal. Java.
„ CIRCE, Boisd.	Cherra.
PIDORUS GLAUCOPIS, Drury.	Darjiling.

SCAPTESYLE TRICOLOR, Walk.	
ETERUSIA TRICOLOR, Hope.	Cherra. Pinang.
" LEDEA, L.	Silhet. Ceylon.
" SCINTILLANS, Boisd.	Silhet.
" <i>E. sublutea</i> , Walk.	
" EDOCIA, Doubl.	Silhet.
" FULCHELLA, Walk.	Darjiling.
" CIRCINATA, Boisd.	Bengal.
" SEX-PUNCTATA, Walk.	Bengal.
" FERREA, Walk.	Bengal.
" SHAHAMA, Moore.	Darjiling.
CANERKES EUSCHEMOIDES, Moore.	Silhet.
PHALANNA POLYMENA, L.	Andamans. Darjiling. Calcutta.
The larva feeds on <i>Convolvulus</i> .	
RATARDA MARMORATA, Moore.	Darjiling.
THYMARA CAUDATA, Moore.	Burma and Paukabari.
SYNTOMIS ANDERSONI, Moore.	Yunan.
" SLADENI, Moore.	Yunan. Tenasserim.
" ATRINSONI, Moore.	Yunan. Tenasserim.
" FYCHET, Moore.	Yunan.
" GROTEI, Moore.	Yunan. Tenasserim.
" MASONI, Moore.	Tenasserim.
" LIBERA, Walker.	Tenasserim.
" DISRUPTA, Moore.	Tenasserim.
" VERNIDA, Moore.	Tenasserim.
" ALBIFRONS, Moore.	Tenasserim.
" DIAPHANA, Kollar.	Bengal.
" CREUSA, L.	Bengal. Ceylon.
" MULTIGUTTA, Walk.	Darjiling.
" SCHLENERRHI, Boisd.	Darjiling.
" SUBCORDATA, Walk.	Bengal.
Larva feeds on <i>Vitis pallida</i> (Grote).	
" HÜBNERI, Boisd.	
" PENANGA, Moore.	Pinang.
PTEROTHYSANUS LATICILIA, Walk.	Darjiling.

Family Euschemidæ.

EUSCHEMA MILITARIS, L.	Tenasserim. Darjiling. Java.
" EXCUBITOR, Moore.	Tenasserim.
" AURILIMBATA, Moore.	Tenasserim.
" HORSFIELDII, Moore.	Tenasserim.
" ANDAMANA, Moore.	Andamans.
" ROEPSTORFFI, Moore.	Andamans.
CELERENA ANDAMANA, Feld.	Andamans.

Family Nyctemeridæ.

NYCTEMERA LATISTRIGA, Walk.	Tenasserim. Java. Canara.
" LACTICINIA, Cram.	Andamans. Java. Ceylon.
The larva feeds on <i>Cacalia conchifolia</i> .	
" VARIANS, Walk.	Darjiling.
" MACULOSA, Walk.	
" CENSIS, Cram.	Darjiling. Cherra.
PITASILA MOOLAICA, Moore.	Tenasserim.
" LEUCOSPILOTA, Moore.	Andamans.

Family **Lithosiidæ.**

HYPSINÆ.

"All the genera in this sub-family possess a peculiar stridulatory apparatus in both sexes. This is distinctly visible on the upper side of the posterior margin of the fore-wing, and as viewed from the *under side* of the wing appears as a short oval, nacreous cavity, situated between the submedian vein and the extreme margin, along the upper edge of which projects a raised longitudinally oblique fold, which is smooth in some, and transversely scabrous in others; and on the *upper side* of the hind wing is a patch of scabrous scales or a short transverse outwardly-curved raised scabrous bar, which, by the motion of this wing, evidently plays upon the raised fold over the edge of the cavity and produces a stridulating sound" (Moore, P. Z. S. 1878, p. 3).

HYPSA ALCIPHON.	Tenasserim. Andamans. Java.
" VENALBA, Moore.	Andamans.
" SUBSIMILIS, Walk.	Tenasserim.
" ANDAMANA, Moore.	Andamans.
" FLAGINOTA, Butler.	Tenasserim.
" CARICE, Fabr.	Bengal.
" EGENS, Walk.	Butan. Pinang.
" FICUS, Fabr.	Bengal. Canara.
" HELICONIA, L.	Bengal.
" PLANA, Walker.	Darjiling.

The larvæ of this genus feed on a species of *Ficus*.

DIGAMA FIGURATA, Moore.	Burma.
" HEARSEYANA, Moore.	Bengal.
<i>Scydra halesidotalis</i> , Walk.	
CALPENIA KHASIANA, Moore.	Khasi Hills.

LITHOSIINÆ.

MACROBROCHIS GIGAS, Walk.	Cherra.
" LEUCOSPILOTA, Moore.	Assum. Cherra.
TRIPURA PRAESENS.	Bengal.
SIDYMA APICALIS, Moore.	Darjiling.
CHURINGA RUBRIFRONS, Moore.	Darjiling.
VAMUNA REMALANA, Moore.	Darjiling.
" MACULATA, Moore.	Darjiling.
" BIPARS, Moore.	Darjiling.
MAHAVIRA FLAVICOLLIS, Moore.	Darjiling.
KORAMA PALLIDA, Moore.	Darjiling.
HEUDRA DIVISA, Moore.	Darjiling.
GHORJA ALBOCINEREA, Moore.	Darjiling.
" SERICEIPENNIS, Moore.	Darjiling.
CHRYSOGLIA MAGNIFICA, Walk.	Bengal. Borneo.
" FERREASCIATA, Moore.	Darjiling.
CEONISTIS ENTELLA, Cram.	Tenasserim.
LITHOSIA DISJUNCTA, Moore.	Darjiling.
SIMARLEA BASINOTA, Moore.	Darjiling.
TARIKA VARANA, Moore.	Darjiling.
" NIVEA, Walk.	Darjiling.
BRUNIA ANTICA, Walk.	Andamans. Ceylon.
GANDHARA SERVA, Walk.	Darjiling.
COLLITA LILACINA, Moore.	Yunan.
" PARVA, Moore.	Darjiling.
KATHA CUCULLATA, Moore.	Andamans.
" INTERMIXTA, Walk.	Andamans.
" TERMINALIS, Moore.	Darjiling.
SYSTROPHIA DORSALIS, Moore.	Darjiling.

CHRYSORABDIA VIRIDATA, Walk.	Darjiling.
CAPISSA VAGESA, Moore.	Darjiling. Khasi Hills.
" PALLENS, Moore.	Darjiling.
DOLGOMA RETICULATA, Moore.	Darjiling.
" ANGULIFERA, Feld.	Darjiling.
" BRUNNEA, Moore.	Darjiling.
MITHUNA QUADRIPLAGA, Moore.	Darjiling.
COSSA QUADRISIGNATA, Moore.	Darjiling.
" BRUNNEA, Moore.	Darjiling.
" NUBECULA, Moore.	Andamans.
RANGHANA PUNCTATA, Moore.	Calcutta.
TEGULATA PROTUBERANS, Moore.	Darjiling.
NUSIADA FLABRIFERA, Moore.	Calcutta.
TEULISNA TENUISIGNA, Moore.	Sikkim.
ZADADRA DISTORTA, Moore.	Darjiling.
PRABHSA VENOSA, Moore.	Darjiling.
" FLAVICOSTA, Moore.	Cherra.
BIZONE COCCINEA, Moore.	Sikkim.
" PERORNATA, Walk.	
" GUTTIPIRA, Walk.	
" <i>B. fasciculata</i> , Walk.	
" DIVAKARA, Moore.	Darjiling.
" ARAMA, Moore.	Darjiling.
" AMARILIS, Moore.	Andamans. Nicobars.
BARSINE GLORIOSA, Moore.	Khasi Hills.
" PUNICEA, Moore.	Darjiling.
" INFLEXA, Moore.	Darjiling.
" FLAVIVENOSA, Moore.	Darjiling.
" TRIVITTATA, Moore.	Andamans.
" DEFECTA, Walk.	Darjiling.
" NUBIFASCIA, Walk.	
ARGINA ASTRÆA, Drury.	Andamans. Nicobars. Java. Butau.
<i>A. cribraria</i> , Cram.	
" DULCIS, Walk.	Bengal. Canara.
" ARGUS, Kollar.	Darjiling. Java.
" SYRINGA, Cram.	Bengal.
LYCLENE ARTOCARPI.	Darjiling.
Larva feeds on <i>Artocarpus incisa</i> (Grote).	
" RADIANUS, Moore.	Darjiling.
" DELICATA, Moore.	Darjiling.
" PROMINENS, Moore.	Cherra.
" ZERRINA, Moore.	Calcutta.
" PALMATA, Moore.	N.E. Bengal.
" INTERSEPTA, Moore.	Darjiling.
" ORSOLETA, Moore.	Darjiling.
" DISCISTRIGA, Moore.	Darjiling.
" TERMINATA, G. Austen.	Khasi Hills.
" ASSAMICA, Atkinson.	Assam.
" INDISTINCTA, Moore.	Darjiling.
ÆMENE MACULIFASCIA, Moore.	Darjiling.
" SINUATA, Moore.	Cherra.
SETINA DISCISIGNA, Moore.	Cherra.
" NEBULOSA, Moore.	Darjiling.
SETTINGHROA AURANTIACA, Moore.	Khasi Hills.
NUDARIA FASCIATA, Moore.	Darjiling.
CASTABALA ROSEATA, Walk.	Bengal.
UTETHESIA PULCHELLA, L.	Darjiling. Java.

UTETHESIA PICFA, Walk.	Martaban.
VITESSA SURADEVA, Moore.	Bengal.
GROEVA ELEGANS, Moore.	N.E. Bengal.
ANAGNIA SUBFASCATA, Walk.	Tenasserim.
„ ORBICULARIS, Walk.	Cherra. Java.

The cocoon is covered with particles of leaves and lichens.

TINOLLUS EBURNEIGUTTA, Walk.	
CISPIA PUNCTIFASCIA, Walk.	
„ VENOSA, Walk.	
SESAPA ANDAMANA, Moore.	Andamans.
EUPLOCIA MEMBLIARIA, Cram.	Andamans. Java.
NEOCHERA MARMOREA, Walk.	Tenasserim.
PHILOXA CINERASCENS, Moore.	Andamans.

Of the moths forming his tribe *Bombyces*, Horsfield observes: "The next tribe comprises those forms which undergo their metamorphosis in a covering, constructed by its occupant, and popularly designated a 'cocoon.' This covering is a characteristic distinction of the whole tribe, and has in each species a peculiar form, which is reproduced instinctively with unvarying uniformity."

Family *Ægeriidae*.

MELITTIA BOMBYLIFORMIS, Cramer.	Tenasserim. Bengal. Java.
„ EURYTION, Westw.	Bengal. Java.

Family *Agaristidae*.

SENDYRA VENOSA, Moore.	Darjiling.
VITHORA INDRASANA, Moore.	N.E. Bengal.
ÆGOCERA VENTILIA, Cram.	Bengal.
EUSEMIA MACULATRIX, Westw.	Darjiling.
„ ALBOMARGINATA, Moore.	Andamans.
„ DENTATRIX, Westw.	Darjiling.
„ ADULATRIX, Kollar.	Darjiling.
„ <i>E. bellatrix</i> , Westw.	
„ VICTRIX, Westw.	Darjiling. Cherra.
„ FUXEBRIS, Moore.	Darjiling.
PHLEGORISTA TRANSIENS, Walk.	Darjiling. Java.
<i>P. catocaloides</i> .	
„ LONGIPENNIS, Walk.	Darjiling.
„ BALA, Moore.	Darjiling.
NYCTALEMON PATROCLUS, L.	Arakan. Assam.

Of the Atlas moth Dr. Mason says: "The Atlas moth is one of the largest insects of the moth tribe known. The smallest specimens I have seen measured from eight to nine inches in the expanse of its wings, which were pencilled with the richest amber, brown and yellow, and bordered with magnificent ocelli. This moth belongs to the silkworm family, and until recently was known to entomologists only as a native of China; but it also abounds in Burma. This is probably the insect which Mr. Blyth had from Rangoon, of which he wrote: "A well-known moth from Burma. *Phalena patroclus*; a splendid species common in collections from China, Assam, Silhet, and Aracan."

„ NAJABULA, Moore.	Andamans.
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Family *Callidulidae*.

CLEOSIRIS CATAMITA, Hübn.	Andamans. Java.
CALLIDULA PETAVIA, Cram.	Bengal. Martaban. Java.

LOPHURA HYAS, Boisd.	Java. Bengal.
The larva feeds on a species of <i>Paderia</i> .	
" PUSILLA, Walk.	Silhet.
SATAPTES INTERNALIS, Westw.	Silhet.
SESA HYLAS, L.	Martaban. Darjiling. Pinang.
ACOSMERYX CINEREA, Butler.	Silhet.
CILEROCAMPA NESSUS, Drury.	Andamans.
The larva feeds on <i>Dioscorea oppositifolia</i> .	
" CLOTIO, Drury.	Tenasserim. Java.
" TENEOROSA, Moore.	Andamans.
" MAJOR, Butler.	Silhet.
" CELERO, L.	Bengal. Java.
" ALLECTO, L.	Darjiling. Java.
" THYLLIA, L.	Bengal. Java.
" LINEOSA, Walk.	Darjiling.
" LUCASI, Boisd.	Bengal. Java. Canara.
" LYCEIUS, Cram.	Bengal.
" BISECTA, Hofs.	Bengal. Java.
" <i>C. Silhetensis</i> , Walk.	
TRIPTOGON ANDAMANA, Moore.	Andamans.
TRIPTOGON PHALARIS, Cramer.	Andamans. Nicobars.
" <i>C. Nicobarensis</i> , Hübn.	
CALYMNIA PAVONICA, Moore.	Andamans.
MACROGLOSSA ORIENTALIS, Butler.	Tenasserim. Yunan.
" SITENE, Boisd.	Martaban. Bengal.
" LUTEATA, Butler.	Tenasserim. Silhet.
" PASSALUS, Drury.	Bengal. Java. Canara.
" CORYTHUS, Boisd.	Darjiling. Java. Canara.
" GYRANS, Boisd.	Bengal.
" INTERRUPTA, Butler.	Darjiling.
" HEMICROMA, Butler.	Silhet.

Family **Sphingidæ.**

TRIPTOGON DRYAS, Boisd.	Darjiling. Java.
" GIGAS, Butler.	Silhet.
" DECORATUS, Moore.	Sikkim.
" DENTATUS, Cram.	Bengal. Java.
The larva feeds on <i>Saccharum cylindricum</i> .	
" CRISTATUS, Butler.	Darjiling.
" SILHETENSIS, Butler.	Silhet.
" FESCESCENS, Butler.	Darjiling.
" SPECTABILIS, Butler.	Darjiling.
LEUCOPHLEBIA LINEATA, Westw.	Bengal.
BASIANA CERVINA, Walk.	Bengal.
" SUPERBA, Moore.	Darjiling.
AMBULYX SUBSTRIGILIS, Westw.	Tenasserim. Java. Canara.
" LITURATA, Butler.	
The larva feeds on <i>Amoora rohitaka</i> .	
" RHODOPTERA, Butler.	Darjiling.
" TURBATA, Butler.	Darjiling.
ACHERONTIA SATANAS, Boisd.	Andamans. Silhet. Java.
" <i>A. Morta</i> , Hübn.	
" <i>A. Lethe</i> , Westw.	
The larva feeds on the Tobacco plant.	

ACHEERONTIA STYX, Westw.	Bengal. Madras. Pinang. Java.
" LACHESIS, Fabr.	
SPIINX CONVOLVULI, L.	Andamans.
<i>Protoparce Orientalis</i> , Butler.	
The larva feeds on <i>Phaseolus mac.</i>	
MACROSILA DISCISTRIGA, Walker.	Tenasserim. Java. Canara.
" NYCTIPHANES, Boisd.	Silhet.
ZONILLA MORPHEUS, Cram.	Bengal. Ceylon.
<i>Perigonia obliterans</i> , Walk.	
LAUGIA KHASIANA, Moore.	Khasi Hills.
PANACRA ELLA, Butler.	Silhet.
" BUSIDIS, Boisd.	Tenasserim. Andamans.
" VIGIL, Guér.	Bengal. Ceylon.
" <i>P. lignaria</i> , Walk.	
" AUTOMEDON, Boisd.	Silhet.
PHILAMPELUS ANCEUS, Cram.	Bengal. Java. Pinang.
" NAGA, Moore.	Darjiling.
DARAPSA BHAGA, Moore.	Bengal.
DAPHNIS NERII, L.	Bengal.
The larva feeds on a species of <i>Nerium</i> .	
PERGESA ACTEUS, Cram.	Tenasserim. Andamans. Java.
The larva feeds on a species of <i>Arum</i> .	
" CASTOR, Boisd.	Darjiling.
" DOLICHOIDES, Feld.	Sikkim.
" ÆGROTA, Butler.	Silhet.
" GLORIOSA, Butler.	Darjiling.

RHOPALOCERA.

Antennæ, with few exceptions, clubbed or terminating bluntly. Diurnal. In the Hesperidæ they are hooked at the tip. In the *Lycanidæ*, *Erycinidæ*, and *Nymphalidæ* the fore-legs are rudimentary, this peculiarity in the two former being confined to the males.

Family Hesperidæ
(including *Pterygaspidea*).

GONILOBA CHROMUS, Cramer.	Andamans. Bengal. Java.
" RAVI, Moore.	Andamans. Pinang. Nankowri.
" BADRA, Moore.	Bengal. Java.
" SENA, Moore.	Darjiling. Java.
" FOLUS, Cram.	Bengal. Java.
" MENAKA, Moore.	Darjiling. Ranjit Valley.
" PRALAYA, Moore.	Tenasserim. Java. Bengal.
" GANA, Moore.	Bengal. Java.
TAGIADES ALICA, Moore.	Andamans.
" HELFEERI, Feld.	Nieobars.
" DASAHARA, Moore.	Ranjit Valley.
" MEETANA, Moore.	Tenasserim.
SATARUPA GOPALA, Moore.	Darjiling.
" SAMBARA, Moore.	Darjiling.
" BHAGAVA, Moore.	Bengal.
DARPA HANRIA, Moore.	Bengal.
ISMENE BENJAMINI, Guér.	Tenasserim. Darjiling. Ranjit Valley.
<i>II. xanthopogon</i> , Kellar.	
" MAHINTHA, Moore.	Burma.
" MALAYANA, Feld.	Andamans.

ISMENE	ARIA, Moore.	Andamans. Bengal.
"	LEBUDEA, Hew.	Andamans.
"	JAINA, Moore.	Bengal. Darjiling.
"	VASUTANA, Moore.	Darjiling.
"	HARISA, Moore.	Darjiling.
"	AMARA, Moore.	Darjiling. Ranjit Valley.
"	GONIATA, Moore.	Bengal.
"	MURDAYA, Moore.	Darjiling.
"	DRUNA, Moore.	Tenasserim. Andamans. Bengal.
"	SASSIYABNA, Moore.	Bengal.
"	LADON, Moore.	N. India. Java.
CALLIANA	PIERIDOIDES, Moore.	N.E. Bengal.
CAPILA	JAYADEVA.	Darjiling.
PISOLA	ZENNARA, Moore.	Bengal.
ACHYLODES	SURA, Moore.	Bengal.
"	VASARA, Moore.	Darjiling.
PLESIONEURA	SUMITRA, Moore.	Bengal. Ranjit Valley.

Very swift in its flight, and always alights with expanded wings, and has the habit of executing an aerial patrol up and down a small space (Nicéville).

"	PULOMAYA, Moore.	Darjiling.
"	AMBAREESA, Moore.	Bengal.
"	CHAMUNDA, Moore.	Bengal.
"	PUTRA, Moore.	Bengal. Java.
"	ALYOS, Boisd.	Andamans. Bengal. Java.
"	DHANADA, Moore.	Bengal.
"	DAN, Fabr.	Bengal. Darjiling. Java.
"	<i>Hes. fatih</i> , Kollar.	
"	INDRANI, Moore.	Darjiling.
"	PRABA, Moore.	Bengal. Java.
"	HILFERI, Feld.	Nicobars.
"	AURIVITATA, Moore.	Tenasserim.
"	ALBIFASCIATA, Moore.	Tenasserim.
"	LILIANA, Atkinson.	Yunan.
HESPERIA	THRAX, L.	Darjiling. Java.

The larva feeds on *Musa paradisiaca*.

"	SEMAMORA, Moore.	Bengal. Sikkim.
"	DIVODASA, Moore.	Bengal. Canara.

The larva feeds on a species of *Phenic*.

"	CHAYA, Moore.	Yunan. Darjiling. Java.
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Ranges to 8000 feet (Nicéville).

"	AQUA, Moore.	Bengal. Java.
"	MANGALA, Moore.	Bengal. Pinang.
"	ELTOLA, Hew.	Yunan. Kurseong.
"	MOOLATA, Moore.	Tenasserim.
"	BEAVANI, Moore.	Tenasserim.
"	CAHIRA, Moore.	Andamans.
"	MATTHIAS, Fabr.	Tenasserim. Nicobars.
"	FARRI, Moore.	Cherra. Calcutta.
"	OCEIA, Hew.	Andamans.
"	TOONA, Moore.	N.E. Bengal.
"	COLACA, Moore.	Andamans. Nicobars.
"	TUYBSIS, Fabr.	Andamans. Nicobars.
"	<i>H. pandia</i> , Moore.	
ISOTEINON	SUBTESTACEUS, Moore.	Tenasserim.

ISOTEINON ATKINSONI, Moore.	Darjiling.
,, KHASIANUS, Moore.	Khasi Hills.
ASTICTOPTERUS OLIVASCENS, Moore.	Martaban. Darjiling.
CYCLOPIDES SUBVITTATUS, Moore.	Martaban. Darjiling.
,, SUBRADIATUS, Moore.	Khasi Hills.
THANAOS INDISTINCTA, Moore.	Martaban.
,, OBSOLETA, Moore.	Cherra. Assam.
PITHAURIA MURDAVA, Moore.	Darjiling.
HALPE BETURIA, Hew.	Andamans. Calcutta.
,, DOLOPIA, Hew.	Darjiling.
PAMPHILA SIVA, Moore.	Khasi Hills
,, SUBOCHRACEA, Moore.	Calcutta.
,, BAMBUSÆ, Moore.	Tenasserim. Calcutta.
,, MASONI, Moore.	Tenasserim.
,, MESOIDES, Butler.	Andamans.
,, MESA, Moore.	Yunan.
,, PURUREA, Moore.	Andamans.
,, GOLA, Moore.	Andamans.
,, OLIVASCENS, Moore.	Tenasserim.
,, SUBVITTATUS, Moore.	Tenasserim.
,, SAGARA, Moore.	Bengal.
,, ANGLAS, L.	Java.
,, PALMARUM, Moore.	Calcutta and Nicobars.
,, VEDANGA, Moore.	Butan. Java.
PYRGUS SUPERNA, Moore.	Bengal.
,, DANNA, Moore.	Butan.

Family Lycænidæ.

PITHECOPS HYLAX, Fabr.	Tenasserim. Andamans. Java.
POLYOMMATUS PUSPA, Horsf.	Yunan. Java.
,, KASHMIRA, Moore.	Yunan.
,, CHANDALA, Moore.	Yunan.
,, SANGRA, Moore.	Andamans and Kamorta.
,, VARUNANA, Moore.	
,, KANDURA, Moore.	
,, LAIUS, Cram.	Calcutta.
The larva feeds on <i>Zizyphus</i> (Atkinson).	
,, KARSANDRA, Moore.	Kamorta (<i>vide</i> Cadell).
,, TRANSPECTUS, Moore.	Khasi Hills. E. Bengal.
,, DILECTUS, Moore.	Sikkim. N. Cashar.
LYCENA ROSIMON, Fabr.	Silhet. Java. Nankowri.
,, KANDARPA, Horsf.	Tenasserim. Java.
,, ELPIS, Godart.	Andamans. Tenasserim. Java.
,, PLUTO, Fab.	N. India. Java.
,, <i>L. Nila</i> , Horsf.	
var. <i>Nicobarica</i> .	Nicobars.
,, PANDAVA, Horsf.	Nicobars. Andamans.
,, ROXUS, Godt.	Tenasserim. Java.
,, PSEUDO-ROXUS, Doubl.	Silhet.
,, BÆTICA, L.	N. India. Java.
,, PLINIUS, Fabr.	N. India. Java.
,, THEOPHRASTUS, Fabr.	
,, CNEJUS, Fabr.	Nicobars. Java.
,, ALEXIS, Stoll	Tenasserim. Andamans. Nicobars.
<i>Hesperia Ælianus</i> , Fabr.	
Larva feeds on the <i>Butea frondosa</i> .	

LYCENA ARDATES, Moore.	Andamans.
,, PACIOLUS.	Andamans.
,, STRABO, Fabr.	Andamans and Nicobars.
,, KINKURKA, Feld.	Nicobars.
,, KANKENA, Feld.	Nicobars.
,, KONDULANA, Feld.	Nicobars.
,, PARRHASIUS, Fabr.	Nicobars.
,, MACROPHTHALMA, Feld.	Nicobars.
,, PLUMBEO-MICANS, Wood-Mason.	Andamans.
VAR. <i>Nicobarica</i> .	Nicobars.
,, ETHION, Hew.	Andamans.
,, ELVA, Hew.	Andamans.
,, MANLUENA, Feld.	Nicobars.
CHRYSOPHANUS PHILEAS, L. (28).	Darjiling.
<i>Pap. virgaurea</i> , Scop.	
,, TIMLEUS, Cram.	Bengal.
ILERDA MOOREI, Hew.	Bengal.
,, EPICLES, God.	Darjiling.
,, BRAHMA, Moore.	Darjiling.
,, TAMU, Kollar.	Darjiling.
,, ANDROCIUS, Boisd.	Darjiling.
LYCENESTHES BENGALENSIS, Moore.	
DIPSAS (including <i>Denderix</i>).	
,, VARUNA, Horsf.	Andamans.
,, MELAMPUS, Cramer.	Calcutta. Java.
,, EPIJARBAS, Boisd.	Andamans. Darjiling.
,, SUFFUSA, Moore.	Andamans.
,, ORSEIS, Hew.	Nicobars.
,, BIENESES, Hew.	Andamans.
,, SYLA, Kollar.	Darjiling.
,, ISOCRATES, Fabr.	Darjiling.
,, NISSA, Kollar.	
,, TIMOLEON, Stoll.	Java.
<i>Amb. rochana</i> , Horsf.	
,, PERSE, Hew.	
,, RECTIVITTA, Moore.	N. Cachar.
,, SHISTACEA, Moore.	Calcutta.

The larva of a species of this genus (*D. Isoocrates*, Fabr.) commits great havoc among Pomegranates, and is an especially interesting object of study from the unusual method of procedure adopted by it. According to Mr. Charles King, several larvæ reside in the interior of the same fruit, and before undergoing their metamorphosis, which takes place in the interior, each caterpillar perforates the rind, and in concert with its co-occupants, weaves a strong silken band with the purpose of attaching the fruit firmly to its stalk and preventing its being blown off and coming to the ground. Mr. E. T. Downes, however, was unsuccessful in verifying the interesting observations of Mr. King, as the larvæ, which he surrounded with gauze in order to watch them in the process of weaving the band connecting the fruit with the stalk, declined to re-enter the fruit, and actually underwent their metamorphosis on the outside of it (*vide* Horsfield, Catalogue, p. 36).

AMBLYPODIA LONGINUS, Fabr.	Bengal.
,, PSEUDOLONGINUS, Doubl.	Maulmain. Java.

The larva feeds on a *Loranthus*.

,, VIDURA, Horsf.	Tenasserim. Java.
,, CAMDEO, Doubl.	Tenasserim. Darjiling.
,, QUERCETORUM, Boisd.	Yunan. Silhet.
,, CLEOBIS, God.	
,, <i>hypatada</i> , Moore.	

AMBLYPODIA	TIMOLEON, Stoll.	Butan.
"	<i>Iycu</i> , Doubl.	
"	NARADA, Horsf.	Java.
"	RAMA, Kollar.	Darjiling.
"	AMERIA, Hew.	
"	DEVA, Moore.	
"	ABSENS, Hew.	
"	ARESTE, Hew.	Darjiling.
"	FULGIDA, Feld.	
"	ATRAX, Hew.	
"	SILHETENSIS, Boisd.	Silhet.
"	AMANTES, Hew.	
"	PERIMUTA, Boisd.	Silhet.
"	CHINENSIS, Feld.	Darjiling.
"	ECMOLPUS, Cram.	Java. Bengal.
"	CENTAURUS, Fabr.	Darjiling.
"	<i>A. nakula</i> , Feld.	
CAMENA	CTESIA, Hew.	
PORITIA	HEWITSONI, Moore.	
APHNEUS	LOHITA, Horsf.	Java.
var.	<i>Zoilus</i> , Moore.	Andamans.
"	ANTIJARBAS, Boisd.	
"	ETOLUS, Cram.	Bengal. Java.
"	SYAMA, Horsf.	Java.
"	ICTIS, Hew.	Calcutta.
"	LUNULIFERA, Moore.	Darjiling.
HYPOLYCENA	OTHOXA, Hew.	
"	AMASA, Hew.	Martaban.
<i>P. etolus</i> ,	Fabr.	
"	ERYLUS, Fabr.	Andamans.
"	ANDAMANA, Moore.	Andamans.
NARATHURA	MOOLAIANA, Moore.	Tenasserim.
	<i>Amblypodia epimuta</i> Hew. (non Moore).	
MYRINA	LAPITHIS, Boisd.	Martaban.
"	SUGRIVA, Horsf.	Martaban. Java.
var.	<i>areca</i> , Feld.	Nicobars.
"	THECLOIDES, Feld.	Nicobars. Singapore.
"	KAMORTA, Feld.	Nicobars.
"	WESTERMANNII, Feld.	Andamans.
"	TARPINA, Hew.	Andamans.
"	LISIAS, Fabr.	Martaban. Tenasserim.
"	JAFRA, God.	Yunan. Tenasserim. Java.
"	PRABHA, Moore.	Andamans.
"	FREJA, Fabr.	Tenasserim.
"	HYPATULA, Boisd.	Martaban.
"	ELTOLA, Hew.	Andamans.
"	ACTE, Doubl.	Bengal.
"	TRIOPAS, Cram.	Calcutta.
"	JALINDRA, Horsf.	Balasar.
"	<i>S. thymbræus</i> , Hübn.	
"	MANDARINA, Doubl.	
"	JANGALA, Horsf.	Darjiling. Java.
"	RAVATA, Moore.*	Bengal.
"	ONYX, Boisd.	Darjiling.
LOXURA	ATYMNUS, Cram.	Tenasserim. Nankowri. Java.
"	TRIPUNCTATA, Hew.	Bengal.
CURETIS	DUCALIS, Moore.	Darjiling.
"	SARONIS, Moore.	Andamans. Tenasserim.

ANOPS STIGMATA, Moore.	Tenasserim.
„ THETYS, Drury. ♀	Martaban. Nicobars. Canara.
<i>Pap. cinyra</i> , Cram. ♂	
„ BULIS, Boisd.	Martaban. Darjiling.
MILETUS SYMETHUS, Cram.	Tenasserim.
„ BOISDUVALI, Moore.	Darjiling.
„ DRUMILA, Moore.	Bengal.

Family Erycinidæ.

ZEMEROS FLEGYAS, Cram.	Tenasserim. Yunan.
TAXILA FYLLA, Boisd.	Yunan.
„ NEOPHIRON, Boisd.	Yunan. Tenasserim.
„ ECHERIUS, Stoll.	Martaban.
„ ANGULATA, Moore.	Tenasserim.
DODONA DIFREEA, Hew.	Bengal.
„ EGEON, Boisd.	Bengal.
„ ADONIRA, Hew.	Bengal.
„ OUIDA, Hew.	Bengal.
<i>Taxila Erato</i> , Boisd.	
„ DEODATA, Hew.	Maulmain.
„ LONGICAUDATA, L. de Nicéville.	Assam.
ABISARA KAUSAMBI, Feld.	Andamans. Java. Sumatra.
„ BIFASCIATA, Moore.	Andamans and Nicobars.

Family Satyridæ.

DEBIS CHANDICA, Moore.	Yunan. Darjiling. Java.
„ DYTLE, Feld.	Yunan.
„ LATIARIS, Hew.	Yunan.
„ SINORIX, Hew.	Bengal.
„ ROHRIA, Fabr.	Tenasserim. Yunan. Java.
„ <i>D. isana</i> , Kollar.	
„ VERNA, Koll.	Tenasserim. Yunan. Darjiling.
„ EUROPA, Fabr.	Yunan. Andamans. Java.
„ MEKARA, Moore.	Tenasserim. Darjiling.
„ ARCADIA, Cram.	Tenasserim. Java.
„ VISRAVA, Moore.	
„ NEILGHERRIENSIS, Guérin.	Darjiling.
„ SIDONIS, Hew.	
„ NICETAS, Hew.	
„ BHAIRAVA, Moore.	Darjiling.
„ SCANDA, Moore, ♂	Darjiling.
„ NADA, Moore. ♀	Darjiling.
„ KANSA, Moore.	Darjiling.
ZOPHOESSA SURA, Doubl. et Hew.	Darjiling.
„ GOALPARA, Moore.	
„ BALADEVA, Moore.	
„ YAMA, Moore.	Butan.
„ ANDERSONI, Atkinson.	Yunan.
CALLEREBIA ORIXA, Moore.	Khasi Hills.
SATYRUS AVATARA, Moore.	
„ SWAHA, Kollar.	Darjiling.
LASTOMMATA SATRICUS, Doubl. et Hew.	
„ SCHRAKRA, Kollar.	Darjiling.
NEOPE PULAHA, Moore.	Yunan. Butan.
„ BHADRA, Moore.	Darjiling.
„ BHIMA, Marshall.	Tenasserim.

ZETHERA DIADEMOIDES, Moore.	Tenasserim.
ERITES ANGULARIS, Moore.	Tenasserim.
ZIPHAËTES SCYLAX, Hew.	
ETHOPE HIMACHALA, Moore.	
<i>Niorina Sita</i> , Feld.	
<i>Tisiphone Sufta</i> , Boisd.	
MYCALESIS MINEUS, L.	Tenasserim. Andamans.
,, PERSEUS, Fabr.	Tenasserim.
,, BLASIUS, Fabr.	Tenasserim.
,, MEDUS, Fabr.	Nicobars.
,, DRUSIA, Cram.	Nicobars. Andamans. Darjiling.
,, SAMBA, Moore.	Andamans. Yunan.
,, <i>M. lalasis</i> , Hew.	
,, ANAXIAS, Hew.	Tenasserim.
,, OTRIA, Cram.	Yunan. Andamans. Java. Butan.
,, RUNEKA, Moore.	Yunan. Tenasserim. Assam.
,, FRANCISCA, Cram.	Assam.
,, MALSARA, Moore.	Yunan. Darjiling.
,, NALA, Feld.	Yunan.
,, SANATANA, Moore.	Darjiling.
,, RADZA, Moore.	Andamans.
,, HESIONE, Cram.	Java. N. India.
,, VISALA, Moore.	Darjiling.
,, NICOTIA, Hew.	
,, HERI, Moore.	Butan.
,, KHASIANA, Moore.	Khasi Hills.
,, CHARAKA, Moore.	N.E. Bengal.
ELYMNIA LAIS, Boisd.	Martaban. Bengal.
,, MIMUS, Wood-Mason et Léon. de Nic.	
,, UNDULARIS, Boisd.	Martaban.
Larva feeds on the <i>Corypha umbraculifera</i> .	
,, COTTONIS, Hew.	Andamans.
,, TINCTORIA, Moore.	Tenasserim.
,, VASUDEVA, Moore.	Tenasserim.
,, LEUCOCYMA, Godt.	Tenasserim.
CULAPA MNASICLES, Hew.	Tenasserim.
YPHTHIMA LYSANDRA, Cram.	Java. Darjiling.
,, PHILOMELA, Hübn.	
,, BALDUS, Fab.	
,, METHORA, Hew.	Yunan. Tenasserim.
,, HYAGRIVA, Moore.	Darjiling.
,, NEWARA, Moore.	Yunan.
,, NARASINGHA, Moore.	Darjiling.
,, SAKRA, Moore.	Darjiling.
MELANITIS UNDULARIS, Fabr.	Bengal.
,, VASUDEVA, Moore.	Silhet.
,, MALELAS, Hew.	Bengal.
,, PATNA, Westw. et Hew.	Bengal.
CYLLO LEDA, L.	Tenasserim. Darjiling. Andamans.
,, CONSTANTIA, Cram.	Darjiling.
,, BANKSIA, Fabr.	Tenasserim. Yunan. Darjiling.
<i>M. Ismene</i> , Cram.	
,, VAMANA, Moore.	Yunan. Darjiling.
,, BELA, Moore.	Tenasserim. Darjiling.
,, ASWA, Moore.	
,, SURADEVA, Moore.	Darjiling.
ORINOMA DAMARIS, Gray.	Yunan. Darjiling.

Family **Libytheidæ.**

LIBYTHEA MYRRHA, Godt.	Tenasserim.
„ LEPTA, Moore.	

Family **Nymphalidæ.**

VANESSA KASHMIRENSIS, Kollar.	Butan.
„ CHARONIA, Drury.	
SYMBRENTHIA NIPHAUDA, Moore.	Sikkim.
PYRAMEIS CARDUI, L.	Andamans. Kamorta. Darjiling. Java.

The larva feeds on a species of *Artemisia*.

„ INDICA, Herbst.	
„ CALLIRHOË, Hübn.	Pinang. Darjiling.
JUNONIA ORITHYIA, L.	Yunan. Tenasserim. Java. Butan.

The larva feeds on a species of *Vitex*.

„ LAOMEDIA, L.	Yunan. Tenasserim. Nicobars.
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The larva feeds on a species of *Achyranthis*.

„ LEMONIAS, L.	Yunan. Tenasserim. Assam.
„ ALMANA, L.	Yunan. Tenasserim. Andamans.
„ ASTERIE, L.	Yunan. Andamans. Java.
var. <i>Nicobariensis</i> .	Kar Nicobar.

The larva feeds on a species of *Justicia*.

„ CENONE, L.	Yunan. Andamans.
„ NICOBARIENSIS, Feld.	Nicobars.
PRECIS IPHITA, Cram.	Yunan. Andamans. Tenasserim.
„ HARA, Moore.	Yunan. Silhet.
„ VEDA, Kollar.	

A water-loving insect flying along a regular beat, up and down the beds of streams, occasionally settling on a leaf, but darting off in pursuit of any intruder. It is a very wary insect, and not easy to capture unless waited for in the line of its flight, when a quick stroke of the net may secure it (Nicéville).

ERGOLIS CORYTA, Cram.	Assam. Java.
„ ARIADNE, L.	Yunan. Tenasserim. Darjiling.
CYNTHIA AKSINÖE, Cram.	Martaban. Darjiling. Java.
„ EROTA, Fabr.	Andamans.
EURYTELA HORSFIELDII, Boisd.	Andamans.
AMATHUSIA PHIDIPPUS, L.	Tenasserim. Andamans.

The larva feeds on the young leaves of *Cocos nucifera*.

CYRESTIS THYODAMAS, Boisd.	Tenasserim. Andamans. Darjiling.
„ RISA, Doubl.	Tenasserim. Darjiling.

This species, as well as *C. Thyodamas*, has the habit of suddenly settling with wings wide outspread on the *under side* of a leaf parallel to the ground, where it is completely hidden. This feat of gymnastics is confined to this genus alone, as far as my experience goes, and must be a great protection to it from its enemies. The disappearance of the insect is so rapid, that unless one has actually watched it settle on the leaf, it seems like magic (Nicéville).

„ COCLES, Fabr.	Tenasserim. Andamans.
„ FORMOSA, Feld.	Andamans.
PARTHENOS GAMBRISIUS, Fabr.	Tenasserim. Andamans. Pinang.
„ APICALIS, Moore.	Tenasserim.
PROTHOË FRANKII, Godt.	Tenasserim. Java.
CIRROCHROA SURYA, Moore.	Tenasserim.
„ AORIS, Doubl. et Hew.	Yunan. Darjiling.

CIRKOCHROA MITHILA, Moore.	Yunan. Bengal.
" ANJIRA, Moore.	Andamans.
" NICOBARICA, Wood-Mason et Léon. de Nic.	Nicobars.
CETHOSIA CYANE, Fabr.	Yunan. Darjiling.
" BIBLIS, Drury.	Yunan. Darjiling.
" NICOBARICA, Feld.	Andamans. Nicobars.
The larva of some species of this genus feeds on the <i>Passion-flower</i> .	
ARGYNNIS NIPHE, L.	Yunan. Darjiling. Pinang.
" RUPRA, Moore.	Yunan.
" CHILDRENI, G. R. Gray.	Yunan.
" ISSEA, Gray.	Butan.
MESSARAS ERYMANTHIS, Drury.	Tenasserim. Nicobars. Java.
" NICOBARICA, Feld.	Andamans. Nicobars.
" ALCIPPE, Cram.	Andamans. Silhet. Borneo.
ATELLA PHALANTA, Drury.	Yunan. Java.
The larva feeds on a species of <i>Leora</i> .	
" EGISTA, Cram.	Java. Tenasserim. N. India.
" SINHA, Kollar.	Bengal.
" ALCIPPE, Doubl.	Katschall Island. Andamans.
LAOGONA HYPOCLA, Cram.	Yunan. Darjiling. Java.
" HYPOCLIS, Godt.	Bengal.
DIADEMA BOLINA, L.	Yunan. Andamans. Java.
" MISIPPUS, L.	Nicobars.
" AUGE, Cram.	Andamans. Nicobars. Java.
" <i>D. Jacintha</i> , Fabr.	
PENTREMA LISARDA, Doubl. et Hew.	Darjiling.
" DARLISA, Moore.	Tenasserim.
" BINGHAMI, Wood-Mason.	Martaban.
HESTERIA NAMA, Doubl. et Hew.	Yunan. Darjiling.
" PERSIMILIS, Westw.	Yunan. Darjiling.
EURIPUS NYCTELIUS, Doubl.	
" CONSIMILIS, West.	Martaban.
" HALIROTHIUS, Westw.	Darjiling.
" HALITHERSES, Doubl. et Hew.	Yunan. Darjiling.
" ISA, Moore.	Darjiling.
" <i>E. haliartus</i> , Feld.	
LEBADEA ATTENUATA, Moore.	Tenasserim.
" AUSTENIA, Moore.	Khasi Hills.
NEPTIS CNACALIS, Hew.	Andamans.
" NICOBARICA, Moore.	Nicobars.
" ANANTA, Moore.	Yunan.
" NANDINA, Moore.	Yunan. Darjiling. Java.
" HORDONIA, Stoll.	Yunan. Java. Siliguri.
" EMODES, Moore.	Yunan. Sikkim. Khasi Hills.
" MIAN, Moore.	Darjiling.
" AMBA, Moore.	Yunan.
" ACERIS, Esper.	Darjiling. Java.
" SOMA, Moore.	Yunan. Silhet. Tenasserim.
" VIKASI, Horsf.	Darjiling.
" MANANDA, Moore.	Andamans and Kar Nicobar.
" COLUMELLA, Cram.	Darjiling. Ceylon.
" ANDAMANA, Moore.	Andamans.
" METANA, Moore.	Tenasserim.
" JAMBAH, Moore.	Tenasserim. Darjiling. Ceylon.
" MATUTA, Hübn.	Nankowri Island.
" ADIPALA, Moore.	Tenasserim. Khasi Hills.

NEPTIS PLAGIOSA, Moore.	Tenasserim.
,, RUDHA, Moore.	Butan.
,, OPHIANA, Moore.	Sikkim.
,, KAMARUPA, Moore.	Assam.
,, KHASIANA, Moore.	Khasi Hills.
,, HARITA, Moore.	E. Bengal.
,, CLINIA, Moore.	Bengal.
,, VIRAJA, Moore.	N.E. Bengal.
,, SUSRUTA, Moore.	Siliguri.
ATHYMA ZEROCA, Moore.	Khasi Hills.
,, LEUCOTHOE, L.	Yunan. Darjiling. Java.
,, NEFTE, Cram.	Tenasserim.
,, SELENOPHORA, Koll.	Yunan. Andamans. Darjiling.
,, OPALINA, Kollar.	Darjiling.
,, CAMA, Moore.	Yunan. Darjiling.
,, CIBARITIS, Hew.	Andamans and Nankowri Island.
,, RANGA, Moore.	Darjiling.
,, JAHNU, Moore.	Tenasserim. Darjiling.
,, CHEVANA, Moore.	
,, ACONTIUS, Hew.	Andamans.
,, SUBRATA, Moore.	
,, TAGGANA, Moore.	Tenasserim.
,, BAHULA, Moore.	
,, EVELINA, Stoll.	Tenasserim.
,, MAHESA, Moore.	Darjiling.
,, COCYTUS, Fabr.	Tenasserim.
,, ZEROCA, Moore.	Khasi Hills.
,, EPIONA, G. R. Gray.	
,, <i>Doubledayi</i> , Boisd.	
,, JINA, Moore.	Darjiling.
,, INARA, Doubl. et Hew.	Darjiling.

The males of this genus are especially fond of settling in damp spots to suck up the moisture.

SYMBRENTHIA COTANDA, Moore.	Darjiling.
,, KHASIANA, Moore.	Khasi Hills.
ABROTA GANGA, Moore.	Darjiling.
<i>Adelius confinis</i> , Feld. ♀	
,, JUMNA, Moore.	Darjiling.
LIMENITIS DARAXA, Doubl.	Yunan. Darjiling.
,, PROCRIS, Cram.	Tenasserim. Java. Bengal.
var. <i>anarta</i> , Moore.	Andamans.

The larva feeds on a species of *Nauclea*.

,, ZULEMA, Doubl. et Hew.	Darjiling.
,, ISMENE, Doubl. et Hew.	Sillet.
,, ZAYLA, Doubl. et Hew.	Darjiling.
,, DANAVA, Moore.	
,, DUDU, Westw. et Hew.	Darjiling.
HERONA ANGUSTATA, Moore.	Tenasserim.
,, MARATHUS, Doubl.	Darjiling. Assam.
var. <i>Andamana</i> , Moore.	Andamans.
DILIPA MARGIANA, Westw.	Khasi Hills.
CASTALIA CHANDRA, Moore.	Yunan. Darjiling.
APATURA AMBICA, Kollar.	Darjiling.
,, PARISATIS, West. et Hew.	Darjiling. Java.
,, PARVATA, Moore.	
,, SORDIDA, Atkinson.	

HELICERA HEMINA, Hew.	
ADOLIAS ALPHEDA, God.	
" LEPIDEA, Butler.	Yunan. Tenasserim.
" GARFDA, Moore.	Yunan. Bengal.
Larva feeds on <i>Trophis aspera</i> , <i>Bryonia</i> and 'Mango' (Grote).	
" SATROPACES, Hew.	Tenasserim.
" FRANCLE, G. R. Gray.	Yunan. Darjiling.
" <i>A. raja</i> , Feld.	
" PARVULA, Moore.	Tenasserim.
" DISCISPILOTA, Moore.	Tenasserim.
var. <i>A. latimargo</i> , Moore.	Andamans.
" SANCARA, Moore.	Darjiling.
" IVA, Moore.	Darjiling.
" LADA, Boisd.	
" EUMOLPHUS, Cram.	Tenasserim.
" ANTHELUS, Boisd.	Tenasserim.
" ADIMA, Moore.	Assam.
" PSEUDO-CENTAURUS, Doubl.	Tenasserim.
" MYCALE, Boisd.	
" EPIMUTA, Boisd.	
" ZETA, Moore.	Andamans.
" TAOOANA, Moore.	Tenasserim.
" NARADA, Hofs.	Andamans.
" NAKILA, Feld.	Tenasserim.
" CENTAURUS, Fabr.	Andamans.
" VIHARA, Feld.	Andamans.
" PHEMIUS, Doubl.	Darjiling.
" KESAVA, Moore.	
" SAMADA, Moore.	
" APIADES, Menetr.	Darjiling.
" <i>A. sedera</i> , Moore.	
" TOLCHINIA, Menetr.	
" APHIDAS, Hew.	
" BALARAMA, Moore.	
" LUBENTINA, Cram.	Bengal.
Larva feeds on <i>Loranthus</i> (Grote).	
" COCYTUS, Fabr.	Bengal. Canara.
" NESIMACHUS, Boisd.	
" NICEA, Gray.	Darjiling.
" DURGA, Moore.	Darjiling.
" SAHADEVA, Moore.	
" NESIMACHUS, Boisd.	Darjiling.
" CONFUCIUS, Westw.	
" SIVA, Westw.	Darjiling. Yunan.
LEXIAS DIRTEA, Fabr.	Yunan. Assam. Borneo.
<i>A. Boisduvalii</i> , G. R. Gray.	
THADUCA MULTICAUDATA, Moore.	Tenasserim.
SYMPLEBRA THYELIA, Fabr.	
" TEUTA, Doubl. et Hew.	Silhet. Java.
" var. TEUTOIDES, Moore.	Andamans.
NYMPHALIS ATHAMAS, Drury.	Yunan. Andamans. Tenasserim.
" BERNARDUS, Fabr.	Tenasserim. Darjiling.
" MARMAX, Westw.	Tenasserim.
" AGNA, Moore.	Tenasserim.
" DELPHIS, Doubl.	Bengal.
" SAMATHA, Moore.	Tenasserim.

NYMPHALIS DELPHIS, Doubl. (419).	Silhet.
„ DESA, Moore.	Tenasserim.
„ HARPAX, Feld.	Tenasserim.
„ FABICUS, Fabr.	
„ DOLON, Westw.	Darjiling.
„ EUDAMIPPUS, Doubl.	Darjiling.
KALLIMA BISALTIÆ, Cram.	Tenasserim. Andamans. Darjiling.
„ PRATIPA, Feld.	Tenasserim. Andamans.
„ LIMBORGII, Moore.	Tenasserim.
„ ALBOFASCIATA, Moore.	Andamans.
„ INACHIS, Boisd.	Yunan. Darjiling.

This species, when flying, turns off at right angles to settle with closed wings and *head downwards* on a stem of bamboo, when its close similitude to a dead leaf renders its detection almost an impossibility, unless the actual spot where it alighted had been marked. This suddenly turning off to settle, at right angles to its line of flight, is what I have observed in no other butterfly (Nicéville).

THAUMANTIS DIORES, Doubl.	Cherra.
„ NOURMAHAL, Westw.	Darjiling.
„ CAMADEVA, Westw.	Darjiling.
„ RAMDEO, Moore.	Darjiling.

Family Morphidæ.

ZEUXIDIA MASONI, Moore.	Tenasserim.
DISCOPHORA TALLIA, Cram.	Tenasserim. Darjiling.
„ CELINDE, Stoll.	Andamans. Darjiling.
The larva feeds on the young leaves of <i>Cocos nucifera</i> .	
„ ZAL, Westw.	Tenasserim.
„ NECRO, Feld.	Tenasserim. Andamans.
ENISPE EUTHYMIUS, Doubl.	Darjiling.
„ CYCNUS, West.	Bengal.
NEORINA HILDA, Westw. et Hew.	Darjiling.
„ KRISINA, Westw. et Hew.	Bengal.
AMATHUSIA AMYTHAON, Doubl.	Silhet.
„ PHIDIPPUS.	Pinang. Java.
The larva feeds on <i>Cocos nucifera</i> in Java.	
ÆMONA AMATHUSIA, Hew.	Naga Hills.
„ LENA, Atkinson.	Yunan. Andamans.
„ PEALII, Wood-Mason.	Assam.
CLEROME ARCESILAUS, Fabr.	Tenasserim.
THAUMANTIAS LOUISA, Wood-Mason.	Tenasserim.

Family Danaidæ.

DANAIS TYTIA, Gray.	Tenasserim. Yunan. Butan.
„ LIMNIACÆ, Cram.	Yunan. Nicobars. Java.
The larva in Java feeds on a species of <i>Epibatharium</i> .	
„ GRAMMICA, Boisd.	Nicobars.
„ MELISSA, Cram.	Yunan. Java.
„ SIMILIS, L.	Java. N. India.
„ NESIPPUS, Feld.	Nicobars.
„ PLEXIPPUS, L.	Tenasserim. Nicobars. Yunan.
„ HEGESIPPUS, Cram.	Bengal. Pinang. Nicobars.
„ var. MELANIPPUS, Cram.	
„ CHRYSIPPUS, L.	Tenasserim. Yunan. Sikkim.

The larva feeds on the *Asclepias gigantea*.

DANAIS LEOPARDUS, Butler.			
„ AGLEA, Cram.	Tenasserim.	Yunan.	Butan.
„ SEPTENTRIONIS, Butler.	Tenasserim.	Sikkim.	
„ VULGARIS, Butler.	Tenasserim.		
„ MELANEUS, Cram.	Tenasserim.	Java.	Sikkim.
„ MELANOLEUCA, Moore.	Andamans.		
„ AGLEOIDES, Feld.	Nieobars.		
SALPINX RHADAMANTHUS, Fabr.	Tenasserim.		
„ CRASSA, Butler.	Tenasserim.		
„ MASONI, Moore.	Tenasserim.		
„ MARGARITA, Butler.	Tenasserim.		
TREPESICHOIS MIDAMUS, L.	Tenasserim.	Yunan.	Sikkim.

The larva feeds on a species of *Ficus*.

CRASTEIA CUPREIPENNIS, Moore.	Tenasserim.		
IDEOPSIS DAOS, Boisd.	Tenasserim.		
HESTIA CADELLI, Wood-Mason.	Andamans.		
„ HADENI, Wood-Mason.	Pegu.		
„ AOAMARSCHANA, Feld.	Andamans.		
STRICTOPLA GROTEI, Feld.	Tenasserim.		
EUPLOEA ALCATHOE, Godt.	Tenasserim.	Silhet.	
„ KLUGII, Moore.	Tenasserim.	Yunan.	Butan.
„ SIAMENSIS, Feld.	Yunan.		
„ ANDAMANENSIS, Atkinson.	Andamans.		
„ SIMULATRIX, Mason et Nicé.			
„ CORE, Cram.	Andamans.		
„ LIMBORGII, Moore.	Tenasserim.		
„ SUBBITA, Moore.	Tenasserim.		
„ GODARTI, Lucas.	Tenasserim.		
„ NOVARA, Feld.	Nieobars.		
„ ESPERI, Feld.	Nieobars.		
„ CAMORTA, Moore.	Nieobars.		
„ DOUBLEDAYI, Westw.			
„ DEIONE, Westw.	Darjiling.		
TELCHINIA VIOLE, Fabr.	Bengal.		
PAREBA VESTA, Fabr.	Yunan.	Darjiling.	

The larva feeds on *Passiflora* and *Thunbergia* (Grote) (and on *Urtica* in Java).

Family Pieridæ.

PRIONERIS CLEMANTHE, Doubl.	Tenasserim.	Martaban.
<i>P. Helfer</i> i, Feld.		
„ SETA, MOORE, ♀	Butan.	
„ TRESTYLIS, Doubl.	Yunan.	Butan.

Moore considers the last the female of this species, but Butler considers them distinct (*P. Z. S.* 1865, 759; 1872, 27).

„ WATSONI.	Tenasserim.	Silhet.
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Very like a dwarf var. of *P. Seta* ♂, but with a female more nearly resembling itself (Butler, *l.c.*).

DELIAS DESCOMBESI, Boisd.	Martaban.	Pinang.	Nipal.
„ AGOSTINA, Hew.	Darjiling.		
„ EUCHARIS, Drury.	Nipal.	Ceylon.	Pinang.

The larva feeds on *Loranthus* (Grote).

„ BELLADONNA, Fabr.			
„ PASITHOE, L.	Tenasserim.	Martaban.	Yunan.
<i>P. Aglaia</i> , L.			

<i>P. Dione</i> , Drury.	
<i>P. Porscena</i> , Cram.	
DELIAS SANACA, Moore.	Darjiling.
" HYPERETE, L.	Assam. Pinang. Java.
<i>P. Autonoe</i> , Cram. ♀	
" DIVACA, Moore.	Burma.
" HIERTE, Hübn.	Siam. Pinang.
var. INDICA, Wallace.	Martaban. Barrackpur.
" THISBE, Cram.	Darjiling. China.
AMIAS LIBYTHEA, Fabr.	Tenasserim. Punjab. Ceylon.
<i>Pap. Zelniera</i> , Cram. (Pap. Exot. Pl. 320, f. E. F).	
<i>Pier. libitina</i> , Godt.	
<i>Pier. Nerissa</i> , Godt.	
<i>Pier. Rouxi</i> , Boisd.	
" ZELMIRA Cram. (Pap. Exot. Pl. 320, f. C. D).	Martaban.
<i>Pier. Larissa</i> , Feld.	Silhet.
" DARADA, Feld.	Martaban.
" GALATHEA, Feld.	Nicobars.
" ALOPE, Wallace.	Tenasserim. Java. Borneo.
<i>Pier. amasene</i> , Boisd.	
<i>Pier. neombo</i> , Moore. (C.L.E.I.C.).	Tenasserim.
" DAPHA, Moore.	Tenasserim.
" PAULINA, Cram.	Tenasserim. Andamans. Martaban.
" HIPPO, Cram.	Ceylon. Darjiling.
" GALBA, Wallace.	Silhet.
" COLIMBA, Boisd. ♂	Silhet.
<i>Pier. Indra</i> , Moore. ♀	
" LALAGE, Doubl. ♀	Silhet. Yunan. Assam.
<i>P. durvasa</i> , Moore. ♀	
" VACANS, Butler. ♂	Tenasserim. Darjiling.
BELENOIS MESENTINA, Cram.	Ceylon. Barrackpur.
<i>Pap. aurota</i> , Fab.	

The larva feeds on *Capparis sepiaria* and *Zizyphus* (Grote).

PONTIA NERISSA, Fab.	Sikkim. Martaban. Nipal.
<i>Pap. amasene</i> , Cram.	
<i>Pap. coronis</i> , Cram.	
" ZEUXIPPE, Cram.	
<i>P. cassida</i> , Fab.	
<i>Pier. hira</i> , Moore.	
" AMALIA, Vollenhoven.	Martaban. Singapore.
" PHRYNE, Fabr.	Martaban. Yunan. Masuri.
" REMBE, Moore.	Ceylon.
var. <i>Pier. amba</i> , Wallace.	Tenasserim.
" LEA, Doubl.	Martaban.
" NADINA, Lucas.	Silhet.
var. (Pier.) NAMA, Moore.	Tenasserim. Andamans. Yunan.
" NINA, Fabr.	Tenasserim. Java. Canara.
<i>Pap. xiphias</i> , Fabr.	
COLIAS EDUSA, Fabr.	Yunan. Butan.
var. FIELDII, Menet.	
IDMAIS CALAIS, Cram.	Balasor. Madras.
TERIAS HECABE, L.	Yunan. Tenasserim. Nicobars.

The larva feeds on a species of *Eschynomene*.

" SILHETANA, Wallace.	Yunan.
" VENATA, Moore.	Tenasserim. Yunan.
" SUAVA, Boisd.	Tenasserim.

TERIAS FORMOSA, Hübn.	Andamans. Tenasserim.
„ LETA, Boisd.	Tenasserim. Cuttack. Darjiling.
„ NICOBARIENSIS, Feld.	Andamans. Nicobars.
„ HARINA, Hofs.	Andamans. Java. Darjiling.
„ PAULINA, Feld.	Nicobars.
var. <i>Galathea</i> .	Nicobars.
„ DRONA, Hofs.	Darjiling. Nicobars. Java.
„ BLANDA, Boisd.	Darjiling. China.
„ PANDA, Godt.	Great Nicobar. Java.
ERONIA AVATAR, Moore.	Darjiling.
„ VALERIA, Cram.	Java. N. India.
<i>Pieris indica</i> , Doubl.	
<i>P. hippia</i> , Fabr.	Yunan.
<i>Thyca indica</i> , Wallace (?).	Martaban.
„ SARAKA, Moore.	Andamans.
„ LUTESCENS, Butler.	Tenasserim.
PIERIS NELETE, Menet.	Yunan.
„ LICHENOSA, Moore.	Andamans. Kar Nicobar.
„ DEVACA, Moore.	Burma.
„ CLEONORA, Boisd.	Martaban.
„ LAGELA, Moore.	Tenasserim.
METAPORIA AGATHON, Gray.	Nipal. Cherra.
„ PHRYXE, Boisd.	Butan.
SYNCHLŒ CANIDIA, Sparrman.	Yunan. Silhet. Punjab.
<i>Pap. gliciria</i> , Cram.	Hongkong.
<i>Pier. glaphyra</i> , Godt.	
„ NIPALENSIS, Gray.	
<i>Pier. Brassicae</i> , L. var. E.	
HEBOMOIA GLAUCIPPE, L.	Tenasserim. Andamans. Yunan.
The larva feeds on a species of <i>Capparis</i> .	
„ REPSTORFFI, Wood-Mason.	Andamans.
IXIAS EVIPPE, Drury.	Darjiling.
„ LATIFASCIATUS, Moore.	Maulmain.
„ SESIA, Fabr.	Bhutan.
„ ANEXIBIA, Hübn.	Bengal.
<i>Pap. pyrene</i> , Cram., Figs. A. C.	
„ PYRENE, L.	Yunan. Butan. Silhet.
<i>Pap. anippe</i> , Cram., Figs. C. D.	
„ MARIANNE, Cram.	Maulmain. Ceylon.
„ VENATRIX, Wallace.	Maulmain.
„ CITRINA, Moore.	Tenasserim.
„ PALLIDA, Moore.	Tenasserim.
„ MAULMEINENSIS, Moore.	Tenasserim.
„ ANDAMANA, Moore.	Andamans.
„ VENILIA, Godt.	Martaban. Java.
CALLIDRYAS PYRANTHE, L.	Malda. Andamans. Yunan.
<i>P. chryseis</i> , Drury.	
„ PHILIPPINA, Cram.	Tenasserim. Andamans.
„ CATILLA, Cram.	Malda. Martaban. Yunan. Java.
„ HILARIA, Cram.	Tenasserim. Andamans. Nicobars.
„ CROCALE, Cram.	Malda. Java. Yunan.
„ ALCMEONE.	Yunan. Darjiling.
DERCAS VERUELLI, Van der Hoeven.	Yunan. Bengal.
NISONIADES DASAHARA, Moore.	Tenasserim.
„ INDISTINCTA, Moore.	Bengal.
„ SALSALA, Moore.	Tenasserim. Java.
„ DIOCLES, Boisd.	Tenasserim.
„ SUBFASCIATUS, Moore.	

Family **Papilionidæ.**

ORNITHOPTERA HELLACONOIDES, Moore.	Andamans.
„ POMPEUS, Cram.	Darjiling.
The larva feeds on an <i>Aristolochia</i> .	
„ RHADAMANTHUS, Boisd.	Martaban. Darjiling.
BRUTANTIUS LIDDERDALII, Atkinson.	Buxa.
PAPILIS AGESTOR, Gray.	Darjiling.
„ ANTIPHATES, Cram.	Tenasserim. Andamans. Yunan.
The larva feeds on a species of <i>Uvaria</i> .	
„ AGAMEMNON, L.	Tenasserim. Andamans. Nicobars.
The larva feeds on a species of <i>Uvaria</i> .	
„ ARCTURUS, Westw.	Darjiling.
„ ALCMENOR.	Tenasserim.
„ ANDROGEOS, Cram.	Darjiling. Siligori.
„ AGETES, Westw.	Darjiling.
„ ANTICRATES, Doubl.	Darjiling.
„ ARISTOLOCHIE, Fabr.	Tenasserim. Nicobars. Sikkim.
var. <i>Kamorta</i> , Moore.	
„ BOOTES, Westw.	Bengal.
„ CASTOR, Westw.	Yunan. Silhet.
„ CARYAPA, Moore.	Calcutta.
„ CHAON, Westw.	Cherra. Borneo.
„ CHIRON, Wallace.	Yunan.
<i>P. bathycles</i> .	
„ CLOANTHUS, Westw.	Yunan. Masuri.
„ COON, Fabr.	Martaban. China.
„ CHARICLES, Hew.	Andamans.
„ DASARADA, Moore.	Cherra.
„ DIPHILUS, Esper.	Bengal.
„ DISSIMILIS, L.	Yunan. Masuri. Ceylon.
<i>P. Panope</i> , L.	
<i>P. Clytia</i> , L.	
var. FLAVOLIMBATUS, Ober.	Andamans.
„ DELOLEON, Cram.	Martaban.
<i>P. Cresphrontes</i> , Fabr.	
„ DOUBLEDAYI, Wallace.	Martaban. Tenasserim.
The larva feeds on a species of <i>Fagara</i> , in Java.	
„ ELEPHENOR, Doubl.	Silhet.
„ EPHYCIDES, Hew.	Darjiling.
„ EVAN, Doubl.	Silhet.
„ ERITHONIUS, Cram.	Yunan. Bengal. Canara.
The larva feeds on the Citron.	
„ EURYPYLUS, L.	Tenasserim. Andamans. Silhet.
„ GLYCERION, Gray.	
„ GANESA, Doubl.	Darjiling.
„ GYAS, Westw.	Darjiling.
„ HECTOR.	Bengal. Ceylon.
The larva feeds on <i>Aristolochia indica</i> .	
„ HELENUS, L.	Tenasserim. Darjiling. Java.
„ JANAKA, Moore.	Darjiling.
„ JASON, Esper.	Balasar.
Larva feeds on <i>Michelia champa</i> and <i>Uvaria longifolia</i> (Grote).	
„ ICARIUS, Westw.	

PAPILIS KRISHNA, Moore.	Butan.
„ LESTRYGONUM, Wood-Mason.	Andamans.
„ MAYO, Atkinson.	Andamans.
„ MAHADEVA, Moore.	Tenasserim.
„ MEGARUS, West.	Tenasserim. Silhet.
„ MINCRENE, Gray.	Darjiling.
„ MEMNON, L.	Martaban.
<i>P. Laomedon</i> , Cram.	
<i>P. Androgeos</i> , Cram.	Tenasserim.
„ MACHAON, L.	Butan. Masuri.

The larva feeds on Carrot and Radish.

„ NOMIUS, Esper.	
„ ONPAPE, Moore.	Tenasserim.
„ POMPEIUS, Cram.	
„ PAMMON, L.	Tenasserim. Nicobars. Yunan.
var. NICOBARICUS, Feld.	

The larva of this and other species is very injurious to various species of *Citrus*.

„ POLYTES, L.	Bengal. Java.
var. NICOBARICUS, Feld.	Andamans.
„ PROTENOR, Cram.	Butan.
„ POLYMNESTOR, Cram.	Bengal. Ceylon.
„ PAYENI, Boisd.	Darjiling.
„ PHILOXENUS, Gray.	Tenasserim. Darjiling. Chnnabatti.

“Sails about high up among the trees and apparently quite safe from the attacks of birds, its strong scent, perceptible a couple of yards off even now, three months after it was caught, being probably most distasteful to insectivorous birds” (Nicéville). M. Nicéville may be right as to birds disliking the particular stink of this insect, but the *teleological* argument implied must be accepted with great caution. It is at least equally probable as not, that some bird or other insectivore cares very little for the stink, else the survival of the fittest would as it were be synonymous with the survival of the nastiest. There are some things in nature no one can precisely explain, and the stink of *P. philoxenus* is paralleled teleologically speaking by the poison of serpents. If the poison glands and fangs of serpents were really necessary or subservient to their well-being in the struggle of existence, how comes it that the majority of serpents get on very well without such aids? and if *P. philoxenus* is designedly preserved from dangers by its stink, how comes it that the bulk of *Lepidoptera* do not stink for the same reason? It is better to confess ignorance of the ways of Lady ‘Why,’ than delude ourselves with transparent fallacies of the teleological class.

„ RAVANA, Moore.	Darjiling.
„ PARIS, L.	Cherra. Sikkim.
„ ROMULUS, Cram.	Bengal.
„ RIETENOR, Westw.	Darjiling.
„ RHODIFER, Butler.	Andamans.
„ SARPEDON, L.	Tenasserim. Ceylon. Masuri.
„ SCLATERI, Westw.	
„ THALIARCHUS, Hew.	Tenasserim.
„ TELEARCHUS, Hew.	Tenasserim.
„ VARUNA, White.	Ranjit Valley at 1000 feet.
<i>P. astorion</i> , Westw.	
„ XANTHUS, L.	Yunan.
„ ZENOCLES, Doubl.	Tenasserim. Silhet. Darjiling.
„ ZELEUCTUS, Hew.	Tenasserim.
LEPTOCIRCUS MEGES, Zinken-Sommer.	
„ CURIUS, Fabr.	
„ VIRESCENS, Butler.	Martaban. Tenasserim.

TEINOPALPUS IMPERIALIS, Hope.

Hills over 9000.

CALINAGA BUDDHA, Moore.

The above is a goodly list of Lepidoptera, inhabiting Burma and the adjoining countries. It is true that as yet the majority of them are unrecorded from any Burmese 'habitat,' but then Burma has not yet been worked as Bengal has, and there can be no reasonable doubt that insects which range from Darjiling to Java occur in Burma likewise. Equally certain is it that numberless species, only as yet recorded from Sikkim, will range into Arrakan and Pegu, whilst other species hitherto recorded from Java or Borneo will be found to range into Tenasserim as well. Excluding Martaban and Tenasserim, Burma is still an almost untrodden field Entomologically.

Little need be said touching the capture of the diurnal species, but it may be added that an excellent plan for capturing the nocturnal moths is to smear trees about one's house, towards evening, with a mixture of beer and sugar, which will attract the moths to it. It should also be remembered that each species has its *own proper time of flying*, and that the same species will not be captured between 8 and 10 p.m. and 10 and 12, and so on. Separate days should therefore be given to different hours of the night, if a thorough exploration of the Lepidopterous fauna of a district be attempted, and this pursuit of the perfect insect should not supersede the study of the life history of each species, as displayed in its progress from the egg, through the caterpillar to the perfect insect.

Order COLEOPTERA.

Wings four, the anterior pair (*elytra*) hard and closing over the back by a straight suture. The posterior pair in repose folded beneath and protected by the *elytra*. Mouth mandibulate. The females rarely apterous.

A convenient division of the Families of Coleoptera is based on the number of joints of the tarsi, though, as in most artificial arrangements, exceptions occur.

Section TRIMERA.

Tarsi three-jointed.

Sub-order APHIDIPIAGA.

Family Coccinellidæ.

The *Coccinellidæ* or Lady-birds are a well-marked and familiar class of insects, all of which are useful to man, by preying in both their larval and adult stages on the aphides or plant-lice which infest his gardens.

HARMONIA SEPTEMPUNCTATA, L.

LEIS BICOLOR, Hope.

,, 19 SIGNATA, Falder.

LEMNIA PLAGIATA, Fabr.

,, BIPLAGIATA, Swartz.

,, (?) SEXAREATA, Muls.

COCCINELLA, sp.

EPIPADENA MACULARIS, Muls.

Section TETRAMERA.

Tarsi four-jointed.

Sub-order CLAVIPALPI.

Last three joints of the antennæ clavate. Maxillary palpi with the last joint broadly transverse.

Family Erotylidæ.

FATUA, sp.

Sub-order *PHYTOPHAGA*.

Antennæ linear. The elytra cover the sides of the abdomen.

Family **Cassididæ.**

The *Cassididæ* are sometimes called 'tortoise beetles' from their shield-like form.

ASPIDOMORPHA SANCLE-CRUCIS, Fabr.

COPTOCYCLA CATINATA, Bohem.

„ PUNCTARIA, Bohem.

Tenasserim.

PRIOPTERA PALLIDICORNIS, Bohem.

Tenasserim.

LACOPTERA NOVEMDECIMNOTATA, Bohem.

SAGRIDÆ.

SAGRA MOUHOTI, Baly.

CRIOCERIDÆ.

TEMNASPIS MOUHOTI, Baly.

CRIOCERIS IMPRESSA, Fabr.

HISPIDÆ.

ANISODERA EXCAVATA, Baly.

CRASPEDONTA LEAYANA, Latr.

HALTICIDÆ.

GRAPTODERA, sp.

CACOSCELIS, sp.

EUMOLPIDÆ.

CORYNODES PEREGRINUS, Herbst.

EUMOLPUS, sp.

CHIRYSOMELIDÆ.

PARALINA CYANICOLLIS, Hope.

LINA, sp.

CLYTHRIDÆ.

DIAPROMORPHA MELANOPUS, Dej.

CRYPTOCEPHALIDÆ.

CRYPTOCEPHALUS, sp.

GALERUCIDÆ.

HAPLOSONYX SMARAGDIPENNIS, Chev.

„ QUADRIFASCIATA, Hope.

CALLOPISTRA FULMINANS, Falderm.

RHAPHIA CYANIPENNIS, Baly.

AULACOPHORA, sp.

RHAPHIDOPALPA SEXMACULATA, Hope.

PHYLLOTRETA CYANURA, Hope.

„ LUREATA, Redtenb.

ADORIUM MACULIVENTRIS, Chev.

GALERUCA, sp.

Sub-order *LONGICORNIA*.

Antennæ long. Body elongate. Female with an ovipositor.

These beetles, and the members of the next sub-order, are in their larval stage wood-borers, the soft grub being armed with powerful jaws with which it perforates both live and dead wood. As the grub progresses, it devours the wood in front of it, and *pari passu*, ejects a committed mass of woody fibres, which, after passing through its intestines, form almost as solid a mass as the wood did prior to its mastication.

Family Prionidæ.

ÆGOSOMA SULCIPENNE, White. Tenasserim.

Family Cerambycidæ.

HAMMATICHERUS SIMULANS, White. Tenasserim.
 NIRLEUS TRICOLOR, Newman. Tenasserim.
 POLYZONUS BIZONATUS, White. Maulmain.
 HELIOMANES NIGRICEPS, White. Maulmain.
 CLYTUS SEMILUCTUOSUS, White. Tenasserim.
 BATOCERA ROYLEI, Hope.
 CEROPLESIS TRICINCTA, Dej.
 LAMIA WALLICHI, Hope.
 ROSALIA.
 BLEPEPHAEUS SUCCINCTOR, Chevrol.
 PURPURICENUS TEMMINCKI, Guér.
 EURYBATUS NOVEMPUNCTATUS, Westw.
 APOMECYNIA ALBOMACULATUS, Perroud.
 GLENEA.

Sub-order *XYLOPHAGA.*

Antennæ short. Maxillæ with one lobe.

Sub-order *RHYNCHOPHORA.*

Larvæ apodal. Head prolonged into a rostrum, which may attain to three times the length of the body. Antennæ geniculate (bent like the knee), with its basal joint received into a groove. This sub-order embraces the '*weevils*,' which in both their larval and adult stages are so destructive to fruit and cereals. A common example of this class of insects is the little grub or beetle, which is so often exposed on cutting open a mango. These beetles possess in a remarkable degree the habit of feigning death when alarmed, or touched.

Family Curculionidæ.

APODERUS, sp.
 ARRHENODES, sp.
 CYRTOTRACHELUS, sp.
 CLEONUS, sp.
 LIXUS, sp.
 BLOSIRUS, sp.
 SIPALUS GRANULATUS, Fabr.

Section *HETEROMERA.*

The four anterior tarsi five-jointed; the posterior four-jointed.

Sub-order *TRACHELIDA.*

Head exerted, narrowed behind into a neck. Antennæ never clavate (except in *Tetraloma*). Many species are parasitic.

Family Cantharidæ.

CANTHARIS NEPALENSIS, Hope.

Various species of this genus possess the power of blistering the skin, and are valuable on that account, the best known being the common '*spanish fly*,' or blistering beetle (*Cantharis vesicatoria*). The following extract from Sir J. Lubbock's "*Origin and Metamorphosis of Insects*" will give a good idea of the curious changes undergone by a near ally of the last genus (*Cantharis*).

“The genus *Sitaris* (a small beetle allied to *Cantharis*, the blister fly, and to *Meloe*, the oil beetle) is parasitic on a kind of bee (*Anthophora*), which excavates subterranean galleries, each leading to a cell. The eggs of the *Sitaris*, which are deposited at the entrance of these galleries, are hatched at the end of September or the beginning of October, and M. Fabre (Ann. des Scien. Nat., sér. 4, tome vii.) not unnaturally expected that the young larvæ, which are active little creatures, with six serviceable legs, would at once eat their way into the cells of the *Anthophora*. No such thing; till the month of April following they remain without leaving their birthplace, and consequently without food, nor do they in this long time change either in form or in size. . . . In April, however, his captives at last awoke from their long lethargy, and hurried anxiously about their prisons. Naturally inferring that they were in search of food, M. Fabre supposed that this would consist either of the larvæ or pupæ of the *Anthophora*, or of the honey with which it closes its cell. All these were tried without success. M. Fabre was in despair. ‘Jamais expérience n’a éprouvé pareille déconfiture. Larves, Nymphes, cellules, miel, je vous ai tous offert: que voulez-vous donc bestioles mandites?’ The first ray of light came to him from our countryman, Newport, who ascertained that a small parasite found by Léon Dufour on one of the wild bees, and named by him *Triangulinus*, was, in fact, the larva of *Meloe*. The larvæ of *Sitaris* much resembled Dufour’s *Triangulinus*, and acting on this hint M. Fabre examined many specimens of *Anthophora*, and found on them at last the larvæ of his *Sitaris*. The males of *Anthophora* emerge from the pupæ sooner than the females, and M. Fabre ascertained that as they came out of their galleries the little *Sitaris* larvæ fasten upon them. Not, however, for long; instinct teaches them that they are not yet on the straight path of development, and watching their opportunity they pass from the male to the female bee.” This may be considered the first act of the drama; but marvellous is the faculty which the young *Sitaris* must be gifted with at its tender age to play the part necessary for its own existence. But to follow M. Fabre: “Guided by these indications, M. Fabre examined several cells of the *Anthophora*. In some the egg of the *Anthophora* floated by itself on the surface of the honey; in others on the egg, as on a raft, sat the still more minute larva of the *Sitaris*. The mystery was solved. At the moment when the egg is laid, the *Sitaris* larva springs upon it. Even while the poor mother is carefully fastening up her cell, her mortal enemy is beginning to devour her offspring, for the egg of the *Anthophora* serves not only as a raft, but as a repast. The honey which is enough for either would be too little for both, and the *Sitaris* therefore, at its first meal, relieves itself from its only rival. After eight days the egg is consumed, and on the empty shell the *Sitaris* undergoes its first transformation, and makes its appearance in a very different form. With the change of skin the active slim larva changes into a white fleshy grub, with the mouth beneath and the spiracles above the surface, ‘grâce à l’embonpoint des ventre,’ says M. Fabre, ‘la larve est à l’abri de l’asphyxie.’ In this state it remains till the honey is consumed, then the animal contracts and detaches itself from its skin, within which the further transformations take place. In the next stage, which M. Fabre calls the pseudo-chrysalis, the larva has a solid corneous envelope and an oval shape, and in its colour, consistency, and immobility reminds one of a dipterous pupa. The time passed in this condition varies much; when it has elapsed, the animal moults again; again changes its form, and after this it again becomes a pupa without any remarkable peculiarities. Finally after these wonderful changes and adventures, in the month of August the perfect *Sitaris* makes its appearance.”

The above is an admirable sketch of the life history of a European species, but hundreds of similar histories might be written of Burmese species by a similar expenditure of industry in observing, as that displayed by M. Fabre, whose peaceful exploits are really as glorious and as worthy of imitation as any achieved by his heroic countrymen at Marengo or Ansterlitz.

Family Rhipidophoridae.

RHIPIDOPHORUS.

Family **Lagriidæ.**

LAGRIA BASALIS, Hope.

Family **Stylopidæ.**

These are the most aberrant of all beetles, and are minute parasites on bees, and the male only is winged, and ceases to be parasitic when adult. In this last stage he wanders about in search of his spouse, who is a minute grub-like creature buried in the body of some bee, with her terminal segment only protruded in the air between two of the 'rings' of the bee's body.

Sub-order **ATHRACHELIA.**

Head not exerted nor narrowed behind. Antennæ linear or sub-clavate. Claws undivided, in *Cistelidæ* serrated. The penultimate joint of the tarsus usually entire. The typical species of *Tenebrionidæ* have connate elytra and no lower wings.

Family **Tenebrionidæ.**

OPATRUM, sp.
EPILAMPUS, sp.

Section **PENTAMERA.**

All the tarsi five-jointed.

Sub-order **MALACODERMI.**

Many of this sub-order are animal feeders.

Family **Bostrychidæ.**

APATE, sp.

Family **Cleridæ.**

STIGMATUS RUFIVENTRIS, Westw.	Assam.
TILLICERA CHALYBEA, Westw.	Tenasserim.
OMADIUS MEDIOFASCIATUS, Westw.	Khasi Hills.

Family **Telephoridæ.**

ICHTHYURUS COSTALIS, Westw.	Maulmain.
„ BASALIS, Westw.	Maulmain.
LAMPYRIS, 2 sp.	

The well-known '*glow-worm*' belongs to this genus. The male is winged and seeks his female, a heavy apterous grub, by aid of the light she displays to disclose her retreat to her mate. To this family also belong the '*fire-flies*,' which are beautiful objects during the still nights of the tropics and warm countries.

Sub-order **STERNOXI.**

Prosternum produced in front and pointed behind. Antennæ filiform or serrated. Vegetable feeders.

Family **Elateridæ.**

The *Elateridæ* are commonly known as '*skip-jacks*' or '*spring-beetles*.' By a sort of *catch* arrangement between the pro- and mesosternum, whereby the tense muscles are suddenly freed, a jerk is produced which throws the animal from off his back on to his legs again. It is not only to recover its legs, that this clicking is gone through, but if the animal is held by the extremity of the elytra, it will seek to free itself by repeated '*clicks*.' Some species (*Pyrophorus*) are phosphorescent or '*fire-flies*' as they are comprehensively called.

CAMPOSTERNUS HOPEI, Westw.	Tenasserim.
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Family Buprestidæ.

CATOXANTHA BICOLOR, Fabri
 CHRYSOCHROA CHINENSIS, Lap. and Gory.
 AGRILUS, sp.

Sub-order *LAMELLICORNIA.*

Last three joints of the antennæ lamelliform, or in the *Lucanidæ* pectinate.

The Lamellicorn beetles are a very varied, interesting, and beautiful group of insects of very different types. Among them are the *Cetoninina* or rose or flower beetles, but among which comes that giant of his order the Goliath beetle of tropical Africa. The *Scarabæina*, or dung-rolling beetles, are remarkable for their industry in providing a nidus for their progeny. One such clay ball (externally clay, but internally made up of a ball of dung for the sustenance of the larva) may be seen in the British Museum, presented by Mr. Atkinson, but found by myself in the Arakan hills, where three, four, or five such balls are often found buried one over the other, and which, when wet, sometimes weigh over two pounds. The maker of these curious clay balls is not known. Smaller species of beetles commonly bury similar balls of clay and dung the size of tennis balls in ground where cattle are stalled, and these balls are sought for eagerly by the Burmese for the dainty grub which they contain, and which they devour with gusto. Still smaller beetles are familiar to every one as 'pill-rollers' on our roads, the male and female both helping to roll the ball wherein the object of their hope, love, and strong affection lies centred, preparatory to burying it in some secure place.

Family Cetoniidæ.

RHOMBORRHINA.
 GLYCYPHANA MARGINICOLLIS, Gory et Perch.
 LOMAPTERA VIRIDILENEA, Gory et Perch. Tenasserim.

Family Scarabæidæ.

COPRIS SAGAX, Schönh.
 ONTHOPHAGUS.
 ONTICELLUS BRAMA, Redt.

Family Melolonthidæ.

SERICA MICANS, Fabr.
 APOGONIA.
 SCHIZONYCHA.
 LEPIDIOTA BIMACULATA, Saunder.

MIMELIDÆ.

ANOMALA SPLENDENS, Hope.
 MIMELA GLABRA, Hope.
 EUCHLORE PERPLEXA, Hope.
 „ MONOCHROA, Reiche.
 POPILIA BIGUTTATA, Wiedm.

DYNASTIDÆ.

HETERONYCHUS PICEUS, Fabr.
 EUPATORUS HARDWICKI, Hope.

Family Lucanidæ.

LUCANUS ÆRATUS, Hope. Tenasserim.

Family Passalidæ.

The present list of *Passalidæ* is drawn up from Stoliczka's monograph of the Indian species in J. A. S. B. 1873, Part II. p. 149.

AULACOCYCLINÆ.

CERACUPES AUSTENI, Stol.	Naga Hills at 6000 feet.
TENIOCERUS BICUSPIS, Kp.	Sikkim. Assam.

ERIOCNEMINÆ.

LEPTAULAX DENTATUS, Fabr.	Sikkim. Tenasserim. Philippines.
„ BICOLOR, Fabr.	Sikkim. Andamans. Nicobars.
„ PLANUS, Illig.	Burma. Andamans.

ACERALÆ.

ACERAIUS GRANDIS, Barn.	Sikkim. Naga Hills. Cachar.
„ EMARGINATUS, Fabr.	Sikkim. Cachar. Pinang. Nicobars.
<i>Passalus Nicobaricus</i> , Redtenbacher.	
BASILIANUS CANTORIS, Hope.	Sikkim. Assam. Malacca.
„ CANCRUS, Perch.	Sikkim. Assam.
„ ANDAMANENSIS, Stol.	Andamans. Nicobars.
„ SIKKIMENSIS, Stol.	Sikkim at 1500 feet.

Family Trictenotomidæ.

TRICTENOTOMA CHILDRENI, Gray.	Tenasserim.
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Sub-order *CLAVICORNIA.*

Antennæ clubbed at the end, club two to five jointed.

Family Cucujidæ.

HECTARTHURUM BREVISSIMUM, Newm.	Tenasserim.
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Sub-order *BRACHELYTRA.*

Antennæ short, never clubbed. Elytra short, not covering the abdomen. Two anal appendages.

The beetles of this sub-order are generally animal feeders, living on carrion. Some, however, reside in ants' nests, or even with wasps. These brachelytrous beetles often fly into the eye and cause severe pain.

*Family Staphylinidæ.*Sub-order *PALPICORNIA.*

Maxillary palpi elongate; antennæ short. The beetles of this sub-order are mostly aquatic, and when adult, herbivorous.

Sub-order *ADEPHAGA.*

Two palpi to each maxilla. Antennæ filiform. These beetles, in both the larval and adult stages, are voracious animal feeders. The two first families are wholly aquatic.

Family Gyrinidæ.

These beetles derive their name from ceaselessly circling about on the surface of the water, often in great numbers together.

Family Dytiscidæ.

DINEUTES LATERALIS, Leach.
DYTISCUS, sp.

The large water beetle, with a pale margin to its elytra, belongs to this genus, and freely takes flight by night. It will, when attracted by lights on a table, alight in a tumbler of water, and I once saw it perform this descent into a glass of beer. It is, in its native element, a savage and destructive animal, killing young trout and other fish, as well as destroying their ova.

Family Carabidæ.

CHELENIAS, 2 sp.
OMASSEUS.
HARFALUS.

To this order belong the 'bombadier beetles,' as they are called, from their spurting from beneath their elytra, which they slightly elevate for the purpose, of a penetrating acid vapour and fluid, which, should it enter the eye, causes severe pain. One common species is a large dark beetle, with four white spots on its elytra, and incautiously seizing one once, I was nearly blinded by a jet of fluid it discharged into my eye. *Horresco referens!*

Family Cicindelidæ.

CYCINDELA CHLORIS, Hope.
" HIMALEYICA, Redt.
" FLAVOMACULATA, Kollar.

The *Cicindelidæ*, or 'tiger beetles,' as they are called, are among the most predatory of their order, being well armed with powerful jaws, and being swift both on foot and on the wing. They commonly frequent river banks, where they chase and devour any insects smaller and weaker than themselves. Dr. Mason writes: "A short time ago I observed one leap on a cockroach four times its own size and weight, like a lion upon an elephant."

Dr. Mason also enumerates the following beetles as found at Toung-ngoo by Capt. L. Smith:—

Coccinellidæ, 4; Cassididæ, 61 (*Cassida*, 6); Hispidæ, 1 (*Alurnus*); Chrysomelidæ, 36 (*Eumolpus* 6); Halticidæ, 15 (*Edionychis*); Crioceridæ, 4 (*Sagra*); Lamiidæ, 4; Cerambycidæ, 23; Prionidæ, 29 (*Prionus* 3); Curculionidæ, 73 (*Rhynchites* 1, *Brenthus* 1, *Apoderus* 1, *Rhina* 10, *Calandra* 3); Cantharidæ 3 (*Horia* 2); Elateridæ, 10; Buprestidæ, 9; Scarabæidæ, 16 (*Ateuchus* 3, *Onthophagus* 11, *Phanus* 2); Cetoniidæ, 35 (*Gymnetis* 2); Telephoridæ, 5 (*Lycas* 2); Staphylinidæ, 16; Hydrophilidæ, 1; Carabidæ, 34 (*Brachinus* 3); Cicindelidæ, 4; or 383 species, not one of which is named specifically.

The following remarks are condensed from Dr. Mason's chapter on Entomology. Under the head Chameleon beetles Dr. Mason remarks: "This changeable beetle is a species of *Buprestis*, an elegant insect with one uniform hue of variable copper and green, burnished with transparent golden bronze. The elytra, or wing cases, of these 'living jewels' are in great demand by the Sgau Karen maidens for necklaces and chaplets, and wreathed with a few wild flowers around their ebony locks, they have really an appearance of elegance. There is a still more brilliant and larger species of *Buprestis* which the Karens call the male of the preceding." Above, grass green, with blue, yellow, and golden reflections. Below, copper, bronzed with green. A crimson band runs down each wing cover, and a crimson spot at the base of the thorax. In general form it resembles *B. bicolor*. "Madame Merriam represented the larva of *B. gigantea* as a grub found underground, feeding on roots, but Westwood says, 'As it is, however, so different from the larvæ of the

Buprestidae, and as in all probability the transformations are undergone in wood, the trunks of trees, etc., I fear that the authoress must have fallen into some error.' It falls to my lot to come to the aid of the lady, for the natives assure me that the transformations of these species of *Buprestis* are undergone in the earth, and that the larvæ form the papery cases with which I have often met."

Of the fire-flies, it is said, "According to the Buddhists, fire-flies were produced by the element of fire. The fire-flies appear to sip the nectar of flowers, and to be very choice in their selection. In the mangrove swamps and on the coast where *Aegiceras* grows, that tree while in flower will be seen to be burning with their radiance, while all is dark around. In other situations I have observed the flowers of a wild species of *Coir* covered with them, to the exclusion of all the other plants in the neighbourhood."

My first experience of fire-flies in Pegu was a remarkable one. Night had closed in, and my servant, who brought in the tea, asked me to step out of my tent and see the fire-flies which, he said, he had never seen the like of before. On stepping out of the tent, a truly beautiful sight presented itself. In front was the broad and deep river sweeping on, *νυκτι εοικώς*, with its indistinctly seen background of primæval forest on its opposite bank. Around me was the recently-formed clearing, with its two or three huts and my own camp, as the sole proof of man's occupancy, for miles and miles, but, for all the wildness and almost desolation of the scene, the bank on which I stood was a glorious spectacle, and those acquainted with the class of native servants will well understand that it must have been at once unusual and beautiful indeed to rivet the attention of a khitmutgar!

The bushes overhanging the water were one mass of fire-flies, though, from the confined space available for them on low shrubs, the numbers may not have been actually more than are often congregated in Bengal. The light of this great body of insects was given out in rhythmic flashes, and, for a second or two, lighted up the bushes in a beautiful manner; heightened, no doubt, by the sudden relapse into darkness which followed each flash. These are the facts of the case (and I may add, it was towards the end of the year), and the only suggestion I would throw out, to account for the unusual method of displaying their light, is, that the close congregation of large numbers of insects, from the small space afforded by the bushes in question, may have given rise to the synchronous emission of the flash, by the force of imitation or *sympathy*.

Order HYMENOPTERA.

Wings four, membranous, naked, veined. Mouth mandibulate and suctorial.

Larva usually apodal. Pupa inactive.

Abdomen united to thorax by a pedicel. Females furnished with an ovipositor, normally consisting of six pieces, and often modified into a sting. The Hymenoptera are solitary or social, the latter forming communities consisting of a single fruitful female, numerous males called 'drones,' and a countless multitude of sexually undeveloped females or neuters, who carry on all the business of the nation. Agamic reproduction (*Parthenogenesis*) obtains in this order partially, as eggs laid by virgin 'queens' produce drones only.

Sub-order TEREBRANTIA.

Abdomen sessile. Female armed with a serrated or boring ovipositor. Larva with six legs and several prolegs. Vegetable feeders. The punctures made in trees or plants by the ovipositor give rise to 'galls.'

TENTHREDO, sp.

Sub-order PUPIFORA.

Abdomen petiolate. Larva apodal.

Family Cyrripidæ.

The insects of this family by laying their eggs in the tissues of trees and plants give rise to 'galls,' wherein the young are nourished on the juices of the plant, and whence they issue on attaining maturity.

Family Ichneumonidæ.

These insects are parasitical to the extent of depositing their eggs within the bodies of caterpillars, where the larva is hatched, and at once commences to consume its host. By an extraordinary instinct it would seem as if it so managed its meal as to avoid a vital part, and the caterpillar lives on (if he cannot be said to thrive), and even passes into the chrysalis stage for the benefit, alas! not of himself, but of his hidden guest. Beyond this stage, however, he does not survive, and in place of a butterfly, one or more 'rascally little flies' issue from the chrysalis, to the disgust perhaps of some naturalist who has been carefully feeding and tending the caterpillar in the hope of ascertaining the perfect insect. As a rule, however, a caterpillar which has been '*ichneumonized*' can be readily detected by one accustomed to these creatures, by a certain sluggish or sickly mood that seems to possess them.

PIMPLA, sp.

Sub-order TUBULIFERA.

Posterior segments of the abdomen retractile, and provided with a membranous ovipositor composed of a single piece. They are solitary insects, which deposit their eggs in the nests of other *Hymenoptera*.

Family Chrysididæ.

The *Chrysidæ*, or 'golden flies,' must be familiar to most people. They are met with hovering about and alighting on the hottest and sunniest walls, and are resplendent with green and azure tints. The under side of the abdomen is concave, and when touched they roll themselves into a ball. Giving just grounds of offence as they do, to insects of a singularly irascible disposition, this habit is no doubt one they are often called on to practise in self-defence, and adaptively eased as their bodies are in an almost impenetrable coat of mail, they are in that position wholly invulnerable by the stings of their enemies.

Sub-order HETEROGYNA.

Social hymenoptera, consisting of males, females and neuters, the latter apterous and sexually undeveloped.

Family Formicidæ.

The marvellous economy of ants is too well known to need recapitulation, but of Burmese species we know next to nothing, and the subject is a very inviting one for some 'coming' naturalist. Ants swarm periodically, much in the same fashion, though not in the same numbers, as *Termites*, and the winged ants which then issue forth are males and females, bent on founding new colonies. Among some species the most enormous disparity of size obtains among the neuters, some of which, provided with disproportionately large heads, are called 'policemen,' and take upon themselves the care and defence of the ordinary workers. In one ant, common at Rangoon, I noticed three different sizes of neuters (?). The smallest was only 1.75 lines in length of head and body, whereas the 'policeman' measured 12 lines or more, and this disparity does not convey a proper idea of the vast difference in bulk between the two sorts, the policeman being a burly monster capable of walking away though 100 of the lesser sort were to attach themselves to him. In addition to these there were, mingled with the rest, many ants of an intermediate size, twenty times or so bulkier than the small neuters, but not comparable with the

'policeman.' Many rare beetles are found nowhere but in ants' nests. To obtain these, dig up the nest, and rapidly shovel the contents—earth, ants and all—into a sack, which remove to a convenient spot; after a while the ants will soon disperse, when the débris can be sifted, and the minute Coleoptera picked out.

FORMICA SMARAGDINA.

Under the head of edible ant, Dr. Mason remarks: "A species of ant is very common which constructs its nest in trees, formed of leaves united together with a papery substance, that the insect itself fabricates. The nests are sometimes a foot in diameter, and the ants are considered quite a delicacy with the Karens, who eat them in their curries. They are said to be very sour." This is probably identical with *F. smaragdina* or a closely-allied species. The crushed-up nests are sometimes seen in the bazaar, as the strongly acid flavour of these ants is relished as a condiment to their rice by the Burmese. They are most irascible and annoying insects, and often swarm on to the ropes of a tent, if they are secured to a tree which holds one of their nests. Should this be the case, it is best to find out another nest, cut it off, and place the branch, nest, and all on the top of the tent. In a short time its infuriated occupants issue forth, and proceed at once to grapple with the strangers already on the tent ropes, to whom they probably attribute their sudden change of quarters. The contest rages with dreadful fury, and is quite Homeric in its incidents. In all directions ants may be seen grappled with by their enemies, whilst several of their friends are at the same time holding on fast to them by legs or antennæ, to prevent their being carried off into captivity, whilst all around a pungent odour of formic acid rises from the belligerent host. No fiercer strife ever raged on the plains of Troy, and the noble simile of the eleventh Book is at once recalled.

"As in some rich man's domain
The reapers drawn in rows,
Right down the furrows shear the grain
And still their labour grows,
And thick the armfuls fall as rain;
So Trojan and Achaian might
Each on the other leapt,
None turned from fight to cursed flight,
But even battle kept."—*Iliad*, XI. 67 (Gladstone's Trans.).

The colour of the workers and males is rufous; but the queen is described as being of a pale-green colour, whence the specific name of the species.

FORMICA OBLONGA.

„ TINCTA.

POLYRHACHIS AFFINIS.

„ ABDOMINALIS.

„ TIBIALIS.

„ MUTATUS.

„ LÆVISSIMUS.

„ FURCATUS.

„ BICOLOR.

PONERA REHCLATA.

„ PALLIDA.

ATTA BELLICOSA.

PHEIDOLE OCELLIFERA.

Family **Dorylidæ.**

The *Dorylidæ* differ from ants in the first segment only of the abdomen forming the pedicel. The sexes of several species are still unknown. One species is a heavy wasp-like insect, which often enters houses at night attracted by the lights. Their life history requires to be studied.

DORYLUS LONGICORNIS, Schuck.

Sub-order *FOSSORES*.

These are the fossorial Hymenoptera, including wasps and hornets; but many species make elaborate nests on the branches of trees, whilst others burrow in the ground or inside decayed trunks, or build nests of mud of various forms, and either single or many-celled. The larvæ of the 'mud-builders' are carnivorous, and feed on the bodies of spiders or caterpillars, which the mother places in the cell for them, first disabling the victims in some way which deprives them of all power of motion or offence, without destroying their vitality. It is a pretty sight to see a large female hunting for spiders to stow in that dread mortuary of their race, the mud-cell wherein she has deposited an egg. She flies lightly along the ground in large circles, just skimming it, and as she goes, kicks over the leaves with her feet. Soon a spider is disturbed and endeavours to fly to a safer spot. Instantly the wasp is on its track, and if she loses sight of it, makes several rapid casts, turning over the leaves with redoubled activity, all the while giving out a terrific humming by the rapid vibration of her wings, which must have a paralyzing effect on the terrified spider; and rarely does the wretched quarry escape. It is pounced on, a nip given which makes it helpless, and in a few seconds this terror to most insects is himself crammed unresistingly into a narrow cell to form the food of a puny grub.

Family Mutillidæ.

"Stinging ants, as they are denominated, are very common, and their sting quite insufferable. They are not, however, ants, but a tribe of sand wasps, the females of which are destitute of wings" (Mason).

Family Scoliidæ.

SCOLIA DIMIDIATA, Guér.	
„ INSTABILIS, Smith.	
„ RUBIGINOSA, Fabr.	
„ ANNULATA, Fabr.	
ELIS LINDENI, St. Fargeau.	Tenasserim.
LIACOS ANALIS, Fabr.	Tenasserim.

Family Bembicidæ.

BEMBEX FESSORIUS, Smith.	Tenasserim.
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Family Eumenidæ.

RHYNCHIUM CARNATICUM.	
EUMENES ARCUATUS, Fabr.	Tenasserim.

Family Vespidæ.

POLYBIA SUMATRENSIS, Sauss.	Tenasserim.
„ ORIENTALIS, Sauss.	Tenasserim.
POLISTES HEBLEUS, Fabr.	
VESPA BASALIS, Smith.	Yunan.
„ DORYLLOIDES, Sauss.	Tenasserim.
„ BELLONA, Smith.	Yunan.

Family Poneridæ.

DIACAMMA SCALPATRAM, Smith.	Tenasserim.
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Family Sphegidæ.

AMMOPHILA NIGRIPES, Smith.	Tenasserim.
CHLORION LOBATUM, Fabr.	Tenasserim.

POMPILIDÆ.

POMPILUS DORSALIS, St. Farg.	
„ PEREGRINUS, Smith.	Tenasserim.
„ VITIOSUS, Smith.	Tenasserim.
MACROMERIS VIOLACEA, St. Farg.	
MYGNIMIA AUREOSERICEA, Guér.	

It cannot be contended that wasps are favourite insects with any people, as the damage they cause to our fruit, and the troublesome way they obtrude themselves within our dwellings in the long summer days, is compensated for by no sort of advantage derivable from them. At the same time, they display to the careful observer many estimable traits of character, and, if not so useful as bees, are from their greater diversity of habits even more interesting than these useful insects. For maternal solicitude and anxious devotion to the general welfare, for unwearied industry in building their combs and in foraging for supplies, and for reckless courage, they yield to no insects whatever. Their courage was so fully recognized by the Greeks that Homer (so judicious and careful with his similes) likens the Myrmidons, when led against the Trojans by Patroclus, to wasps in the memorable sixteenth Book of the Iliad, the passage being thus rendered by Lord Derby :

“ They who in arms round brave Patroclus stood,
 Their line of battle formed, with courage high
 To dash upon the Trojans, and as Wasps
 That have their nest beside the public road,
 Whom boys delight to vex and irritate,
 In wanton play, but to the general harm ;
 Them, if some passing traveller unawares
 Disturb, with angry courage forth they rush
 In one continuous swarm to guard their nest ;
 E'en with such courage poured the Myrmidons
 Forth from the ships.”

Sub-order *MELLIFERA*.

Males, females, and neuters winged, the two last armed with stings. The basal joint of the posterior tarsi dilated, and adapted for storing and carrying pollen. The Bees are either solitary or social. The social communities (exemplified by the domestic bee) consist of a single fertile queen, several males, whose sole function is to furnish a partner for the virgin queen of a fresh swarm, and workers or sexually undeveloped females. The nuptial flight of the virgin queen is her first and last departure from the hive. Eggs laid by her before she has selected her mate, or if separated from the male, produce males only. In default of a perfect queen, the larva of a ‘neuter’ is selected, and by being reared in a differently formed cell to the ordinary ‘neuter’ cells and well fed, is converted into a queen, though this fact is less extraordinary than the last, as neuters are merely females whose ovaries are undeveloped, and which are by this mode of education stimulated into functional activity.

APIS INDICA, Fabr.	Tenasserim.
„ FLORALIS, Kirby.	
„ FLOREA, Fabr.	
„ DORSATA, Fabr.	
„ LABORIOSA, Smith.	

Domestic Bees are not kept in Burma, and the Burmese receive with polite incredulity the accounts of Bees being kept domesticated in the walls of dwelling-houses, as is the case in the Himalayas. A favourite place for a wild bees’ comb is the angle formed by the branch of some gigantic wood oil or other tree, as not only is the position sheltered from sun and rain, but it is not easily accessible by bears,

the trunk being too large and smooth for them to climb. To take the honey, a number of pegs of bamboo are prepared, which are driven about three inches deep into the bark one above another in a straight line. Affixed to these pegs a long bamboo, or two or more if necessary are tied, so that the failure of one or more pegs is immaterial so long as the rest hold, and at night, as I am informed (for I never witnessed the operation), a man ascends the bamboo right up to the comb, by means of the short projecting ends, purposely left on the bamboos at the joints. In his hand he carries a torch made of a peculiar jungle plant, which is so constructed that it shall throw out a great deal of smoke but no flame, and especial care is taken that there shall be no crackling of fire, which sound infuriates the bees. The smoking torch is now held under the comb till the bees have dispersed, and it is then quickly cut off and lowered down to the man's companions below, or if small brought down by him in a pot. The pegs driven into a tall tree stem are what every traveller in the Burmese forests must have noticed, but they are not used themselves as steps, as some suppose, but in the manner described.

The domestication of Bees, like that of most of our useful animals, dates from prehistoric times, and the prominent features of their social polity were known to Virgil, as we learn from his charming fourth *Georgic*. Their monarchical government he clearly shows, though we know that it is the Queen-mother who fills the place of King—

“Præterea regem non sic Ægyptos et ingens
Lydia, nec populi Parthorum aut Medus Hydaspes
Observant. Rege incolumi mens omnibus una est;
Amisso, rupere fidem, constructaque mella
Diripere ipsæ, et crates solvere favorum.
Ille operum custos; illum admirantur, et omnes
Circumstant fremitu denso, stipantque frequentes;
Et sæpe attollunt humeris, et corpora bello
Objectant, pulchramque petunt per vulnera mortem.”

(*Georg. IV. 210.*)

Bees, it may be added, were sacred among the ancients, and honey was one of the offerings to the dead Ulysses was charged to make, when about to consult in Hades the shade of Tiresias, in that magnificent, episode in the *Odyssey*, his descent to the nether-world.

“Here opened Hell, all Hell I here implored,
And from the scabbard drew the shining sword;
And trenching the black earth on every side,
A cavern formed, a cubit long and wide:
New wine with honey-tempered milk we bring,
Then living waters from the crystal spring;
O'er these was strewed the consecrated flour,
And on the surface shone the holy store.”

(*Pope's Odyssey, XI. 27.*)

Worsley, in his excellent translation, has “mead” for ‘μελικρήνω,’ but in this instance Pope is more accurate in his mention of honey and milk.

The ‘bee’ figures on old Greek coins, and was the emblem of the city of Ephesus and of the Ephesian Artemis, and it has been suggested that the sacred character attaching to this insect led to the adoption of wax tapers in preference to all others in the gorgeous ceremonial of the Romish Church, a supposition by no means extravagant to those who know the intimate relation which subsists between the symbolism of Roman worship and the old Pagan religion, and how completely the Virgin in Catholic countries has inherited the symbols, attributes, and functions of the Queen of Heaven of old (to whom the Jews offered spice cakes), with her host of names—Artemis, Astarte, Isis, Tanith, and the like. (See also Inman's *Ancient Faiths*, under ‘Deborah.’)

Westwood estimates a community of the domestic Bee to consist of 2000 drones, 50,000 workers and 1 queen.

TRIGONA TERMINATA, Smith.	Tenasserim.
„ LEVICEPS.	Pegu.

Trigona læviceps or the 'Dammar Bee,' as it is called by Mason, is common in Pegu, and is a familiar insect, which, when one is reclined in the forest, will alight on the face or hand and carefully lick it, and when so engaged is readily caught. It is fond of getting into the beard and hair, where it is liable to become entangled; but this never puts it out of temper. The nest of this species is commonly made in hollow trees, and is sought, for the resin of which it is composed, and this substance is erroneously termed "wax" by Dr. Mason, as it seems to consist rather of vegetable resin gathered in the forests. It is called by the Burmese '*Pwai-nget*' and is exposed for sale in all large bazaars, being much used, when cooked up with earth oil, to caulk boats with. It is a well-known habit of many species of wasps to use resinous substances in the construction of their cells. Specimens sent by the Rev. C. S. Parish to England are said to have been identified by Mr. F. Smith with *T. læviceps*, originally described from Singapore.

In 'Science Gossip,' for 1866, p. 498, the Rev. C. S. P. Parish, then Chaplain of Maulmain, gives a very clear account of *Pwai-nget*. In Mr. Parish's opinion (in which I quite concur), *Pwai-nget* is composed mainly of the resinous exudation of *Hopca odorata* and species of *Dipterocarpi*. Mr. Parish thus describes the nest:—"The *Trigona læviceps* builds its nest generally in the hollow of a tree, entering by a small aperture. These apertures are lined with *Pwai-nget*, and sometimes only show a small rim of that substance raised above the bark of the tree. Sometimes, however (perhaps always if undisturbed), the bees go on building outside, and adding on to the rim until they have formed a wide-mouthed entrance, which projects as much as a foot from the tree. These structures commonly assume the shape of the mouth of a trumpet, flattened horizontally, and have a perpendicular diameter of a foot or so and a horizontal diameter of three or four inches." Speaking of this external tube Mr. Parish points out a remarkable feature of its structure. "By holding this up to the light you will see three or four large cells of about an inch in diameter, without any opening. I can only suppose that the object of these cell walls is to strengthen the narrow base in its support of the larger projecting mass. If so, here is another instance of a mysterious intelligence possessed by one of the smallest of living creatures." Doubtless Mr. Parish is right in his conjecture, and for countless eons before the birth of Brunel and Stephenson have these tiny creatures gone on applying the principle of cell structure or a double skin in mechanics, to their own dwellings, as intelligently and with as definitive an aim as man himself could. According to the sketch of the projecting tube, the upper angle of the structure is that which is strengthened by the construction behind it of blind cells. I would however venture to suggest if the true position is not here reversed, and if the blind cells in reality do not occupy the lower angle of the structure, as that is the part which most requires strengthening. If, as may possibly be the case in this or other instances, the cells really are placed along the upper part of the structure, they would still strengthen the wall and enable the bees to work into it a less amount of material than if it were unsupported from behind in that manner. I would also suggest a reason for the peculiar trumpet-shaped structure, and that is, to exclude water from the interior of trees selected by the insects for their nests. The operation of stopping up cracks in the tree is of course an easy one, but the insects would, for all that, run the risk of being drowned in their nests, by the rush of water pouring down the trunk of the tree during a tropical shower, but for this expanded trumpet-like aperture, slightly projecting beyond the surface of the tree and to that extent elevated above the reach of the heaviest stream of rain water that could ever run down it. A similar contrivance may also be noticed in some ants' nests in the ground or on the side of some overhanging bank, a circular, elevated and trumpet-shaped, and somewhat recurved entrance wall, a most perfect bar to the entrance of water into the nest, and precisely the same in principle as the porcelain

insulators used with the same object to support our telegraph wires. The preparation of the *Pwai-nget* for use is thus described by Mr. Parish: "The principal, if not only use at present, is for caulking, and for this purpose it is mixed with earth oil or *Petroleum*. The method is to boil the *Pwai-nget* in water, which makes it quite soft, and then to knead it with a certain quantity of petroleum until it attains the consistency of a lump of putty, which it much resembles. In that state it is fit for use and is extremely viscid and tenacious. . . . It is soluble in oils and in turpentine, but not in spirits of wine."

BOMBUS EXIMIUS, Smith.	Tenasserim.
„ MONTIVAGUS, Smith.	Tenasserim.
„ IMPETUOSUS, Smith.	

The females of two or three species of carpenter bees may be frequently seen excavating their cells in the cavities of bamboos, or chiselling for themselves tunnels in decayed wood. When the shaft is sufficiently deep, they deposit their eggs, and balls of nutriment for the grubs; then floor over the orifices with mud, and lay again, and so continue to do until they have deposited all their eggs.

These insects fly into houses, and Europeans call them bumble bees, but they belong to a tribe of solitary bees (*Xylocopa*), of which no species are found in England.

XYLOCOPA TENUISCAPA, Westw.	
„ LATIPES, Drury.	Tenasserim.
„ ÆSTIVANS, L.	Tenasserim.
„ COLLARIS, St. Farg.	Tenasserim.
„ AMETHYSTINA, Latr.	Tenasserim.
MEGACHILE DIMIDIATA, Smith.	Tenasserim.
CROCISA DECORA, Smith.	Yunan.
ANTHOPHORA ZONATA, L.	

CONCHIOLOGY.

THE list of shells given by Dr. Mason was a very meagre one, and may be regarded as wholly superseded by later researches. To Dr. Mason belongs, however, the credit of being the first to pay attention to the land and freshwater shells of Burma, and so far back as the year 1842 he despatched a collection of shells to Dr. Gould, of Boston, the majority of which were undescribed, and which gave the first hint of the extraordinary richness and interest of the Burmese shell fauna. The entire number, however, of shells indicated by Dr. Mason, both land and marine, was less than 150, and of these only a moiety can be regarded as specifically determined. The following species are mentioned by Dr. Mason as being used for food by the Burmese, who, it may be remarked, will, on a pinch, eat almost anything that the human masticatory organs can dispose of. The *Teredo* found in wood is, Dr. Mason says, collected and sold in the bazaars, and is considered very good eating, as are the burrowing shells *Pholas*, *Daedylina* and the like, and the Tellens and Razor shells. More commonly, because more plentiful and accessible, the estuarine forms of *Area* and different species of *Cardium* and sundry *Veneracea*. "A large species of mussel may be sometimes seen in the bazaar, where it sells for a comparatively high price, being regarded by the natives as the best eating of any shell fish in the country." This is *Mytilus smaragdinus*, and *Hiatula diplos* is almost equally esteemed. In the following list the nomenclature of the "Genera of Recent Mollusca," by H. and A. Adams, has been usually followed, with the adoption, however, in many cases of the genera of Lamarck instead of some older and less familiar ones. One important deviation from Adams' arrangement should, however, be mentioned, viz. the removal of the operculated pulmonata from their place in the sub-class Pulmonifera to the sub-class Prosobranchiata, in the vicinity of the pulmonate *Ampullarida*.

Those species marked * were collected by myself on the Arakan coast, between Sandaway and Cape Negrais, and the specific names were kindly furnished to me by Sylvanus Hanley, Esq., who remarked that the names are not always those which claimed priority, but only that the shells corresponded with the specific reference quoted. The remaining shells are added mainly on the authority of Messrs. G. and H. Nevill, E. E. Smith, and W. T. Blanford. The present list, however, is merely given in default of a better, and makes no pretence of fully representing the rich molluscan fauna of the east side of the Bay of Bengal and its islands. The list is largely composed of species obtained along the coast, and a few months' careful dredging would no doubt go far towards doubling the number of species here recorded. Any one desirous of collecting shells will find great assistance and encouragement from the perusal of any of the following books:—Woodward's Manual of the Mollusca; The Genera of Mollusca, by H. and A. Adams; Chemu's Manuel de Conchyliologie, or Sowerby's 'Thesaurus Conchyliorum.'

Sub-Kingdom VI. MOLLUSCA.

Soft-bodied unsegmented animals, with or without an external or internal "shell." A stomach, intestine, and both oral and anal orifices. Sexes distinct or united. Reproduction by ova, but animals sometimes viviparous. The teeth are minute, siliceous, and ranged symmetrically on the 'lingual ribbon,' radula or 'odontophore,' as it is more properly called. They are beautiful objects under the microscope, and of value in classification.

Class BRACHIOPODA.

Bivalves. Valves unequal, upper and lower, not right and left, as in ordinary bivalves; no elastic ligament, and lower valve often perforated apically to allow the passage of a tendinous peduncle for attachment to fixed substances. Gills none. Radula none. A pair of ciliated oval arms, whereby food is obtained, but which are not extensile beyond the shell.

Family Craniidæ.

CRANIA STELLA, Reeve.

Family Lingulidæ.

LINGULA HIANS, Swainson.

The Andamans.

Of this species Capt. Wilmer writes (Proc. Zool. Soc. L. 1878, p. 820): "It lives in mud or sandy clay at low-water mark, the shell being buried about a foot from the surface. It is very easily alarmed, and retreats rapidly downwards. In order to collect specimens I searched for oval orifices in the mud, and having found one, a spade was plunged very deeply in, and the mud turned over, the hands then being used to go deeper; yet still in many cases the creature was too quick for the diggers."

„ (sp. near *Anatina*).

A species of *Lingula* is sometimes brought for sale as food, to the Akyab bazaars and merits our respect, for its ancient lineage, belonging as it does to a genus, which may be said to have witnessed the dawn of life in the seas, and compared with which man's birth on the planet is an event of yesterday.

Class LAMELLIBRANCHIATA.

Bivalves. Valves equal or unequal. Respiration by means of lamelliform branchiæ. Radula none. Sexes distinct. The shells of females are often more swollen than those of males, from the greater space required for their enlarged ovaries. This disparity is sometimes so great in some *Uniones* as to have led to the sexes being specifically separated.

The young are hatched within the body of the parent, and are discharged in cloud-like swarms of tiny creatures, to seek each its own living. The embryos at first swim freely about, in which stage they represent the permanent condition of the *Icteropoda*, but soon dropping their filamentous organs of motion, as tadpoles do their tails, they either attach themselves permanently to any convenient roosting-place within their reach, as *Ostrea* or *Chama*, moor themselves securely by a 'byssus' or cable, like *Pinna* or *Mytilus*, or lead a free and roving life like *Cardium* or *Unio*. "The body of the bivalve Mollusca is enveloped in a muscular mantle, which is usually more or less united at the margins, forming a branchial cavity with three openings, a pedal, a branchial or inhalent, and an excretory or anal, the pedal orifice being situated anteriorly, and the others towards the hind part. The mantle secretes the shell, the interior of which it lines, and to which it is fixed by the adductor muscles, which pass through it to be attached to the body of the animal." (Adam, 'Genera,' Vol. II. p. 318.) In some genera, as *Ostrea*, the mantle is open,

and there are no distinct pallial orifices; in other genera, as *Cardium*, the orifices of the mantle are prolonged into tubes, which in some cases are very extensile and exceed the shell in length. The length of these tubes or siphons, as they are called, may be estimated by the size and length of the siphonal scar on the shell, which is always proportionate to that of the tubes themselves, and is longest in such burrowing forms as *Mya* and *Scrobicularia*. Respiration is carried on by vascular lamellae or gills, through which the water taken in by the inhalent orifice is passed, being at one and the same time dispossessed of its oxygen and such organic or other matter as it may hold in suspension, and which serve as nutriment for the animal, and it is surprising how soon and how effectually a group of healthy active bivalves will clear a mass of turbid water (stained say with clay or any harmless pigment) by straining it through their siphons and gills. If any particle of a noxious substance, however, is held in such a position as to be drawn into the inhalent orifice, the injured animal at once closes its valves with a snap, producing a violent jet of water, with which the offending substance is expelled.

Locomotion is mostly performed by means of the foot, though some bivalves progress by opening and closing their valves, as the 'Pectens,' and the foot is also the organ by means of which burrowing shells excavate their residence in rock or wood, usually by means of the rugose surface of the valves, as in *Pholas*, which being rotated by the muscular foot, rasp the rock like a file. In some cases, however, the action would seem to be other than mechanical, and either the result of an acid secretion or perhaps merely the carbonic acid produced by respiration. In the former case any substances less hard than the valves can be attacked and perforated, in the latter calcareous rocks only.

Order ASIPHONATA.

Respiratory siphons none or rudimentary. Mantle lobes free.

Many of this order are fixed by their shell and incapable of locomotion, save in their earliest stage, as *Ostrea* and *Chama*; others are moored by a byssus, as *Mytilus* and *Pinna*; whilst others, as *Unio* and *Trigonia*, move freely, the latter animal being very active and capable of leaping (when out of water) some distance.

Family Anomiidæ.

Byssus large and passing through a nearly complete foramen through the right mantle lobe and a hole in the lower valve.

The shells of *Anomia* are thin, and often take the form of objects to which they are attached. The byssal plug is calcareous, and the upper shell has three muscular scars.

- ANOMIA ENIGMATICA, Chem.
- * ,, ELECTRINA, Chem. non L.
- * ,, SOL, Reeve.

Family Placunidæ.

Shell subnacreous. Hinge formed of the divergent ridges. Shells free, buried erect in sandy mud.

Hinge ridges gradually diverge, the hinder much the longer. Shell semi-transparent.

- *PLACENTA PLACENTA, L.

This is the 'window oyster,' so called from its valves being transparent like tale.

Family Ostreidæ.

- *OSTREA CUCULLATA, Bom.

The 'Ladies slipper' oyster or 'Jinjok' of the Burmese. This is the species which crusts the surf-beaten rocks off the coasts of India and Burma, giving them

the appearance of a cake covered with a coat of white sugar. This oyster is edible and pleasant when it has been gathered from spots freely covered by the waves, but is very apt to prove unwholesome, if not poisonous, when gathered from spots where it is left exposed to the sun and air for several successive hours. In some spots on the Arakan coast I have noticed this species growing where in my opinion it could never have been submerged for more than two or three hours consecutively by spring-tides, and must have remained for perhaps days without opening its valves, save to receive casual spray.

- * ,, CIRCUMSUTA, Gould.
- * ,, NIGROMARGINATA, Sow.

The specimen figured under this name in the *Conchologia Iconica*, Pl. xxxiii. 84, was obtained by myself between tide-marks on the Arakan coast near Baumi. It occurs sporadically on the rocks, and some specimens are barely distinguishable from the European *O. edulis*. It is in my opinion a dwarf variety of the next species, reduced in its proportions by the fact of its growing in spots unsuited to it, that is, between tide-marks.

The Burmese call these middle-sized oysters 'kamch.'

- * ,, TALIEWAHENSIS, Crosse (?).

The 'creek' or 'rock-oyster' or 'kamā' of the Burmese.

This species, which much resembles the fossil *O. lingula*, Sow., was doubtfully referred to Crosse's species by my deceased friend Dr. F. Stoliezka. It attains to nearly a foot in length, and flourishes in compact masses just below the level of low spring-tides, during which period it is sought for by men armed with iron bars to detach it from its anchorage. As food, this species is wholesome and good, but rather too large to bring uncooked to table; but if not so slightly as the smaller species, it may be always more thoroughly relied on (*vide* Theobald, Raised Oyster Banks, Records, Geological Survey of India, vol. v. p. 111).

- *LOPHA HYOTIS, L.

Cocksecomb oysters. Shell strongly ribbed.

Family Spondylidæ.

Shell irregular, attached by the right valve; ribbed, spiny or foliaceous. Teeth two in each valve. Ligament internal.

Cardinal area divided by a groove and enlarging with age.

- *SPONDYLUS COCCINEUS, Lam.
- * ,, LONGISPINA, Lam.
- * ,, ZONALIS.

Cardinal area indistinct.

- *PLICATULA DEPRESSA, Lam.
- * ,, AUSTRALIS, Lam.

Family Pectinidæ.

Foot small, cylindrical, with a byssal groove. Ligament wholly or partly internal.

PECTEN.

Shell equivalve, ribbed. The anterior auricle larger, the right one with a byssal sinus. The foot is used chiefly as an exploring organ, and to anchor the animal when required, by a temporary byssus. The young swim freely in a zigzag manner by opening and snapping their valves. (Adams.)

- * ,, SUPERBUS, Reeve.
- * ,, PALLIUM, L.
- CILAMYS ALBOLINEATUS, Sow.

Andamans.

JANIRA.

Shell inequivalve, ribbed, the upper valve flattened. Auricles subequal.

- * ,, HISTRIONICUS, Gmel.
* ,, PYXIDATUS, Born.

AMUSSIUM.

Shell subequivalve, orbicular, thin, gaping, smooth.

- * ,, PLEURONECTES, L.

Family *Vulsellidæ*.

VULSELLA.

Anterior adductor muscle none.

- * ,, LINGUA-FELIS (?), Reeve.

Family *Aviculidæ*.

Shell inequivalve, pearly within, with a prismatic cellular layer, and nacreous lustre.

MELEAGRINA.

Shell orbicular. Right valve with a byssal sinus. Hinge linear, edentulous.

- * ,, MARGARITIFERA, L.

The 'Pearl oyster' occurs along the coast of Arakan, and 'banks' of them would no doubt be found if proper search was made. Any shell, however, whose interior coat displays a fine nacreous lustre is capable of producing pearls, which are merely a deposit of the lustrous lining material of the shell round some foreign and offending object, and in Europe pearls are found in the river mussel *M. margaritifera*, L. Black pearls are occasionally produced by a species of *Pinna*, and a pink pearl by the giant stromb of the West Indies. In China one or more species of *Unio* and *Anodon* are employed as pearl-makers, being domesticated in ponds, and sundry foreign substances introduced within their valves, which the occupant coats over with a thin film of 'pearl.' Among others, small metal images of Buddha are introduced, and in the course of some months are removed as 'idol pearls,' which meet with a ready sale at moderate prices. There is nothing in the nature of a 'pearl oyster' to render it more difficult to breed and rear than the common edible oyster, but a trial can alone determine whether banks of pearl oysters could be artificially formed and worked to a profit.

PERNA.

Hinge area wide, with numerous transverse elongated cartilage-pits.

- * ,, EPHIPPICUM, L.
* ,, SULCATUS, Lam.
* ,, EREMITA, Gould.

Shell strong.

- * ,, VULSELLA, Lam.
,, SAMOENSIS, Boisd.

Andamans.

MALLEUS.

Shell subequivalve, greatly elongated at the base. Beaks small, central. Hinge straight, edentulous, carcd, with a long cartilage-pit under the beaks. The peculiar elongation of the shell is developed as the animal attains maturity, and is inconsiderable in young shells.

- ,, sp.

A species of 'hammer oyster' is sometimes met with, but has not been determined.

PINNA.

Shell triangular; equivalve, inequilateral, more or less fragile, and attached by a long silky 'byssus' to fixed objects. This 'byssus,' when cleaned and combed, is capable of being woven into such articles as gloves or socks, and is one of the warmest materials known. It is, however, too scarce to be ever more than a mere curiosity.

- * ,, CHEMNITZII, Mensley.
- * ,, VEXILLUM, Bom.

Family Mytilidæ.

Shell edentulous, moored by a 'byssus,' or filamentous cable, to fixed objects. The animals of the genus *Mytilus* are prized as food, though occasionally in Europe the 'common mussel' has proved poisonous, for some reason which is not well understood. It is most probable, however, that the animals which occasionally have given rise to unpleasant symptoms have been exposed to some injurious influence, such as a sewage diet, or impure water, which may have engendered an unhealthy diathesis, causing their unfitness for food. It is also known that some men have a peculiar bodily idiosyncrasy which prevents their eating any sort of shell-fish or even *Crustacea* without suffering severely. The occasional unwholesomeness of mussels has also been referred to the presence of a minute crab, living parasitically within its valves (and observed by me in the case of *Cyrena*), but this is not very probable.

*MYTILUS SMARAGDINUS, Chem.

This is a large handsome mussel of a dark apple green, and is highly esteemed as food.

*CRENELLA, sp.

MODIOLA.

Shell equivalve, inequilateral, anterior side very short.

The *Modiolæ* differ from the 'mussels' in being burrowers, and often construct a nest for themselves of bits of stones and shells, which they spin together with their byssal threads.

- * ,, METCALFEI, Hanley.
- * ,, STRIATULA, Hanley.
- * ,, TRAILLII, Reeve.
- * ,, MARGINATA, B. Estuaries. Also Hugli River.

Family Arcidæ.

Foot large, oblong. Shell not pearly within. Hinge with numerous interlocking or pectinate denticles.

Sub-family ARCINÆ.

Foot with a byssal groove.

The *Arcæ* are variable in their habits, some mooring by a byssus, or nestling in holes, whilst others are free and move about the mud of estuaries. These last are much sought for food.

- *ARCA TORTA, Mörch.
- * ,, RHOMBEA, Born.
- * ,, TENEBRICA, Reeve.
- * ,, IMBRICATA, Brug.
- * ,, DECUSSATA, Reeve.
- * ,, FUSCA, Brug.
- * ,, LABIATA, Reeve (non Sow.)
- * ,, DISPABILIS (?), Reeve.
- * ,, PECTUNCULOIDES, Hanley MS.
- * ,, MYRISTICA, Reeve, A.
- * ,, GRANOSA, L. Irrawaddy Delta.

Scaphula, *Benson*.

Shell thin, equivalve very inequilateral, hinder slope keeled, covered with a smooth epidermis. Animal byssiferous, and nestles in cavities in stones in freshwater or tidal streams.

- | | | | |
|---|----|---------------------|--|
| * | ,, | PINNA, B. | Tenasserim River (within the tideway). |
| * | ,, | DELTA, W. Blanford. | Irrawaddy Delta. |

Sub-family AXINÆINÆ.

Foot without a byssal groove.

Pectunculus, *Lamarck*.

Shell equivalve and equilateral, with prominent ribs. Hinge curved, teeth pectinate.

- | | | | |
|---|----|---------------------------------------|-----------|
| * | ,, | CASTANEUS, Lam. (Reeve). | |
| * | ,, | PLANATUS, G. and H. Nevill. | Andamans. |
| | | LIMOPSIS COMPRESSA, G. and H. Nevill. | Andamans. |

Family Nuculidæ.

Foot compressed, deeply grooved and forming when expanded an ovate disk with a serrated margin. Shell pearly.

Hinge-line angulated, with a prominent internal cartilage-pit at the angle. Teeth pectinate. Shell nacreous.

- | | | | |
|---|----|---|--|
| * | ,, | NUCULA MITRALIS, Hinde. | |
| | | ,, TURGIDA, Gould (<i>vide</i> Mason). | |

Family Unionidæ.

Shell equivalve. Foot large, not grooved. The branchial or inhalent region fringed with cirrhi, the exhalent simple. Inhabits fresh water.

The head-quarters of *Unio* are North America, from which country upwards of 590 species had been described by Lea up to 1867, and after every deduction has been made for undue multiplication of species, North America will still stand unrivalled not only in the number but in the beauty of the species tenanted its waters. In some species of *Unio* the form of the male and female shells is different, but this peculiarity is not seen to any marked degree in our Indian *Unios* beyond a greater tumidity of the shells in females, the result of the larger space required in that sex for their gravid ovaries. The young *Unio* is matured and hatched within the mantle of its parent. The amount of young matured in a season by a single specimen of *Anodonta* was estimated at 600,000 by Lea, and may be perhaps put at something less for *Unio*; still the numbers are enormous, though only a small per-centage eventually attains to maturity. *Unio* is one of those genera which, it has been remarked, seem created for the amusement of species-makers, and it has long seemed to me desirable to group the different races, the result of different climatal and other surroundings, round a type species, to which they seem nearest allied, or whence derived; thereby breaking up this overgrown genus into manageable groups, each group in reality representing one species, with its associated or derivative races or sub-species. By following this plan we have in Burma six species, embracing over 20 so-called species or races already ascertained, and some probably yet to be discovered.

What some naturalists would seem to understand by species is not easy to understand. C. Wyville Thomson, after sneering, in his preface to "The Depths of the Sea" (p. 11), at the Darwinian doctrine of descent by modification of one species from another as "only a hypothesis," goes on to add: "During the whole period of recorded human observation not one single instance of the change of one species into another has been detected; and singular to say, in successive geological formations, although new species are constantly appearing, and there is abundant

evidence of progressive change, no single case has yet been observed of one species passing through a series of inappreciable modifications into another." Now what this passage means, I know not, if it is not an assertion which is contradicted in the most absolute manner by the plainest deductions of zoology. The zoologist's one difficulty is with those species which vary so by "inappreciable modifications" that it is impossible to say where one species ends and another begins—and this variability is the very mode whereby under favourable conditions one species does (so to say) pass into another. As for the geological phase of the question, it may be met by quoting the case of the living Wild Buffalo (*Bubalus Arni*) and the living Indian Elephant (*Enelephas indicus*), which can hardly be descended from any stock save the Siwalik *Bubalus paleindicus* and *Enelephas hyrudricus*, and although this may be stigmatized as "only a hypothesis," it is a hypothesis infinitely less absurd than the only alternative one, namely, that these forms so nearly related to extinct Siwalik species are not really descended from them, but were independently elaborated *de novo*. The idea is one we are familiar with in the writings of poets and other holy and unholy men, and certainly lends itself to a good deal of pretty writing, as, for example, those charming lines on the *Creation* by Vincent Bourne:

"Eecce! iterum terræ pariunt et fusa per agros
Undique depascunt virides animantia campos.
Reptilium innumeræ gentes, quas fertile verbum
Produxit, vitam accipiunt, initumque movendi.
Immanes surgunt tigres rabidique leones
Cornigerique boves distentaque læte capella.
Eecce! novis tremulum diverberat acra pennis
Alituum genus et multo super Æthera plausu
Fertur, et nudantes inplet concentibus auras."

Now this, as poetry and a creation of the fancy, is beautiful, but as a scientific utterance or physiological canon is simply "bosh."

a. *Marginalis* group.

UNIO MARGINALIS, Lam.	
„ OBESUS, Hanley and Theobald.	Toung-ngoo.
„ CORRIEANUS, Lea.	Pegu.
„ GENEROSUS, Gould.	Pegu.
„ SCUTUM, B.	Tenasserim R.

b. *Corrugatus* group.

„ CORRUGATUS, Müll.	
„ FEDDENI, Theob.	Bhamo.
„ LUTEUS, Lea.	Newville (Tavoy).
„ TAVOYENSIS, Gould.	Pegu and Tenasserim.
„ Parma, B.	
„ BURMANUS, W. Blanford.	Bhamo. Mandalay.
„ BHAMOENSIS, Theob.	Bhamo. Mandalay.
„ <i>Mandelayensis</i> , Theob.	
„ VULCANUS, Hanley.	

e. *Ceruleus* group.

„ CERULEUS, Lea.	
„ ANDERSONIANUS, G. Nevill.	Myadoung.
„ BONNEAUDI, Eyd.	Pegu. Upper Burma.
„ CRISPATUS, Gould.	Tavoy.

d. *Crispissulcatus* group.

„ CRISPISULCATUS, B.	Pegu.
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e. *Pugio* group.

„ PUGIO, B.	Pegu. Bhamo.
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f. *Foliaceus* group.

UNIO FOLIACEUS, Gould.	Tavoy. Pegu.
<i>Peguensis</i> , Anthony.	
,, EXOLESCENS, Gould.	Tavoy.
,, FRAGILIS, G. Nev.	Yaylaymaw. Upper Burma.

MONOCHONDYLEA, *D'Orbigny*.

This genus is readily discriminated from *Unio* by the teeth being smooth and tangential, not serrated and interlocking, as in that genus. In habits they resemble *Unio*, with which they are associated in the hill streams.

* ,, SALWENIANA, Gould.	Pegu. Salween R.
* ,, INOSULARIS, Gould.	Pegu. Salween R.
* ,, CREBRISTRIATA, Anthony.	Pegu.
<i>Peguensis</i> , Ant.	
,, AVE, Theob.	Mandalay.

A single species of Conrad's genus *Soleaia* (*S. soleniformis*, B.) has been found in Kachar, and may possibly be discovered in Arakan; but the most promising ground for future discoveries lies between Maulmain and Zimmay, where some species of *Unio* occur almost rivalling in size the largest American species.

Order SIPHONATA.

Respiratory siphons more or less well developed.

Family **Chamidæ**.CHAMA, *Bruquière*s.

Shell inequivalve, fixed by one valve. Teeth two in one valve, one in the other. Beaks recurved, unequal.

* ,, LAZARUS, L.
* ,, GRYPHOIDES, Chem. (non L.).
* ,, SQUAMOSA, Chem.

TRIDACNA GIGAS, L.

Shell inequivalve, triangular, inequilateral, ribbed, margins dentate. A single primary tooth in each valve, and two lateral teeth in one valve and one in the other. Byssal orifice large. Shell dense, and so calcified as to almost obliterate all traces of organic structure (Carpenter).

The giant clam inhabits coral reefs, and large individuals seen through the clear water, through the sinuous gape of their shells, look like dark serpents. Aged individuals cannot close their valves, and are said to grow to upwards of 500 lbs. Their flesh is not exactly inedible, but is stinging and peppery to the taste, and probably unwholesome if freely partaken of.

HIPPOPUS, *Lamarck*.

This shell differs from the last by the absence of the byssal foramen, and by its double primary tooth.

Family **Cardiidæ**.

Foot very long and bent. Shell regular, equivalve. Hinge composed of two oblique primary teeth in each valve and two elongate lamellar laterals. Ligament short, external, conspicuous.

CARDIUM, <i>Linnaeus</i> .
* ,, RUGOSUM, Lam.
* ,, ASIATICUM, Chem.
* ,, FIMBRIATUM, Wood.

*CARDIUM ELONGATUM, Lam.	
* ,, PAPYRACEUM, Chem.	
* ,, LATUM, Gmel.	
* ,, APERTUM, Chem.	
* ,, MULTISTRIATUM, Sow.	
,, maculosum, Reeve.	
(CIENOCARDIA) HYSTRIX, Reeve.	Andamans.
,, AUSTRALE, Sow.	Andamans.
HEMICARDIA ORIENTALIS.	Andamans.
(LUNULICARDIA) RETUSA, L.	

Family **Ledidæ.**

Foot compressed, deeply grooved, forming when expanded an oval disk with crenate edges. Siphons long, slender and completely retractile. Shell thin, pearly.

*LEDA NICOBARICA, Chem.

Family **Lucinidæ.**

Foot cylindrical, hollow, opening into the visceral cavity. Muscular sears very large, rough and elongated.

*LUCINA, sp. (near ROTUNDATA).	
* ,, sp. (near SERICATA).	
* ,, sp. indet.	
* ,, sp. indet.	
*LORIPES PHILIPPINARUM, Hanley.	
* ,, PHILIPPIANA, Reeve.	
CORBIS FIMBRIATA, L.	Andamans.

Family **Cyrenidæ.**

Siphons short. Shell orbicular, closed, covered with a brittle epidermis. Cardinal teeth two or three, lateral teeth compressed. Ligament external.

CYRENA, *Lamarck.*

Shell inequilateral, beaks eroded, lateral teeth smooth. Inhabits salt or brackish water.

* ,, BENGALENSIS, Sow.

The species of *Cyrena* are found in mangrove swamps and estuaries. In Burma they are frequently tenanted by a small globular crustacean, about the size of a pea, always found living in pairs, parasitically inside the valves, without any apparent inconvenience to its host.

CORBICULA, *Megerle von Muhlfeldt.*

Hinge, with three cardinal teeth in each valve. Lateral teeth striated. Ligament prominent. Beaks sometimes eroded. Inhabits fresh water.

The rivers of India and Burma contain several species of *Corbicula*, but there is no doubt that the number of species of this genus have been unduly multiplied. All here enumerated are strictly river forms.

,, GRACILIS, Prime.	Tenasscriu R.
,, arata, B.	
,, FISUM, W. Blanford.	Ava.
,, LAMARCKIANA, Prime.	Mandalay. Momein.
,, YUNANENSIS, G. Nevill.	Manwyne in Yunan.
,, ANDERSONIANA, G. Nevill.	Momein in Yunan.
BATISSA INFLATA, Prime.	The Nicobars.
SPILERIUM AVANUM, Theob.	Ava.

Family **Astartidæ.**

Foot conical, compressed. Hinge with strongly developed cardinal teeth. Pallial line entire or but slightly indented. Shell thick, often concentrically ribbed.

CRASSATELLA, *Lamarck.*

Shell solid, equivalve, attenuated behind. Ligament internal. Teeth two primary and one lateral in each valve.

* ,, *RADIATA*, Sow. Andamans.

CARDITA, *Lamarck.*

Shell cordato, equivalve, inequilateral, radiately ribbed. Lateral teeth none.

* ,, *BICOLOR*, Lam.

* ,, *PICTA*, Reeve.

Family **Veneridæ.**

Siphons short, unequal. Foot large, linguiform, compressed.

Sub-family VENERINÆ.

VENUS, *Linnaeus.*

Foot lanceolate, without a byssal groove. Siphons divergent, the branchial, with a double row of cirrhi; the anal conical, crowned with short cirrhi. Shell thick, tumid, margin crenulated. Hinge with three teeth in each valve. Pallial sinus short. Animals burrow in the sand and are collected for food.

* ,, *CHEMNITZII*, Hanley.

* ,, *ARAKANA*, Hanley MS.

* ,, *COR*, Reeve.

This species is an estuarine form.

,, *AFFINIS*, Sow.

Andamans.

,, *ALABASTRUM*.

Andamans.

CRYPTOGRAMMA *ARAKANA*, G. and H. Nevill.

**CHIONE* *COCHINENSIS*, Sow.

,, *CEYLONENSIS*, Sow.

Irrawaddy Delta.

* ,, *CALOPHYLLA*, Hanley.

* ,, *RADIATA*, Chem.

* ,, *THIARA*, Wood.

* ,, *NEBULOSA*, Lam.

,, *pinguis*, var. Chem.

**CYTHAREA* *MERETRIX*, Lam.

* ,, *IMPUDICA*, Lam.

**CALLISTA* *ERYCINA*, L.

* ,, *KINGII*, var. *NICOBARICA* (Sow. Thes.).

**SUNETTA* *BURMANICA*, Phil.

* ,, *SCRIPTA*, L.

* ,, *PICTA*, Lam.

* ,, *EXCAVATA*, Hanley.

**CIRCE* *GIBBIA*, Lam.

* ,, *SCRIPTA*, L.

* ,, *EQUIVOCA*, Sow.

* ,, *PLACUNELLA*, Lam.

* ,, *DIVARICATA*, Chem. (non Sow.).

Sub-family DOSINIINÆ.

Shell orbicular. Pallial sinus oblique, deep, pointed.

DOSINIA, Scopoli.

Shell concentrically striated or scabrous, deeply lunulate under the beaks. Hinge with three teeth on each valve. Ligament external. "While in *Venus* and its sub-genera we find the cancellated or festooned style of ornament to predominate, and in *Meretrix* the smooth and painted style to prevail, the surface of the valves in *Dosinia* is usually concentrically grooved and of a white or pale colour" (Adams).

- * ,, *EXCISA*, Chem.
- * ,, *JUVENILIS*, Gmel.
- * ,, *SCABRUSCULA*, "Phil." Reeve.
- * ,, *LAMINATA*, Reeve.

CLEMENTIA, Gray.

Shell equivalve, inequilateral, subtrigonal, white, thin. Pallial sinus ascending nearly as far as the beaks.

- * ,, *SIMILIS*, Sow.

Sub-family TAPESINÆ.

Foot lanceolate, byssiferous.

TAPES, Megerle von Muhlfeldt.

Siphon united half way, ends divergent. Shell ovate, equivalve, inequilateral, closed, margins entire.

- * ,, *SEMIDECUSSATA*, Reeve.
- * ,, *PAPILLIONACEA*, Lam.
- * ,, *UNDULATA*, Born.

VENERUPIS, Lamarck.

Foot small, linguiform, byssiferous. Shell ovate or subglobose, inequilateral, gaping posteriorly. Three teeth in one valve, two in the other. Ligament external.

- * ,, *MONSTROSA*, Chem.
- * ,, *MITIS* (?), Sow.
- * ,, *IRUS*, L. ("precisely the Mediterranean form," Hanley).
- * *CYPRICARDIA ANGULATA*, Lam.
- * ,, *SPATHULATA*, Sow. Andamans.
- * ,, *VELLICATA*, Reeve.
- * *CORALLIOPHAGA CORALLIOPAGA*, Gmel.

Family Mactridæ.

Siphons united to their ends, which are surrounded by simple cirrhi. Foot lanceolate, subanterior. Shell equivalve. Hinge with two cardinal teeth in each valve, the hinder small or rudimentary. Lateral teeth in the right valve double, in the left single. Ligament internal. Pallial sinus distinct.

- * *TRIGONELLA VIOLACEA*, Gmel.
- * ,, *ADANSONI*, Reeve.
- * ,, *CUNEATA*, Chem.
- * ,, *ANTIQUATA*, Spengl.
- * ,, *TURGIDA*, Gmel.
- * ,, sp. (near to *TURGIDA*.)
- * ,, *PELLUCIDA*, Chem.
- * ,, *CAPILLACEA*, Reeve.
- * ,, *ÆGYPTIACA*, Dillwyn.
- * ,, *COMPLANATA*, Desh.
- * ,, *PPLICATA*, L.
- * *OXYPERAS TRIANGULARIS*, Lam.
- * *LUTRARIA PLANATA*, Chem.
- * ,, *ELONGATA*, Gray.

Family **Tellinidæ.**

Siphons very long, slender, divergent and separated for their entire length. Foot compressed, linguiform, bent. Shell free. Hinge with two cardinal teeth at most in each valve. Ligament on the shorter side of the shell.

Sub-family TELLININÆ.

Shell compressed, gaping posteriorly.

ASAPHIS, *Moder.*

Valves radiately ribbed or striated. Ligament external, large.

- * ,, DEFLOKATA, L.
- PSAMMOBIA MALACCANA, Reeve.
- ,, ARAKANA, Hanley MS.
- * ,, VIOLACEA, Lam.
- * ,, TRIPARTITA, Reeve.
- ,, *carulescens*, Lam.
- (PSAMMOCOLA) TOGATA, Reeve.
- *HIATULA DIPHOS, L.

This species abounds in backwaters along the coast of Burma, and is eagerly sought for as food. A man walks along the stream, scrutinizing the sand, till he perceives the key-hole (so to say) which marks the retreat of the wily *diphos*. A thin strip of bamboo, with a cordate extremity, is now thrust down, and passes right through the body of the animal, whose position is of course a vertical one. The valves are at once forcibly closed, and little difficulty is now experienced in hauling forth the coveted prize. W. Blandford describes it as burrowing *four* feet and having siphons longer than the shell (J.A.S.B. 1867, Part ii. p. 69).

- * ,, ATRATA, BORN.
- TELLINELLA, *Gray.*
- * ,, PRISTIS, Lam.
- * ,, STRIATULA, Lam.
- * ,, REMIES, L.
- * ,, GUINACA, Chem.
- * ,, POLYGONA, Chem.
- * ,, PHILIPPINARUM, Hanley.
- * ,, ROSEA, Hanley.

Sub-genus MERA, *H. and A. Adams.*

- ,, RHOMBOIDES, Quoy and Gaim. Andamans.
- *TELLINIDES PLANISSIMA, Anton.
- * ,, LANCEOLATA, Gmel.
- * ,, TRUNCATULA, Sow.
- * ,, CONSPICUA, Hanley.
- *MACOMA ALA, Hanley.
- ,, BIRMANICA, Phil.

Sub-family DONACINÆ.

Siphons short, divergent. Ligament external, short.

DONAX, *Linnaus.*

Shell strong, cuneiform, equivalve, inequilateral, the hinder portion shorter than the anterior. Two cardinal teeth in one valve and a bifid one in the other. Pallial sinus wide and deep.

- * ,, CUNEATUS, L.
- * ,, RADIATUS, Schroeter.
- * ,, BICOLOR, Lam.
- * ,, DYSONI, Desh.
- * ,, INCARNATUS, Chem.
- * ,, SCORTUM, L.

Sub-family SCROBICULARIINÆ.

Shell thin, subequivalve, gaping, and often flexuous posteriorly. Ligament internal.

SCROBICULARIA, *Schumacher*.

Hinge with one or two teeth in each valve, and an internal spatulate cartilage-pit. Pallial sinus large.

"In this genus the orifices of the siphons are plain, the mantle is denticulated, and the foot is large and compressed. The animals usually live buried vertically five or six inches deep in the mud of tidal estuaries: the siphons can be extended five or six times the length of the shell." (Adams.)

- * ,, CORDIFORMIS, Chem.
- ,, ANGULATA, Chem.

Sub-family PAPHIINÆ.

MESODESMA, *Deshayes*.

Shell ovate, subequilateral. Hinge with the lateral teeth, short, subequal. A single primary tooth, and a rudimentary process in place of a second. Ligament in an internal pit. Epidermis greenish-brown.

- * ,, INTERMEDIA, Reeve.
- * ,, OVATA, Reeve.

Family Solenidæ.

Foot large, elongated, thick, not byssiferous. Shell elongated, equivalve, and gaping at both ends. Hinge with two or three compressed teeth in each valve, the hinder one bifid. Ligament large, external, supported on a prominent shelf.

These shells, or "Razor fish," as they are called, live vertically buried in sand. They are sensitive, timid, and difficult to capture, but are good eating. They may be sometimes forced to ascend to the surface by putting salt in their holes, but they must be cleverly caught, or they will descend if frightened, and no additional salt on their tails will persuade them to come up again.

SOLEN, *Linnaeus*.

Shell straight, margins parallel, beaks gaping, terminal. Ligament long, external. Pallial sinus short, square.

- * ,, BREVIS, Gray.

CUTELLUS, *Schumacher*.

Shell rounded and gaping at each end. Beaks subanterior, supported internally by an oblique rib.

- * ,, CUTELLUS, L.

SILIGUA, *Megerle von Mulfeldt*.

Shell curved, oblong, polished, gaping at the ends, and strengthened internally by an elevated umbonal rib.

- * ,, RADIATA, L.

SOLECURTUS, *Blainville*.

Shell compressed, rounded, and gaping at the ends. Hinge with two diverging primary teeth in each valve.

- * ,, CONRICTUS, Lam.
- * ,, INFLEXUS, Wood.
- * ,, NIVEUS, Desh.

Family Glauconomyidæ.

Foot moderately large, thick, compressed, keeled. Siphons very long. Shell oblong, thin, ventricose, covered with a green epidermis.

GLAUCONOMYA, *Bronn.*

Hinge narrow, with three teeth in each valve, the middle teeth in the left and the hinder one in the right valve, bifid. Ligament external. Pallial sinus deep. Inhabits fresh and brackish waters.

* ,, CHINENSIS, Gray.

NOVACULINA, *Benson.*

Beaks subposterior. Shell covered with a thin wrinkled epidermis.

* ,, GANGETICA, B.

This is a fresh-water species found in rivers above the tideway, but growing, I think, largest in mud banks within tidal influence.

Family Corbulidæ.

Siphons short, the anal furnished with a tubular retractile valve. Body unsymmetrical. Foot long with a byssal groove.

CORBULA, *Bruquière.*

Shell ovate, gibbous, very inequivalve, beaks prominent, valves concentrically striated. Hinge a recurved tooth in the right valve, received into a cartilaginous process in the left. Ligament small, internal.

,, FORTISULCATA, E. A. Smith. Andamans.

SPHERIA, *Turton.*

Shell oblong, inequivalve, produced and gaping posteriorly. Surface smooth or rugose, covered with an epidermis. Hinge a dilated laminar tooth in front of the oblique cartilage-pit in the right valve, with a corresponding pit in the left cartilage internal.

,, PERVERSA, W. Blanford. Irrawaddy Delta.

Family Anatinidæ.

Shell thin, nacreous, inequivalve. Hinge teeth rudimentary. Ligament external. Cartilage internal, in a pit in each valve, usually furnished with a free ossicle.

ANATINA, *Lamarck.*

Siphons long, covered with a rugose epidermis. Cartilage-pit in each valve spoon-shaped, projecting internally, furnished in front with a transverse ossicle.

* ,, BOSCHASIANA, Reeve.

PANDORA, *Solander.*

Siphons very long. Shell thin, inequivalve, closed, pearly within. Right valve flat. Ligament internal. Hinge with a primary tooth in each valve with corresponding cartilage-pits, but no free ossicle.

* ,, CEYLANICA, Sow.

Family Gastrochænidæ.

Siphons very long, united almost to their ends. Foot small, not byssiferous. Shell equivalve, valves gaping. Hinge rudimentary. Cartilage external, small, weak.

The *Gastrochænidæ*, together with the *Pholades*, constitute the *Tubicola* of Lamarck, a very natural group characterized by their living chiefly inclosed in tubes or burrows which they never leave. The valves of the shell are sometimes firmly

incorporated with the protecting tube, as in *Aspergillum*, or one valve only is free, as in *Clavagella*, or else both valves are free, as in *Gastrochena*. The tubes themselves are usually buried with the thickest end downwards in the mud or sand near low-water mark.

GASTROCHENA, *Lamarck* (not *Spengler*).

Shell with both valves free, cuneiform, equivalve, widely gaping in front, closed behind, valves very inequilateral. Ligament external. Tube calcareous, claviform, free or fixed. Valves free, widely gaping in front. The shells are often inclosed in strong flask-shaped tubes, attached to shells in which the animal burrows.

- * ,, LAGENA, Lam.
- * ,, APERTISSIMA, Desh.
- * ,, CYMBIUM, Retz.

Gastrochena mumia, *Spengler*, or the *Fistulana clara*, Lam., as it is generally called, is a curious shell, whose clavate tubes are found associated gregariously at low-water mark at Singapore and in the Eastern seas, the tips only of the tubes projecting, whilst their thick and closed ends are deeply buried in the mud.

ASPERGILLUM, *Lamarck*.

Shell small, oval, equivalve, glued to the walls of the tube, the umbones only being visible. Open posteriorly or above. Clavate anteriorly or below, and closed with a convex disk, pierced with tubular holes and with a minute central fissure, and a handsome peripheral ring of tubes. The upper or siphonal end plain or frilled.

- * ,, SPARSEM, Sow.

The watering-pot shell.

Few people who have admired the curious tubular shell ending in a disk, pierced with holes like a garden watering-pot, are aware that the occupant and maker thereof is a *bivalve*. If, however, the head of the tube be carefully examined, the two tiny valves of the juvenile architect may be seen cemented into its wall.

Family Pholadidæ.

Shell free, or within a tube, gaping at both ends. Thin, white, brittle, edentulous, armed anteriorly with rasp-like imbrications. Hinge fitted with accessory valves. Hinge plate reflected over the beaks, and furnished with a long curved muscular process beneath each. Pallial sinns deep. Siphons long. The ligament is strong and elastic, external, and strengthened with an accessory membrane formed by the coriaceous end of the mantle, which issues between the anterior ends of the valves and covers it, and is, moreover, armed with siliceous granules. These shells indeed exhibit the perfection of adaptation for boring mechanically into rocks, wood, or other substances, and their burrows are made by constantly rotating their valves by means of their sucker-like foot. The animals are vividly phosphorescent, and excellent eating.

Sub-family PHOLADINÆ.

PHOLAS, *Linnæus*.

Shell equivalve, with accessory dorsal valves.

- * ,, OBTECTA, Sow.
- * ,, INCEI, Sow.
- * ,, (*Dactylina*) ORIENTALIS, Gmel.

JOUANNETIA, *Des Moulins*.

Shell globose, inequivalve. The front gape closed by a callous plate. Right valve produced posteriorly, the left overlapping the dorsal valve. Dorsal plate single. Umbonal processes none.

- * ,, GLOBOSA, Sow.
- * ,, CUMINGII, Sow.

These shells abound in calcareous rocks on the coast, and having excavated their burrows, would seem to become fixtures therein, so tightly do they fit into and fill the cavity which contains them.

MARTESIA, *Leach*.

Shell equivalve, the front gape closed by a callous plate. Valves regularly divided in front by a furrow, extending from the beaks to the base. Lives in fresh, brackish, or salt water.

„ *FLUMINALIS*, W. Blanford. Irrawaddy Delta.

Sub-family TEREDININÆ.

TEREDO, *Linnaeus*.

The '*Teredo*' or ship-worm differs from the generality of bivalves by becoming fixed at a very early period of its existence, after which it constructs a shelly tube in the timber whereon it has fixed. The *Teredos* are, however, amiable and social creatures, never interfering with one another's paths, though often crowded together as closely as it is possible for them to be packed, whereas some burrowing shells, as *Lithodomus*, cut clean through any opposing substance, even though the same should be the body of an unoffending brother bivalve.

* „ (*Calobates*) *THORACITES*, Gould.

and several undetermined species.

Class PTEROPODA.

Of the Pteropods of the Burmese seas we know nothing. These beautiful oceanic creatures are crepuscular in their habits, sinking far from the surface during the day, and rising again towards evening; hence they are only to be captured by a net of muslin or bunting suspended during light winds from a sailing ship during the night. Their tiny and exquisitely beautiful shells are ceaselessly 'raining' down into the abysmal depths of the ocean (as the animals die), and are filling up its hollows with an impalpable mud, somewhat analogous to the English chalk, of which it is no poetic figment to say "The dust we tread upon was once alive."

Order SCAPHOPODA.

Head rudimentary. Mouth surrounded by filiform tentacles. Eyes none. Heart none. Branchiæ none. Sexes distinct.

Shell tubular, curved, perforate at each end.

Family Dentaliidæ.

**DENTALIUM OCTOGONUM*, Lam.

* „ *LONGITRORSUM*, Reeve.

* „ *GADUS*, Mont.

Identical, *vide* Hanley, with British examples (sed?).

Class GASTEROPODA.

Locomotion effected by the ventral disk or foot. A distinct head in nearly all, with one or two pair of tentacles. A heart, liver, and convoluted intestine present, and the mouth furnished with a radula or 'lingual ribbon,' as it is called, armed with teeth.

Sub-class *OPISTHOBRANCHIATA.*

Gills exposed or slightly covered by a fold of the mantle, situated behind the heart, and never lodged in a distinct cervical cavity. Sexes united in the same individual. Larva shell-bearing, and furnished with deciduous cephalic fins (H. and A. Adams).

Order TECTIBRANCHIATA.

Gill forming a tuft or plume towards the hind part of the body, under a fold of the mantle. Foot elongate, formed for walking. Marine.

“Observed (writes Adams) under favourable circumstances in their native haunts, the *Tectibranchiate* mollusks are by no means unattractive or sluggish in their habits, but contribute, by their changing forms and lively colours, to lend animation to the weedy shores and coral reefs among which they take up their abode. The *Bulla* there, no longer a shapeless mass of blubber, expands its fleshy foot lobes, and floats leisurely through the water; and crawling on the rocks above the ripple of the sea the green amphibious *Smaragdinella* may be observed probing the surface with its plastic head disk. Gliding along the surface of the slimy mud, the *Pleurobranchus* may be seen, its back splendid with varied colours, or the *Operculatum*, more sedentary in its habits, fastened by its thick, deep orange foot, studded with pearl-like tubercles, to the bottom of the shallow pools, while gliding briskly over the branches of the corals, the *Aplysia*, or sea hares, may be noticed extending their necks, and busily exploring everything within their reach.”

Family Actæonidæ.

- *BUCCINULUS SOLIDULUS, L.
 ,, COCCINATUS, Reeve. Andamans.

Family Aplustridæ.

- *HYDATINA VEXILLUM, Chem.

Family Bullidæ.

- *BULLA AMPULLA, L.
 *HAMINEA TENERA, W. Bl.
 * ,, CYMBULUM, Quoy et Gaimard.
 *ATYS XACCUM, L.
 ,, CYLINDRICA.
R. elongata, A. Adams.
Bulla solida, Brng.

Family Aplysiidæ.

APLYSIA, sp.

An undetermined species is not rare on the Arakan coast. When molested, it pours forth a quantity of deep violet fluid.

Order NUDIBRANCHIATA.

Gills exposed or contractile into cavities on the surface of the mantle. Adult animal shell-less. “While the numerous tribes of mollusks furnished with testaceous coverings offer us objects of contemplation remarkable alike for their extreme beauty and the durability of their calcareous envelopes, the scarcely less extensive and certainly far less known families of the Naked-gilled Gasteropods exhibit an astonishing variety of form, extreme delicacy of organization, and great diversity of colour to captivate the eye, and occupy the attention of those who wander by the shore or explore the depths of the ocean. Clinging to the stems of floating sea-weeds, many, like the *Anthobranchs*, will be seen extending their flower-like gills of surpassing elegance, exploring with their foliated tentacles or complex mantle filaments the plants around them, the brilliant hues of their striped or spotted bodies glancing through the water. Some will be observed with bodies so fragile and pellucid that you may see the colour of their blood, and count the pulsations of their hearts; some will be seen to have their gills disposed in rows of papillary tubercles on the sides of their bodies, like the *Æolids*, or tree-like and branching like the *Tritomas*. The foreheads of some will be smooth and simple, while those of others will be found adorned with various

singular appendages. In others again all processes will disappear, all branchial arrangements vanish, and we shall meet with forms almost as simple in their structure as the Nemertoid types among annelids. In their embryonic state these lovely fragile mollusks are supplied with little clear spiral shells, and swim like Pteropoda freely through the water; being furnished at this epoch of their lives with two head-fins and a large frontal veil. As they grow, however, the shell falls off, and the veil becomes modified, but is usually persistent in the adults." Adams (Gen. Moll. vol. ii. p. 47). The *Nudibranchs* of Burma are as yet wholly unknown.

In the Proceedings of the Zoological Society of London, however, for 1877 (p. 196), some 460 species of Anthobranchiate mollusks are enumerated and described by M. Phineas S. Abraham, of which ninety-five are recorded from the Red Sea or the coasts of India, and many of which undoubtedly range to Burma. Of the whole of these 460 species, only a single species, *Doridopsis limbata*, Cuv., is reported as inhabiting both the Mediterranean and Red Sea, and *Doris verrucosa*, Cuv., the Mediterranean Sea and Mauritius.

Sub-class PROSOBRANCHIATA.

Gills plumose or pectinate, placed in a cavity above the neck or under the mantle on the left side. Heart behind the gills. Sexes distinct. The adult and larva both provided with shells, the latter also furnished with deciduous ciliated fins springing from the sides of the head.

Order PECTINIBRANCHIATA.

Gills comb-like on the left side of the mantle over the back of the neck.

Sub-order PROBOSCIDIFERA.

The predaceous gastropods are armed with a retractile proboscis, by means of which they firmly hold and perforate the shells of bivalves in order to feed on the animal within. Their instinct would, however, seem occasionally to be at fault, as spines of a sea-urchin have been found so drilled, apparently by mistake on the part of some hungry gastropod.

Family Muricidæ.

MURICINÆ.

MUREX, *Linnaeus*.

In this genus a 'varix,' or thickening of the lip, is secreted at each third of the periphery of a whorl annually.

,,	ADUNCO-SPINOSUS, Beek.	Andamans.
,,	NIGRISPINOSUS, Reeve.	Andamans.
*	,, UNDATUS, Pfr.	
*	,, CONTRACTUS, Reeve.	
*	,, MARTINIANUS, Pfr.	
*	,, PINNATUS, Swain.	
*	,, TERNISPIRA, Lam.	

Sub-genus CHICOREUS.

*	,, CAPUCINUS, Lam.
*	,, ADUSTUS, Lam.
*	,, MICROPHYLLUS, Reeve.

Sub-genus OCINEBRA.

,,	BREVICULUS, Sow.	Andamans.
,,	<i>M. tetragonus</i> , Reeve (non Brod.).	
,,	GIBBA, Pease.	Andamans. Ceylon.

Sub-genus MURICIDEA.

..	CIRROSUS, Hinde.	Andamans.
..	RUSTICUS, Reeve.	Andamans.
..	BARCLAYANUS, H. Adams.	Andamans.

FUSINE.

FUSUS, *Klein.*

The typical fusi are (as their name implies) elongate shells, with the mouth produced into a straight canal.

*	..	MULTISQUAMOSUS, Reeve.	
*	..	THEOBALDI, Hanley (MS.).	
*	..	D.S. (near LIGNARIUS, Lam.).	
	..	ABNORMIS, E. A. Smith.	Andamans.
*	PYRELA	PUGILINA, Born.	
*	..	TERNATANA, Lam.	
*	..	RAPA, Gmel. (non L.).	
*	..	BULBOSA, Dillwyn.	
*	..	VIOLACEA, Kieb.	
*	..	NERITOIDEA, Chem.	
*	CANTHARUS	NUDOSUS, L.	

Family Pleurotimidæ.

These shells differ from the *Fusi* by having a 'sinus' or slit in the outer lip near the suture, which is in correlation to a slit on the mantle of the animal. Operculum ovate, nucleus apical.

*	PLEUROTOMA	FULMINATUS, Klein.	
*	..	TUBERCVLATUS, Gray.	
*	..	CRENULARIS, Lam.	
*	..	CATENA, Reeve.	
*	..	GRIFFITHII, Gray.	
*	..	CLARUS, Reeve.	
*	..	ABBREVIATA, Reeve.	Andamans.
*	..	TIGRINA, Lam.	Andamans.
	DRILLIA	LUCIDA, G. and H. Nevill.	Andamans.
	..	ACUMINATA, Migh.	Andamans.
	..	VARIABILIS, E. A. Smith.	Andamans.
	..	WILMERI, E. A. Smith.	Andamans.
	MANGELIA	FULVOCINCTA, G. and H. Nevill.	Andamans.
	..	FAIRBANKI, G. and H. Nevill.	Andamans.
	CLATHURELLA	RUGOSA, Migh.	Arakan Coast.
	..	REEVEANA, Desh.	Andamans.
	..	<i>C. tumida</i> , Pease.	
	..	APICULATA, Montr.	Andamans.
	..	var. MINOR, G. and H. Nevill.	
	..	MALLETI, Recl.	Andamans.
	..	NIGROCINCTA, Montr.	Andamans.
	..	SINGULARIS, G. and H. Nevill.	Andamans.
	..	MASONI, G. and H. Nevill.	Andamans.
	..	ARMSTRONGI, G. and H. Nev.	Andamans.
	CYTHERA	DUBIOSA, G. and H. Nevill.	Andamans.

Family Tritoniidæ.

The 'Tritons' resemble *Murex*, but the teeth, according to Adams, are in seven rows or thereabouts, whereas in *Murex* there are three rows only.

Sub-genus NIOTHA, <i>H.</i> and <i>A. Adams.</i>		
*	„	RETICOSA, A. Adams.
*	„	CUMINGII, Reeve.
*	„	MARGINULATA, Lam.
*	„	ALBESCENS, Reeve. Andamans.
	„	MARGARITIFERA, Dunker. Andamans.
	„	<i>N. costellifera</i> , A. Adams.
	„	STIGMARIA, A. Adams. Andamans.
	„	GEMMULIFERA, A. Adams. Andamans.
Sub-genus ARCLARIA, <i>Link.</i>		
*	„	GLOBOSA, Quoy and Gaimard. Andamans.
	„	GRANIFERA, Kien. Andamans.
	„	BIMACTIOSA, A. Adams. Andamans.
	„	CALLOSPIRA, A. Adams. Andamans.
Sub-genus ALECTIION, <i>Montfort.</i>		
	„	ELEGANS, Kien. Andamans.
Sub-genus HEBRA, <i>H.</i> and <i>A. Adams.</i>		
	„	ECHINATA, A. Adams. Andamans.
	„	HORRIDA, Dunker. Andamans.
	„	<i>N. curta</i> , Gould.
*	„	MURICATA, Reeve.
Sub-genus ZEUXIS, <i>H.</i> and <i>A. Adams.</i>		
*	„	MITRALIS, Reeve.
*	„	BADIA, A. Adams.
*	„	CONCINNA, Powis.
	„	PLANICOSTATA, A. Adams.
	„	CRENULATA, Brug. Andamans.
*	„	TENIA, Gmel. Andamans.
	„	<i>N. olivacea</i> , Brug.
Sub-genus TELASCO, <i>H.</i> and <i>A. Adams.</i>		
*	„	PUNCTATA, A. Adams.
Sub-genus HIMA, <i>Leach.</i>		
	„	PAUPERA, Gould.
	„	SISTROIDEA, G. and H. Nevill. Andamans.
Sub-genus TRITIA, <i>Risso.</i>		
	„	COSTELLIFERA, A. Adams. Andamans.

PURPURINE.

PURPURA, *Aldrovandus.*

Operculum oblong. Nucleus elongate, forming the outer edge.

This genus is so named from many of its species yielding the celebrated 'Tyrian purple,' one of the costliest articles of luxury known to the ancients. The dye is contained in a small vessel, and was obtained by pounding the shells whole in basins cut out of the solid rock on the shore, and the purple colour only became developed by exposing the articles dipped in the juices of the animal to a bright sun.

“From one of the *Buccini* a purple colour has been derived, long esteemed of great value. According to Pliny, the artists began by removing the vein containing it, and adding to one hundred pounds of this substance twenty ounces of salt, the whole being allowed to macerate for exactly three days. It was then boiled in a leaden caldron until greatly reduced. A moderate heat was then kept up by means of a long stove, after which the flesh, which remained attached to the veins, was skimmed off; and the tincture being completely liquefied on the tenth day, and

afterwards strained, the wool was plunged into it. They continued to keep it warm until the desired hue had been obtained. A lively red was less valued than a blackish one.

“The wool was left to steep for five hours, for after being corded it was re-plunged into the bath, until it had imbibed as much of the liquid as possible. The buccinum was not employed by itself, because the dye it produced would not hold, or rather, perhaps, because it did not preserve the lively red; but by mixing it with the purpura, it gave to the too dark tint of the latter the solidity and brilliancy of the scarlet, which was greatly valued. ‘By this mixture,’ says Pliny, ‘that superb colour is obtained which is named amethyst.’”

This colour would seem to have been held by the Romans especially appropriate for the nuptial couch of wealthy couples, as red or crimson is at the present day in Bengal by all classes of Hindoos.¹ Catullus, in his epithalamium to Julia and Manlius, says—

“Aspice, intus ut accubans
Vir tuus *Tyrio in toro*
Totus immineat tibi,”

and still more significant is the allusion of Claudian in his Fescennine verses on the occasion of the nuptials of Maria and Honorius—

“Amplexu caleat purpura regio,
Et vestes *Tyrio sanguine fulgidas*
Alter virginis nobilitet eruar.”

*PURPURA GRADATA, Phil.	
” MUSICA.	Andamans.
* ” CARINIFERA, Lam.	
* ” SACELLUM, Reeve.	
* ” THIARELLA, Lam.	
* ” UNDATA, Lam.	
* ” RUDOLPHI, Chem.	
* ” BUFO, Lam.	
*(THALLESSA) <i>H. and A. Adams</i> , BITUBERCULARIS, Lam.	Andamans.
” PICA, Kien.	
* ” HIPPOCASTANUM, Lam.	
* ” ECHINATA, Reeve.	
*(TROCHIA) <i>Swainson</i> , SPIRALIS, Gray.	
*LOPAS SCITULA, Reeve.	
* ” SERTUM, Lam. (or a closely allied sp.)	
*RICINULA HORRIDA, Lam.	
* ” ARACHNOIDES, Lam.	
* ” TUBERCLATA, Klein.	
* ” ANAXARES, Duclos.	
* ” AFFINIS, Pease.	
* ” MUSIVA, Reeve.	
SISTIUM UNDATUM, Chem.	
var. <i>Indica</i> , Nevill.	Andamans.
” MARGARITICOLA, Brug.	Andamans.

RAPANINE.

Operculum ovate, blunt, the nucleus elongate, forming the outer edge, as in *Purpura*.

¹ Quantum differt sententia Bengalensis in hac re ab immodestiâ legis Mosis! Deut. xxii. 15.

CUMA KIOSQUIFORMIS, DuRoi.

RAPA PAPHRACEA, Lam.

Andamans.

The habitat of this shell, which has been captured alive by the Rev. C. Parish, is very curious. It burrows in the substance of a species of sponge, which crusts the rocks to a thickness of several inches; forming a thick leathery coating, which has to be torn in pieces to extract the living shells. Dead shells can be picked up in plenty, but the living shell is only to be found buried in the substance of the sponge, at the Andamans at least, so far as Mr. Parish could judge. The operculum is ovate, pointed at one end, and corneous.

MAGILUS ANTIQVORUM, Mont.

This curious little shell lives imbedded in living coral, to keep pace with the growth of which, and prevent itself being overlapped and smothered, the lip of the shell is produced into a long tube *parri passu* with the growth of the surrounding mass; thereby maintaining access to the free water of the sea. On removal from the inclosing coral, the shell of three or four whorls, the size of a 'periwinkle,' is seen glued, as it were, to the end of an enormously disproportionate tube of a couple of feet or more in length, and solidified throughout, save its mouth, which is occupied by the animal.

Family Olividae.

Teeth in three series. The siphon recurved. Foot large and usually reflexed over the sides of the shell. Operculum small or wanting.

HARPINÆ.

Operculum none. Shell ventricose, ribbed. These animals are handsomely coloured and variegated, and have the singular power of spontaneously detaching a portion of the foot when molested, resembling in this respect *Haliotidea* and *Gena*. At Mauritius they are caught with lines baited with flesh (Adams).

- *HARPA NOBILIS, Lam.
- * „ CONOIDALIS, Lam.
- * „ MINOR, Lam.
- *OLIVA GIBBOSA, Born.
- * „ TRICOLOR, Lam.
- * „ EPISCOPALIS, Lam.
- * „ ISPIDULA, L.
- * „ TEXTILINA, Lam.
- * „ PONDEROSA, Reeve.
- * „ IRRISANS, Lam.
- * „ CARNEOLA, Lam.
- * „ MAURA, Reeve.
- * „ LEPIDA, Goidl.
- * „ GUTTATA (var. LEUCOPHÆA).
- *ANCILLARIA CANDIDA, Lam.

Family Fasciolaridæ.

Teeth in three series. Siphon straight. Operculum acutely ovate, with apical nucleus. Shell fusiform, with plaits on the fore part of the columella.

- *FASCIOLARIA TRAPEZIUM, L.
- * „ „ FILAMENTOSA, Lam.
- LATIRUS DECORATUS, A. Adams. Andamans.
- „ „ FASTIGIUM, Reeve. Andamans.
- „ „ INCARNATUS, Desh. Andamans.

Family **Vasidæ.**

- *MAZZA CORNIGERA, Lam.
 * " SMARAGDULUS, L.
 * " RAPA, Lam. (non Reeve).
 * " INCARNATA, Reeve.

Family **Volutidæ.**

Teeth in a single series. Mantle often greatly developed and covering the shell. Siphon short, recurved, with auricles at its base. Foot large. Operculum none. Tentacles remote, united by a veil. Columella plaited. Apex of shell mammillated.

MELO INDICA, Gmel.

Family **Mitridæ.**

Tentacles approximate at their base. Foot small and triangular. Operculum none or rudimentary. Columella plaited. Apex acute.

MITRIDÆ.

Foot truncated in front.

MITRA, *Lamarck.*

When irritated some species of *Mitra* emit a purple fluid, having a nauseous odour.

- * " AURANTIA, Lam.
 * " CRIBRILIRATA, Reeve.
 * " MLESTA, Reeve. Andamans.
 * " MARLE, H. Adams. Andamans.
 * " DERMESTINA, Reeve.
 * " WALDEMARI, Kien.
 * " SCUTELLATA, Chem.
 * " CRENULATA, Chem.
 * " Plicata, Lam. Andamans.
 * " GUTTATA (?) Reeve.
 * " NEBULOSA ?
 * " EBENUS, Lam. (Mediterranean species!).

An allied species is perhaps meant, as Mr. G. Nevill is probably correct in asserting that not one single species is common to the Mediterranean and the coast of Arakan.

- * " STIGMATARIA.
 * " FILOSA.
 *NEBULARIA ADUSTA, Lam.
 CANCELLA ANNULATA, Reeve. Andamans.
 " PHILIPPINARUM, A. Adams. Andamans.
 CHRYSAME TABANULA, Lam. Andamans.
 " CUCUMERINA, Lam. Andamans.
 *TURRICULA MELONGENA, Lam. Andamans.
 * " GRUNERI, Reeve. Andamans.
 COSTELLARIA CRUENTATA, Chem. Andamans.
 " EXASPERATA, Chem. Andamans.
 " DESHAYESII, Reeve. Andamans.
 " SEMIFASCIATA, Lam. Andamans.
 CALLITHEA OBELISCUS, Reeve. Andamans.
 var. *Andamana*, G. and H. Nevill.
 " ACUPECTA, Reeve. Andamans.
 CYLINDRA UNDCLOSA, Reeve. Andamans.
 * " DACTYLUS, L.
 * " GLANS, Reeve.

Sub-family COLUMBELLINÆ.

Foot anteriorly produced. Shell usually invested with an epidermis. Inner lip toothed, outer lip gibbous. The dentition resembles that of the *Maricida*. (Adams.)

*COLUMBELLA	VERSICOLOR, Sow.		
*	„	LINEOLATA, Kier.	
*	„	FLAVA, Brug.	
*	„	OVULATA, Sow.	
*	„	MENDICARIA, L.	
*	„	ZONALIS, Lam.	
*	„	PUMILA (?).	
*	„	DUCLOSIANA, Reeve.	
*	„	ARAKANA, Hanley (MS.).	
	„	NIGRICOSTATA, E. A. Smith.	Andamans.
	„	PUELLA, Sow.	Andamans.
	„	PARDALINA, Lam.	Andamans.
ZAFRA	TENUISCUPTA, G. and H. Nevill.		Cape Negrais.
ENGINA	ASTRICTA, Reeve.		Andamans.

Family Marginellidæ.

Teeth similar to those of *Toluta*. Tentacles close together at the base. Mantle with expanded side lobes, covering the shell. Siphon elongate. Foot large, truncate before, elongated behind. Operculum none. Shell porcellanous, polished; columella plaited. Outer lip thickened.

*MARGINELLA	ANGUSTA, Sow.	
*	„	QUINQUEPLICATA, Lam.

Family Doliidæ.

Teeth in seven rows. Siphon recurved. Foot small. Operculum none. Shell thin, ventricose, transversely ribbed; aperture with an oblique notch in front.

*DOLIUM	MACULATUM, Lam.		
*	„	CUMMINGII, Hanley.	
RINGICULA	ACUTA, Phil.	Arakan Coast.	
	var. <i>minuta</i> , H. Adams.		
	„	APICATA, Nevill.	Andamans.

Family Ficulidæ.

Teeth in seven rows. Mantle covering the shell. Siphon long and straight. Operculum none.

The animals of this group crawl very rapidly, bearing their light shells easily and with their neck stretched out, their siphon exerted and foot expanded, present a remarkable object. They are generally flesh-coloured animals, marked with crimson and pink, their eyes large and black, and their long flat heads and neck usually white. (Adams.)

*FICULA	FICUS, L.	
*	„	PAPYRACEA, Lam.

Family Naticidæ.

Teeth in seven rows. Animal bulky. Tentacles distant, united by a veil. Eyes absent or minute, and beneath the veil. Foot very large, with a fold in front reflexed over the head. Operculigerous lobe very ample. Operculum paucispiral. The size of the operculum seems to be in inverse ratio to the size of the mouth, being horny and rudimentary in *Catinus*, but ample and calcareous in *Natica*. The eggs of the *Naticidæ* are arranged in broad subspiral bands or fillets, slightly attached and resting on the sand.

The *Naticas* frequent sandy ground, along which they creep quickly, or in which they burrow in pursuit of bivalves, which constitute their food, whose shells they drill with their tongue, and then extract the contents by means of their long retractile proboscis.

- *NATICA GLOBOSA, Phil.
- * „ PELLISTRIGRINA, Kust.
- * „ CHEMNITZII, Reeve.
- * „ MAMMILLATA, Lam.
- * „ LINEATA, Lam.
- * „ ARACHNOIDEA, Gmel.
- * „ MELANOSTOMA, Gmel.
- * „ ANTONI, Phil.
- * „ ZANZEBARICA, Reeve.
- * „ ZONARIA, Lam.
- * „ TENIATA, Phil.
- * „ SIMLE (?), Reeve.
- * „ GALACTIFES, Phil.

MAMMA, *Klein*.

Operculum horny. Shell solid, smooth, with inner lip oblique, thickened. Columella spirally twisted. Apex more or less dilated and convex. When the animal crawls, the hind lobe of the foot nearly covers the shell.

- MAMMA ALBULA, Rumph. Andamans.
- „ MAMMILLA, L. Andamans.

CATINUS, *Klein*.

Operculigerous lobe very large, almost concealing the shell. Operculum very small and rudimentary.

The *Catini* are sluggish and very timid, crawling on mud flats, and exploring the ground with the produced fore-lobe of the foot.

- *CATINUS DELESSERTI, Recluz.
- (*fuscus*, Morch.)
- * „ PLANUS, Reeve.

Family Cassididæ.

Teeth, many rows of lancet-shaped ones, and one denticulated row in the centre. Siphon recurved. Foot large, dilated. Operculum annular, nucleus in the middle of the straight inner edge. Shell ventricose, aperture with a recurved canal, outer lip thickened, inner lip wrinkled or granular. The *Cassidæ* or 'Helmets' are active and voracious, preying on bivalves. The shells of the larger species are used in the manufacture of 'cameos.'

- *SEMHCASSIS AREOLA, L.
- * „ GLAUCA, L.
- * „ BIARMATA, Dillwyn.
- „ *S. torquata*, Reeve.
- * „ ERINACEUS, Brug.
- *CASSIDEA VIBEX, L.

Family Scalariidæ.

Teeth in transverse rows, with no median series. Mantle with a rudimentary siphonal fold. Foot obtusely triangular, grooved below, and furnished in front with a fold. Operculum horny, paucispiral. Animal predaceous. Shells white, and remarkable for their elegant sculpture.

- *SCALARIA TRILINEATA, De Haan.
- * „ (like a dwarf COMMUNIS).

Family Terebridæ.

Radula and teeth rudimentary or wanting. Tentacles small or wanting. Foot small. Operculum annular. Nucleus apical.

TEREBRINÆ.

Acts, *Humphrey.*

Eyes on the tip of the tentacles.

* ,, *DUPLICATA*, L.

* *HASTULA ANOMALA*, Hinds.

TEREBRA, *Adanson.*

Eyes at the outer bases of the tentacles.

* ,, *STRAMINEA*, Reeve.

* ,, *SWAINSONI*, Reeve.

* ,, *MYRUS*, Hinds.

* ,, *FORTUNEI*, Reeve.

,, *AFFINIS*, Gray.

Andamans.

,, *EXIGUA*, Desh.

Andamans.

Family Pyramidellidæ.

Radula unarmed, teeth none, or rudimentary. Tentacles broad, ear-shaped, connate at their base, and bearing the eyes immersed on their inner sides. A rudimentary siphonal fold. Foot produced anteriorly, truncated and with a fold in front. Operculum horny. Shell turritid, aperture entire, not produced. Columella plaited.

PYRAMIDELLA, *Lamarck.*

Shell turritid, many-whorled. Longitudinally ribbed.

* ,, *VARIEGATA*, Adams.

* ,, *AURIS-CATI*, Chem.

Andamans.

OBELISCUS, *Humphrey.*

Shell subulate; many-whorled, smooth. *Obeliscus* differs from *Eulimella* by having the columella plaited; from *Pyramidella* by wanting the longitudinal ribs; and from other members of the family by its plaited columella and subulate form.

* ,, *DILABIATUS*, Adams.

* ,, *TEREBELLUM*, Reeve.

* ,, *VENTRICOSUS*, Guer.

Family Eulimidæ.

Radula and teeth rudimentary. A rudimentary siphonal fold. Foot produced in front, with a bilobed fold above the front margin. Operculum horny, ovate, sub-spiral. Shell turritid, white, aperture entire in front. Columella simple.

EULIMA ACUTIFRONS, Nev.

Andamans.

,, *ACUFORMIS*, G. and H. Nevill.

Andamans.

Family Cerithiopsidæ.

Eyes placed centrally at the base of the subulate tentacles. Mouth armed with a retractile proboscis. Foot quadrate in front, furnished superiorly with a fold, grooved below for half its length, the groove ending in a perforation.

CERITHIOPSIS PAGODULA, A. Adams.

Family Solariidæ.

Tentacles folded, with the suture below. Operculum horny, spiral, ovate or circular. Shell depressed, trochiform, not pearly. Radula unarmed.

SOLARIUM, *Lamarck*.

Shell angulated at the periphery. Operculum flat, subspiral.

* ,, PERSPECTIVUM, L.

TORINIA, *Gray*.

Shell rounded at the periphery. Operculum elevated, subspiral.

,, PERSPECTIVUNCULUS, E. A. Smith. Andamans.

Sub-order *TOXIFERA*.

Animal provided with a distinct retractile proboscis, furnished with a fleshy tube having a bundle of subulate barbed teeth at the end, which act very efficaciously in boring through the shells of other molluses.

Adanson states that the tubular expansion of the veil serves as an oral sucker to attach the animal to its prey, the armed tube acting meanwhile as a powerful boring instrument.

Family *Conidæ*.

Operculum when present unguiform, with an apical nucleus. The Cones should be cautiously handled when alive, as they can bite severely.

- *CONUS NICOBARICUS, Hwass.
- * ,, TEXTILE, L.
- * ,, PANNACEUS, Bonn.
- C. episcopus*, Reeve.
- * ,, ACHATINUS, Chem.
- * ,, MINIMUS, Brug.
- * ,, CONCOLOR, Sow.
- * ,, LINEATUS, Chem.
- * ,, RATTUS, Lam.
- * ,, CAPITANEUS, L.
- * ,, GLANS, Brug.
- * ,, VERMICULATUS, Brug.
- * ,, ZONATUS, Hwass. Andamans.
- * ,, ANDAMANENSIS, E. A. Smith. Andamans.
- * ,, PRETIOSUS, G. and H. Nevill. Andamans.
- * ,, MASONI, G. and H. Nevill. Andamans.
- *(STEPHANOCONUS) LIVIDUS, Brug.
- * ,, DISTANS, Hwass.
- *(PENTHICULIS) PULICARIUS, Hwass.
- (CORONAXIS) HEBREUS, L.
- ,, CEYLONENSIS, Hwass. Andamans.
- ,, PUSILLUS, Chem. Andamans.
- *(DENDROCONUS) BETULINUS, L.
- *(LITHOCONUS) EBURNEUS, Brug.
- * ,, FLAVIDUS, Lam.
- *(LEPTOCONUS) CLERYI, Reeve.
- * ,, NOBILIS, L.
- ,, MARCHIONATUS, Hinds.
- *(CHELYCONUS) CATUS, Hwass.
- * ,, PARIUS, Reeve.
- *(RHIZOCONUS) PUNCTATUS, Chem.
- ,, MUSTELINUS, Hwass. Andamans.

Sub-order *ROSTRIFERA*.

A more or less elongate, contractile rostrum. Lingual ribbon often very long.

Family Strombidæ.

The Strombs are active and predaceous creatures, progressing in a jerky fashion, by successive leaps, which they effect by placing the narrow part of the foot under the shell, and then straightening it, so as to throw the shell suddenly forwards. Their eyes are well developed. The *Strombus gigas* of the West Indies sometimes produces pink pearls, and its shell is largely used in the manufacture of cameos and porcelain (Adams).

- *STROMBUS GIBBERULUS, L.
- *(MONODACTYLUS) LAMARCKII, Sow.
 M. Auris-dianæ, Reeve.
- *(GALLINULA) CANARIUM, L.
- * ,, COLUMBA, Lam. (Reeve). Andamans.
- *(STROMBIDEA) BULBULUS, Sow.
- * ,, DENTATUS, L.
- *PTEROCERAS, *Sowerby*.

These shells are called 'spider claws' or 'scorpions,' from the curved, digitated, and channelled processes of the outer lip. In young shells the outer lip is simple, but the 'claws' appear with age, as open canals, which afterwards become closed and solid.

- * ,, LAMBIS, L.
- * ,, SCORPIO, L.

ROSTELLARIA, *Lamarck*.

Shell fusiform, spire elevated, and the mouth produced into a long beak. Outer lip digitated. Operculum small.

These shells are sometimes called 'spindle strombs,' from their shape.

- * ,, FUSUS, L.
- *(RIMELLA) CANCELLATUS, Sow. Andamans.

TEREBELLINÆ.

TEREBELLUM, *Klein*.

Tentacles none. Margin of shell acute, anteriorly truncate.

- * ,, SUBULATUM, Chem.

One eye pedicle of this species is longer than the other, and can be advanced telescopically through the notch in front of the shell. It will then remain, with its shell vertically poised, on the watch till assured of security, when it commences to roll over and examine the ground with its rostrum (Adams).

Family Cypræidæ.

Teeth in seven series. Tentacles long, with the eyes on tuberosities on their external bases. Mantle furnished with a siphon, and large expanded side-lobes, which envelope the shell. Operculum none. Shell usually polished. Lips toothed or corrugated. In young shells the outer lip is sharp. The animal is shy and slow in its movements.

The 'cowries' are mostly inhabitants of warm seas, and for beauty and variety yield to no other family, their shells being lustrous and ornamental, and the animals, as seen gliding in their native element, often singularly beautiful.

- *CYPRÆA ASELLUS, L.
- * ,, TABESCENS, Solander.
- * ,, INTERRUPTA, Gray.
- * ,, FELINA, Gmel.
- * ,, HIRUNDO, L.

- *CYPRÆA MELANOSTOMA, Leathes.
- * " CARNEOLA, L.
- * " ISABELLA, L.

Cowries with a flattened base, callous lip, and gibbous back.

- *(ARICIA) ANNULUS, L.
- * " MONETA, L.
- * " ARABICA, L.
- * " MAURITIANA, L.
- * " HISTRIO, Gmel.
- * " CAPUT-SERPENTIS, L. Andamans.
- * " SCURRA, Chem.
- *(LITTONIA) CAURICA, L.
- * " LYNX, L.
- * " CRIBRARIA, Lam.
- * " GANGRENOSA, Gmel. Andamans.
- * " LAMARCKII, Gray.
- * " TIGRIS, L.
- * " VITELLUS, L.
- * " PANTHERINA, Solander.
- * " OCELLATA, L.
- * " HELIOLA, L. Andamans.

Small cowries, with the back either transversely wrinkled, as in the little pink 'cowrie' of the European seas, or ornamented with pustules.

- * TRIVIA BECKII, Gaskoin.
- * " ORYZA, Lam.
- * PUSILLARIA STAPHYLEA, L.
- * " NUCLEUS, L.
- *(EPONA) GLOBULUS, L.
- " ANNULATA, Gray. Andamans.

Family Amphiporasiidæ.

Teeth in seven rows. Shell pointed at both ends, polished, inner lip without teeth, outer lip inflexed. Operculum none.

CALPURNUS, *Montfort*.

Shell cowry-shaped, with a wart-like tubercle at either end.

- * " VERRUCOSUS, L.

Family Cancellariidæ.

Radula and teeth none. Operculum none.

CANCELLARIA, *Lamarck*.

Shell ribbed and cancellated. Canal short. Columella with several strong oblique plaits.

- * " SCALARINA, Sow. Thes. Con.
- * " ELEGANS, Reeve.
- * " CRISPATA (or CRENIFERA), Sow.

Family Cerithiidæ.

Teeth in seven rows. Rostrum broad and short. Tentacles distant, eyes on short pedicles adnate to the outer bases of the tentacles. A rudimentary siphonal fold. Operculum horny, spiral.

CERITHIINÆ.

CERITHIUM, *Adanson*.

Shell turrited. Columella thickened. Some species emit a bright green fluid when molested.

- * ,, NODULOSUM, Lam.
- * ,, CERULESCENS, Sow.
C. tuberculatum, Kien non L.
- * ,, TRAILLI, Sow. Andamans.
- * ,, ARTICULATUM, Sow. Andamans.
- ,, ALVEOLUS.

VERTAGUS, *Klein*.

Shell with a strongly recurved beak.

- * ,, OBELISCUS, Brug.
- * ,, ASPER, L.
- * ,, KOCHI, Phil. Andamans.
- * ,, TURRITUS, Sow. Andamans.

COLINA, *H. and A. Adams*.

Shell elongate, swollen in the middle, the last whorl nearly smooth and somewhat pellucid. The outer lip dilated and reflexed.

- * ,, MACROSTOMA, Hinds.
- * ,, PUPLEFORMIS, Sow.

POTAMIDINÆ.

TRIFORIS, *Deshayes*.

Shell turrited, aperture produced anteriorly into a tubular canal, and sometimes a posterior canal also present. Operculum round, paucispiral.

- * ,, RUBER, Hinds.
- * ,, sp. (brown).
- * ,, SCULPTUS, Hinds. Andamans.

TYMPONOTONOS, *Klein*.

Shell turrited, whorls spinous. Columella twisted.

- * ,, FLUVIATILIS, Michaud.
- ,, ALATUS, Phil.
- ,, EURIPTERA, A. Adams.

TELESCOPIUM, *Chemnitz*.

Shell stout, pyramidal, smooth, last whorl angulated. Columella twisted.

- * ,, FUSCUM, Chem.

These marine marsh shells are collected for lime and the animal is also eaten.

CERITHIDEA, *Swainson*.

Shell turrited, apex decollated.

- * ,, OBTUSA, Lam.

The Cerithidea are brackish-water forms, and are amphibious, and can crawl out of the water and suspend themselves by glutinous threads to trees and bushes.

BROTIA, *H. Adams*.

Shell fusiform, whorls spinose. Operculum multispiral.

- ,, PAGIDULA, Gould. Thongyeen R. Martaban.

This is a fresh-water form, which was separated from the *Melaniidæ* by Adams, from the character of its operculum, which approximates to that of the *Cerithidæ*.

Family **Melaniidæ.**

Teeth in seven rows, rostrum broad. Tentacles subulate, with the eyes on tuberosities on their outer bases. Siphonal fold rudimental. Operculum horny. Shell spiral, covered usually with a dark epidermis, and more or less eroded at the apex; outer lip simple.

MELANIINÆ.

PALUDOMUS, Swainson.

Operculum concentric. Apex usually decollated. These shells abound in hill-streams, but are also found in ponds and stagnant water.

„	ANDERSONIANA, G. Nev.	Ava. Bhamo.
„	BERMANICA, G. Nev.	Mandalay.
„	BLANFORDIANA, G. Nev.	Ava and Assam.
„	CINCTA, Gould.	Tenasserim Headwaters.
„	LABIOSA, B.	Tenasserim R.
„	REGULATA, B.	Pegu.

MELANIA, Lamarck.

Operculum paucispiral. Apex frequently eroded.

„	BACCATA, Gould.	Thoungyen R. Upper Tenasserim.
„	BALTEATA, Reeve.	Pegu.
„	BATANA, Gould.	Tenasserim R.
„	CORRUGATA, Lam.	Tavoy.
„	FLUCTUOSA, Gould.	Newville, Tavoy.
„	HAINSIANA, Lea.	Pegu.
„	HUMEROSA, Gould.	Manko, Tavoy.
„	JUGICOSIS, B.	Tenasserim R. and Irrawaddy R.
„	IRAVADICA, W. Bl.	Bhamo.
„	LINEATA, Gray.	Pegu.
„	PEGUENSIS, Anthony.	Pegu.
„	PREMORDICA, Tryon.	Thoungyen R. Upper Tenasserim.
„	REEVEL, Bpöt.	Pegu.
„	SCABRA, Müll.	Pegu.
„	THIARELLA, Lam.	Tavoy.
„	TUBERCUFLATA, Müll.	Pegu.
„	VARIABLES, B.	Pegu and Tenasserim.
	<i>M. Herculea</i> , Gould.	Tavoy.
	<i>M. gloriosa</i> , Ant.	Pegu hill streams.

Family **Littorinidæ.**

Teeth in seven rows. A rudimentary siphonal fold. Foot grooved below. Operculum horny, paucispiral. Shell turbinate or depressed; never pearly.

LITTORINA, Ferrussac.

The *Littorinas* or Periwinkles are many of them very amphibious, living more out of the water than in it, though always within reach of the spray. Others again affect the zone between tidemarks, and a few are extensively collected for food.

*	„	SCABRA, L.	
		var. <i>angulifera</i> , Lam.	
*	„	UNDULATA, Phil.	Andamans.
*	„	MOLUCCANA, Phil.	
*	„	INTERMEDIA, Phil.	
*	„	MELANOSTOMA, Gray.	
*	„	VENTRICOSA, Phil.	Andamans.

*RISELLA LUTEA, Quoy et Gaimard.

LITHOGLYPHUS, Muhlfeldt.

Tentacles subulate, eyes at their outer bases. Operculum ovate, paucispiral. Shell thick, smooth. Inner lip callous.

„ *MARTABANENSIS*, Theobald. Martaban.

A few specimens without the animals have been found in some places in the Martaban district, but have not been noticed elsewhere.

*Family Planaxidæ.**PLANAXIS, Lamarck.*

Teeth in seven rows. A produced siphon in front. This genus approaches *Littorina*, but is separated by the presence of a siphon.

* „ *SULCATA*, Born.

* „ sp.

Family Rissoidæ.

Operculum horny, subspiral. Shell turritid, generally white, and aperture simple.

RISSOINÆ.

*RISSOINA *D'ORBIGNYI*, Adams.

* „ *OBELISCUS*, Recluz.

* „ *BICALLOSA*, Schwartz.

* „ *CANCELLATA*, Phil.

„ *FUNICULATA*, Souverbie. Andamans.

* „ *WEINKAUFFIANA*, G. Nevill. Andamans.

* „ *MINUTA*, G. and H. Nevill. Andamans.

„ *EVANIDA*, G. and H. Nevill. Andamans.

* „ *CÆLATA*, Adams.

ASSIMINEINÆ.

ASSIMINEA, Leach.

Operculum horny, subspiral. Eyes placed superiorly towards the end of the tentacles. Inhabit salt, brackish, or fresh water near the coast.

„ *FRANCESLE*, Gray. Pegu.

„ *RUBELLA*, W. Bl. Pegu.

„ *HUNGERFORDIANA*, G. Nevill. Mouth of the Rangoon R.

„ *TEMPLEANA*, G. Nevill. Nicobars.

In addition to the above, the following species have been described, some of which may range to Burma:—

„ *WOODMASONIANA*, G. Nevill. Mouth of the Ganges.

„ *BEDDOMEANA*, G. Nevill. Mouth of the Ganges.

„ *THEOBALDIANA*, G. Nevill. Mouth of the Ganges.

„ *MICROSCULPTA*, G. Nevill. Mouth of the Ganges.

IRAVADIA ORNATA, W. Bl. Bassein District.

*Family Viviparidæ.**VIVIPARA, Lamarck.*

Animal with a small lobe on each side of the neck. Shell turbinate. Operculum horny, nucleus central.

„ *BENGALENSIS*, Lam. Pegu and Tenasserim.

V. doliaris, Gould. Tavoy.

V. filosa, Hanley. Pegu.

V. digona, W. Blanford. Pegu.

VIVIPARA	DISSIMILIS, Mull.	Pegu.
	<i>V. heliciformis</i> , Fraen.	Pegu.
	<i>V. decussatula</i> , W. Blanford.	Bhamo.
	<i>V. viridis</i> , Reeve.	
"	CHINENSIS, Gray.	Nantin. Momien. Hotha (Yunan).
	<i>V. lecythis</i> , Benson.	
	<i>V. ampulliformis</i> , Eyd. et Soul.	
"	PETROSA, Gould.	Tavoy.
"	SIANENSIS, Theob.	Upper Salween River.
	<i>V. naticoides</i> , Theob. (pre-occupied.)	
MARGARYA	MELANOIDES, G. Nev.	Lake Tali in Yunan.
LARINA	BURMANORUM, W. Blanford.	Bassein district and Rangoon River.

This shell occurs rarely at Port Cannug, *vide* Nevill.

BYTHINIINÆ.

BYTHINIA, *Leach*.

Animal with a small lobe on one side of the neck. Operculum shelly, nucleus subcentral. Shell turbinate, covered with an epidermis. The female is oviparous and deposits her eggs in a band, on a spot which she cleans with her mouth for the purpose.

"	GONIOMPHALUS, Morl.	Mandalay.
	<i>B. iravadica</i> , W. Bl. <i>vide</i> Nevill.	
"	MOULETIANA, G. Nevill.	Yaylaymaw.
"	NASSA, Theob.	Upper Salween R.
"	PULCHELLA, Hutton.	Pegu.
"	TURRITA, W. Bl.	Kyoutoung, Upper Burma and
	<i>Fairbankia turrita</i> , W. Bl.	Irrawaddy Delta.

SCENOETHYRA, *Benson*.

Shell compressed, whorls four, the last large, contracting towards the circular mouth. Operculum shelly, nucleus subcentral. Peritreme continuous, entire. Whorls often punctately sculptured.

"	MONILIFERA, B.	Mergui. Pegu.
"	PUNCTICULATA, Gould.	Tavoy.
"	HUNGERFORDIANA, G. Nevill.	Andamans.

The following species have been described from India, and may range to Burma.

"	WOODMASONIANA, G. Nevill.	Mouth of the Ganges.
"	BLANFORDIANA, G. Nev.	Chilha Lake and Ganges Delta.
"	MINIMA, Sow. (var. ?)	Madras and Kattiawar.

Family **Turritellidæ.**

Radula minute, teeth in seven similar series. Foot very short. Operculum circular, horny, multispiral.

TURRITELLA, *Lamarck*.

Shell turritid, many-whorled, imperforate, spirally grooved, aperture round, lip simple, acute.

*	"	ATTENUATA, Reeve.	
*	"	COLUMNARIS, Reeve.	
*	"	DUPLICATA, L.	
	"	INFRACONSTRICTA, E. A. Smith.	Andamans.

Family Vermetidæ.

Foot cylindrical, not serving for locomotion. Operculum horny, circular, multi-spiral (or wanting). Shell tubular, irregularly twisted, or only regular when young.

*SPIROGLYTHUS CONTRARIUS, Moreh.

This shell is by some classed as an *Annelid*.

Family Onustidæ.

Foot small, cylindrical, used for jumping, not walking. Operculum large, horny, subannular. Right half free, nucleus lateral, dextral. Muscular scar sinistral, semi-lunar. Shell trochiform, with foliaceous margin and fragments of stone and shell attached near the suture. The animal scrambles along over the rough ground like *Strombus*.

ONUSTUS INDICUS, Reeve.

XENOPHORA SOLARIOIDES, Reeve.

The 'carriers' inhabit deep water. Each species appears to have its own peculiar method of collecting the fragments of stones and shells with which it ornaments its shell, and each uses its own peculiar materials. The agglutinated fragments are so arranged as not to project downwards and impede the progress of the animal.

Family Calyptræidæ.

Radula winged in front. Teeth in seven series. Tentacles short, with the eyes on tuberosities on their outer bases. Foot flat, expanded. Operculum none. Shell patelliform, with an internal shelly appendage.

*CRUCIBULUM EXTINGTORIUM, Lam.

* ,, FASTIGIATUM, Gould.

*CREPIDULA UNGUIFORMIS, Lam.

* ,, SCABRIS, Reeve.

Family Capulidæ.

Radula and teeth, eyes and tentacles, as in *Calyptræidæ*. Foot folded on itself, anteriorly thin and strap-shaped, posteriorly thick, orbicular and concave. Operculum none. The egg-cases in this family are membranous, and form a tuft in front of the foot, under the neck.

*CAPULUS AUSTRALIS (?), Lam.

AMALTHEA AUSTRALIS, Lam.

Andamans.

Family Ampullaridæ.

Left gill rudimentary. Mantle cavity with a large pulmonary sack on each side. "Although distinct gills exist, the respiratory cavity is very large and partly closed, so as to enable these animals to live a long time out of water; in fact they appear to be truly amphibious, and to be enabled to survive a long drought, and have been known to revive after having been kept several years out of water" (Adams).

AMPULLARIA APERTA, Phil.

Pegu.

A. saxea, Reeve.

,, CONICA, Gray.

A. paludinoides, Phil.

,, MAURA, Reeve.

,, THEOBALDI, Hanley.

Martaban and Shan states.

LAND SHELLS.

The following observations on the land shells of Burma, their relationship and distribution, are from the pen of Mr. W. T. Blanford, and are so pertinent that I make no apology for extracting them verbatim from the B. B. Gazetteer, for which work they were written:—

“Taking the land shells first, it should be recollected that they belong to two different classes of Mollusca, but to two classes very much more closely allied to each other than to any of the other classes into which the Mollusca are divided. These classes are: (1st) The operculated land shells, which are frequently arranged apart from the ordinary univalve shells of the seas or rivers, such as whelks, periwinkles, and *Pululinidæ*, on account of having a breathing chamber not furnished with certain appendages known as gills; and (2nd) the *Pulmonata*, or true snails, without opercula. By those naturalists who attach great importance to the modifications of the breathing organ, the operculated land shells are sometimes classed as a peculiar order or sub-order called *Neurobranchiata*, and sometimes united with the true *Pulmonata*. The latter course is certainly a mistake, for the two groups differ in almost every detail of their organization, and even the form of the breathing chamber is quite distinct; and as the only difference of any importance between the so-called *Neurobranchiata* and the ordinary *Gasteropoda* or *Prosobranchiata* consists in the adaptation of the breathing sac in accordance with the medium in which each form lives, (as there is in some families, as *Littorinidæ* and *Rissoidæ*, a gradation between pure air breathers and pure water breathers, and as an instance is even known in the estuarine genus *Cerithidæ* inhabiting brackish creeks and salt swamps of two closely allied species, one possessed of gills and the other quite destitute of them,) it is plain that the distinction is adaptative and of no structural importance as evidence of relation.

Both of the two groups of land shells, the operculated and the non-operculated, or the air-breathing *Prosobranchiate Gasteropoda* and the *Pulmonata*, are represented by numerous species in Burma. The former, indeed, are very much more common, and represented by many more forms in Burma than in the Peninsula of India generally, with the exception, perhaps, of the hills along the Malabar coast. Their forms, too, are, on the whole, more remarkable and varied, and some of them are exquisitely coloured or sculptured. Many are minute, but the largest are of considerable size, some forms of *Cyclophorus* being upwards of two and a half inches in diameter. The non-operculate shells also vary in size, but minute forms are rather less numerous.

A list of the known Burmese land shells is given in the following pages. Figures of almost all of these will be found in the ‘Conchologia Indica’ of Hanley and Theobald, but the descriptions are scattered through many different works, and can only be found united in Pfeiffer’s ‘Monographia Heliceorum’ and ‘Monographia Pneumonoporum,’ neither of which is illustrated. The former contains the non-operculate forms, the latter those possessed of opercula.

The following are the genera occurring. Those in the first family noticed—the *Rissoidæ*—are of minor importance. The *Rissoids* are principally small marine estuarine and freshwater shells, and it is uncertain whether *Aemella* is justly referred to them. *Truncatella* is scarcely a land shell, being confined to the sea-shore. *Aemella hyalina* is a very minute hyaline, smooth, conoidal form of doubtful affinities, and only found hitherto on limestone hills near Maulmain. The family *Pomatiasidæ* contains only the genus *Pomatias*, which is abundant in Southern Europe, and is represented by isolated species in the Eastern Himalayas, the ranges south of the Assam valley, and the Arakan Hills, where one form is found. The shells are turritid in texture and finely ribbed. The *Cyclophoridæ* (*Cyclotidæ* or *Cyclotaceæ* of many writers) comprise the great bulk of the operculated land shells of Burma and of the neighbouring countries. They are divided into three well-marked families.

1. The *Cyclophorinæ*, discoid or conical shells frequently richly coloured or with a rough epidermis. 2. The *Diplommatinidæ*, discoid, conical, or ovate, all of one colour

throughout or nearly so, and nearly all having some raised sculpture across the whorls, and all, too, distinguished by a constriction at some distance behind the mouth, but in the ovate and turritidly ovate forms (*Diplommatina*) this constriction is more or less concealed by the last whorl. 3. *Pupininae*, ovate or turritid shells, usually of one colour and often very richly coloured, destitute of constriction and as a rule of sculpture. They are usually larger shells than *Diplommatinidea*, many of which are very minute.

The genera of *Cyclophorinae* found in Burma are four in number. *Cyclophorus* comprises discoid and turbinate shells, the former simple, coiled in the form of a disc and flat above, the latter conical above and rounded below (the spire being always considered the upper part and the mouth the lower). In this genus the spire is never much raised, the aperture is circular, destitute of notches, or projecting processes, and usually thickened, and the operculum is horny and nearly flat. In the subgenus *Scabrina* there is a rough epidermis, the operculum is thickened, and the margins of the whorls of which the operculum is composed consist of narrow free lamellæ; the shell is depressed and subdiscoidal. In *Pterocyclus* there is a small wing-like process covering the corner of the aperture where the peristome (or edge of the shell surrounding the mouth) joins the last whorl, and beneath this wing there is a deep notch in the shell. *Spiraculum* resembles *Pterocyclus*, but has in addition a tube open at both ends, at one end into the whorl and at the other end into the air, attached to the last whorl close to the suture a little behind the mouth. In both *Pterocyclus* and *Spiraculum* the operculum is horny, convex or flat, thick, with the edges of the whorls free. In *Rhiostoma* the mouth is free and furnished with a subtubular process projecting upwards in front; there is also a sutural tube, as in *Spiraculum*; the operculum is shelly, very thick, and deeply concave inside. *Leptopoma* is a conical shell, rather thin, with a thin horny operculum. *Lagocheilus* is subconical, and like a small *Cyclophorus*, but with a small vertical groove across the peristome, close to the place where it joins the last whorl.

The *Diplommatininae* comprise *Alycaeus*, subdiscoidal or subconical, usually of small size, with a very marked constriction some distance behind the mouth, and, in many cases, strong ribbing transverse to the whorls behind the constriction. There is also a small tube running back from the constriction, for a greater or less distance, along the suture, opening into the whorl in front and closed behind. *Diplommatina* is subfusiform, elongately ovate, of minute size, with a sutural tube, generally white or amber-coloured, and usually with vertical ribs. *Clostophis* is only known from one specimen; it resembles *Diplommatina*, except that the last whorl is free and descending. It is far from certain that the solitary type is anything but a distorted *Diplommatina*.

The *Pupininae* include four genera, but the species are few in number. *Megalomastoma* is a turritid thick shell, about an inch in length, with a circular aperture destitute of grooves or tubular processes. The operculum is thin and horny. The shell has a thick brown epidermis. *Hybocystis* is a solid shell, egg-shaped, flattened above the aperture, which is round and destitute of grooves or tubes. The operculum is shelly, multispiral outside, paucispiral within. This genus is the largest of the *Pupininae*, being nearly one and a half inches in length and four-fifths of an inch in diameter. *Pupina* and *Raphaulus* are smaller shells, very highly polished and ovate in form; in the first the peristome is marked by deep transverse incisions, one above, the other on the left side; in the second there is a tube opening in the peristome itself, close to its junction with the last whorl, and running to a short distance outside the shell.

The *Helicinidae* differ much in structure from the other families of land shells. The operculum is not round, but lunate, or semicircular, shelly, transparent, devoid of spiral structure, and in one genus, *Hydrocena*, furnished with an internal process. It should here be remarked that in all probability *Helicina* and *Hydrocena* really belong to different families. *Helicina* is a lenticular, smooth, or nearly smooth, form, whereas *Hydrocena* (*Georissa*) is subturritid or subconical, with rounded whorls, and, as a rule, with raised spiral sculpture. The few Burmese forms of *Helicina* are small, none exceeding one-third of an inch in diameter, but the species of *Georissa* are minute.

The true *Pulmonata* are nearly twice as numerous as the operculated land shells, and comprise, in the same manner, forms belonging to several families, although by far the greater portion are included amongst the *Helicidae*. The forms referred to the *Testacellidae* differ greatly from the typical genus, a carnivorous type of slug. But little is known of the habits of *Streptaxis* and *Ennea*; the former a peculiar hyaline shell more or less depressed, and with the lower whorls excentric from the axis of the upper, so as to have a remarkable appearance of distortion; the latter also hyaline but turritid or pupiform. Both have a peculiar bicoloured animal, red and white, or yellow.

The only true slug, *Limax viridis*, yet described from Burma is so imperfectly known that its generic relations are obscure; it is a small green species inhabiting mangrove bushes. The genus *Helicarion* however comprehends several slug-like mollusca, having the animal much too large for complete retraction into the shell, which is somewhat ear-shaped, thin, and with high lustre. *Vitrinopsis* is another *Vitrina*-like genus. *Ariophanta* is reversed, depressed and thin, with a sharp keel. *Macrochlamys* is composed of smooth discoid or subdiscoid shells, all very thin, with a thin lip and high lustre. The animal is provided with long linguiform processes to the mantle, and these processes, whilst the animal is crawling, are reflected over the upper surface of the shell. The relations of the shells referred to *Nanina* are less accurately determined, all are more or less discoidal, but with some sculpture above. *Sitala* consists of thin turbinate or subconical species, usually with some sculpture. *Hemiplecta* of comparatively large subdiscoid shells, sculptured above, smooth below. *Sophina* is a genus of discoid or subdiscoid species, smooth, thin, and resembling *Macrochlamys*, but remarkable for having a slit-like groove in the margin of the mouth below, near the axis of the shell. *Sesara* is lenticular or discoidal, ribbed transversely to the whorls above, smooth below; there are usually teeth in the mouth, and the lip is more or less thickened. *Trochomorpha* comprises thin, lenticular shells, very sharply keeled. *Plectopylis* consists of thick discoid shells, for the most part quite flat above and concave beneath; the lip is thickened and often toothed, and there is a remarkable barrier formed by teeth and transverse laminae in the whorls some distance behind the aperture. The true *Helices* found in Burma are not numerous, and are mostly distinguished by having the margin of the aperture slightly expanded; the majority are flat shells, but *H. capitium* is conical and finely coloured. *H. bifoveata* is concave both above and below. The animals of the genera *Helicarion*, *Vitrinopsis*, *Ariophanta*, *Macrochlamys*, *Nanina*, *Sitala*, *Hemiplecta*, *Sophina* and *Sesara* have a large glandular depression sometimes, as in *Macrochlamys*, with a projecting lobe above, at the posterior extremity of the creeping disk or 'foot.' This is extremely minute in *Trochomorpha*, and wanting in *Helix* and *Plectopylis*; several other peculiarities of structure, such as a groove running along the edge of the foot, are also characteristic of the former group.

The other genera of the *Helicidae* are distinguished, as a rule, by being much more elongate or turritid. *Amphidromus* comprises some large handsome species conically ovate in form, lemon yellow in colour in parts, usually classed as *Buliminae*. Some of these shells are worn as an ornament by women in parts of Tenasserim. *Stenogyra graevis* is a small white lustreless turritid shell, common throughout India and Burma: the animal is lemon yellow. *Glessula*, commonly classed as *Achatina*, consists of thin, horny, highly polished species, some with short, others with high spires. The mouth ends in an imperfect channel, which appears as if truncated below. *Hapalus* consists of whitish subovate shells of moderate size. *Pupa* of minute ovate forms, the mouth usually denticulate. *Hysselostoma* is conical, or subdiscoidal, with the mouth free, expanding, and not opening, in the usual direction, but turned upwards or forwards. *Clausilia* is a turritid shell reversed, with teeth in the mouth, the peculiar sub-genus *Oospira* consisting of thick ovate shells, whilst in *Nenia*, a South American subgenus represented by one form in Pegu, and another in Upper Burma, the mouth is free and expanded.

The *Veronicellidae* are shell-less mollusks covered with a thick coriaceous mantle; the breathing and other orifices below the margin. The *Succineidae*, or amber snails, are named from their colour. They are thin shells, with large

mouths and a short spire, found in damp places and sometimes amongst the leaves of palm trees.

As a rule, all land shells are most abundant in the neighbourhood of limestone, and the limestone hills, so common in parts of Burma, usually abound in mollusks. Not infrequently some species are confined to the neighbourhood of limestone, and occasionally particular forms appear restricted to one hill or range of hills. There is a remarkable instance near Maulmain, one of the richest localities for land shells in the world. The various isolated limestone hills in the Salween and Attaran valleys are in many instances inhabited by peculiar species differing from those found at other hills. These hills are separated from each other by flat land liable to flooding, and it is very probable that the tract was formerly an archipelago, and that the sea occupied what are now the low flats of the Salween valley. This is probably the cause of the present isolation of the species occurring. Thus at the "Farm Caves" *Sophina schistostelis* and *S. discoidalis*, *Sesara pylaica*, *Clausilia philippiana*, *Streptaxis Sankeyi*, *Hyboecystis gravida* and *Raphaulus chrysalis* occur, none of which, Stoliczka says, are found on the perfectly similar limestone hill at Damotha (Dham-ma-tha), only fifteen miles distant, where, however, *Sophina forabilis*, *Sesara infrendens*, *Hydrocena (Georissa) lirata*, *Diplommatina carneola*, *Pterocyclus (Rhiosstoma) Haughtoni*, etc., are met with.

Several of the above forms are peculiar so far as the Burmese area is concerned, no species of *Rhiosstoma*, *Hyboecystis*, or *Raphaulus* having been found elsewhere in Burma, whilst *Clostophis* and the peculiar type of *Clausilia (Oospira)*, represented by *C. philippiana* and its allies, has not been discovered anywhere else in the world, and *Sophina* is almost peculiar. *Clostophis*, however, may, as already stated, be merely a distorted *Diplommatina*, no second specimen having been found. *Hyboecystis* is found in Upper Siam, *Pterocyclus (Rhiosstoma)* in Siam, Cambodia and Cochin-China, *Raphaulus* in Penang and Borneo, one species presenting some distinctions of no generic value, but distinguished as *Streptaulus*, being found in the Eastern Himalayas.

Leaving apart this very marked assemblage of species, the molluscan fauna of Tenasserim is on the whole closely allied to that of Siam and the Malay Peninsula, and has numerous connections with the forms existing in the Malay Archipelago. The fauna of the Mergui Archipelago has not been sufficiently ascertained to justify any conclusions; it is probably very rich. There is a marked distinction between the species found in Tenasserim and those inhabiting other parts of Burma, the latter being allied to Assamese and Himalayan types for the most part; but in the Thayet district of Pegu, and still more in Upper Burma, a very different association of forms is found, having some alliances with the species found in the Peninsula of India, and also some forms allied to Central Asiatic and Chinese types. There are thus at least four well-marked molluscan faunæ found in Burma, and it may perhaps be useful to notice some of the most characteristic. The provinces are the following:—

1.—Arakan and Southern Pegu. *Pomatias peguensis*, *Pterocyclus parvus*, *Alycaeus ingrami* and allies, *A. politus* and allies, *A. polygonoma*, *Pupina artata*, *Helicina arakanensis*, *Streptaxis burmanicus*, *Helicarion gigas*, *Sesara mammillaris*, *S. helicefera*, *Nanina textrina*, *Trochomorpha castra*, *Plectopylis plectostoma*, *P. karenorum*, *Helix declibrata*, *Amphidromus sinensis*, *Glossula pertenuis*, *G. genma*, *G. peguensis*, *Clausilia fusiformis*, *C. arakana*, *C. Theobaldi*.

2.—Upper Burma and Thayet district. *Helix similis*, *H. sculpturita*, *H. bolus* and allies, *H. capitium*, *H. tapeina* and allies, *Nanina pansa*, *Hypselostoma tubiferum*, *Pupa insularis*, *P. cœnopieta* (the last two species not found in Pegu).

3.—Limestone Hills near Maulmain. *Aemella hyalina*, *Cyclophorus calyx*, *Pterocyclus ater*, *Rhiosstoma Haughtoni*, *Alycaeus amphora*, *Diplommatina crispata*, *Hyboecystis gravida*, *Raphaulus chrysalis*, *Georissa raucisiana*, etc., *Streptaxis petiti*, *S. bombax*, and several other species, *Emea cylindrelloidea*, *Vitrinopsis ataranensis*, *Sophina* several species, *Sesara infrendens* and allies, *S. pylaica*, *Plectopylis achatina*, *P. cyclaspis*, *Hypselostoma dayanum*, *Clausilia (Oospira) philippiana* and allies, *C. insignis*.

4.—Tenasserim. *Cyclophorus expansus*, *Alycaeus pyramidalis*, *Megalomastoma sectilabrum*, *Pupina arula*, *Helicina merguensis*, *Ariophanta retrorsa*, *Macrochlamys resplendens*, *Nanina artificiosa*, *Situla arx*, *Hemiplecta saturnia*, *Helix merguensis*, *H. bifoveata*, *Amphidromus atricallosus*, *A. janus*, etc."

Sub-order *PNEUMOBANCHILATA.*

Terrestrial air-breathers. Shell closed by an operculum, which is occasionally (*Diplommatina*) retracted out of sight from the aperture. Tentacles contractile simply, not retractile by inversion, as in the *Helicidae*. Sexes distinct. The operculum is very variable, being spiral and horny as in *Cyclophorus*; spiral and shelly as in *Hylocystis*; or non-spiral and shelly as in *Helicina*, with numerous curious modifications in different genera. The Burmese species embrace some of the smallest land shells as well as the largest found in that region.

Family **Truncatellidæ.**

TRUNCATELLA, *Risso.*

Operculum horny, subspiral. Apex of shell decollated.

„ VALIDA, Pfr. Arakan Coast.

These small shells are littoral in their habits, and always found close to the sea. They walk something like a leech, whence their name of 'looping snails.'

Family **Acmellidæ.**

ACMELLA HYALINA, Theob. and Stol. Maulmain.

„ MORELETIANA, Nev. Batte Malve. Nicobars.

„ ROEPSTORFFIANA, Nev. Katchall. Nicobars.

The natural position of these small shells was regarded by Stoliezka as intermediate between the *Rissoide* and *Cyclophoridæ*. The single species from Maulmain is extremely rare.

Family **Cyclophoridæ.**

Operculum spiral, horny, shelly; or composite, partly horny, partly shelly.

POMATIASINÆ.

POMATIUS, *Studer.*

Operculum cartilaginous, paucispiral, and formed of two laminae, one outer and one inner. Shell turreted.

„ PEGUENSIS, Theob. Gwah Hill. Arakan Coast.

CYCLOPHORINÆ.

CYCLOPHORUS, *Montfort.*

Operculum horny, multispiral. Shell turbinated.

„ PERNOBILIS, Gould. Tenasserim.

A splendid shell of 64 mills. diameter. Mouth usually rich orange red, but sometimes white.

„ AURANTIACUS, Schum. Amherst and Maulmain.

This is an equally fine shell, and seems the representative species of the last in Martaban.

„ THEOBALDIANUS, B. Tondoung near Thayet-myo.

The figure in the *Conchologia Indica*, pl. cxliv. fig. 2, is a var. of *C. speciosus*, Phil., and quite unlike Benson's species.

„ FULGURATUS, Pfr. Pegu. Mimboo.

This is a very variable shell in size and colour, ranging from 47 mills. to 31 mills. The lip is sometimes deep orange, sometimes pale or yellowish, and rarely white. In hot and arid spots a dwarf race is found of only 19 mills. diameter.

„ MATENS, W. Bl. Pegu and Arakan Hills.

A small solid race closely allied to the last.

CYCLOPHORUS ARTHRITICUS, Theobald. Hill ranges of Pegu.

This is a large and hypertrophied ally of *fulguratus*, ranging from 44 to 53 mills. Lip either white or orange.

„	FLAVILABRIS, B.	Pegu.
„	EXCELLENS, Pfr.	Martaban Province.
	<i>C. Haughtoni</i> , Theob.	
	<i>C. balteatus</i> , B.	
	<i>C. serratizona</i> , Thorpe.	

The general character of these shells is a funiculately coloured keel and a pale peripheral band. Not having seen the type, I follow Pfeiffer in accepting *C. excellens* as the common Maulmain shell.

„	AFFINIS, Theob.	Martaban Province.
„	PHAYREI, Theob.	Martaban Province.

The last three species are nearly allied and probably local races, each having a restricted range in the province of Martaban, or, in other words, incipient species in process of differentiation.

„	SPECIOSUS, Phil.	Martaban Province.
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A handsome and variable shell as to size and markings.

„	OPHIS, Hanley.	Tenasserim.
„	EXPANSUS, Pfr.	Tenasserim.

This species varies much in size.

„	MALAYANUS, Pfr.	Upper Salween Valley.
„	PORPHYRITICUS, B.	Tenasserim.
„	SUBLEVIGATUS, W. Bl.	Bhamo.
„	CRYPTOPHIALUS, B.	Ava.
„	CORNU-VENATORIUM, Sow.	Ava.
„	SCURRA, B.	Arakan Hills.
„	ZEBRINUS, B.	Bhamo. Ponsce.
„	CHARPENTIERI, MOUSS.	
	var. <i>Nicobaricus</i> , Mart.	Nicobars.
(CYCLOHELIX)	TURBO, Chem.	Nicobars.
„	CROCATUS, Born.	Nicobars.
„	FOLIACEUS, Chem.	Andamans and Nicobars.
	<i>C. Leai</i> , Tryon.	

This solid shell, with its frills of varices, is of quite a different type from any of its allies on the mainland.

The flat discoidal *Cyclophori* may be conveniently separated from the turbate species. The small Burmese species have been referred to *Scabrina*.

(SCABRINA)	CALYX, B.	Maulmain. Farm Caves.
„	INGLISIANA, Stol.	Damathat Hill.
„	HISPIDULA, W. Bl.	Mya-leit-doung. Ava.

LAGOCHELILUS, Theobald.

These are small turbate forms, with a notch in the peristome.

„	SCISSIMARGO, B.	Phaiethan Hill. Tenasserim.
„	TOMOTREMA, B.	Arakan.
„	LEPORINUS, W. Blanford.	Thayet-myo. Akouktoung.
„	WALNEFORDIANUS, G. Nevill.	Andamans. Nicobars. Great Coco.
„	ROEPSTORFFI, Morch.	Nicobars. Kamorta. Katchall.
„	GALATHEE, Morch.	Nicobars. Kamorta. Katchall.

Other species are *L. trochoides*, Stol., and *L. striolatus*, from Penang. *L. garreli*, Eyd. et Soul, Sumatra. *L. polynema*, Morch, Teressa.

LEPTOPOMA, *Pfeiffer*.

These are small light thin shells, the animals being of arboreal habits, but with no very marked characters.

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| „ | ASPIRANS, B. | Pegu and Tenasserim. |
| „ | ROEPSTORFFIANUM, G. Nev. | Andamans. |

DERMATOCERA, *H. and A. Adams*.

This genus is distinguished by carrying an erect horn on the extremity of the foot. One species is referred to it by Nevill with doubt

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| „ | IMMACULATUM, Chem. | Nicobars. Katchall. |
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PTEROCYCLOS, *Benson*.

Operculum horny, multispiral, concave within, laucellated without. Shell depressed, widely umbilicated. A wing-like dilatation of the peristome at the suture.

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| „ | ATER, Stol. | Ataran Valley. |
| „ | ARAKANENSIS, W. Bl. | Tounglup, Arakan. |
| „ | CETRA, B. | Phaiethan Hill, Tenasserim. |
| „ | FEDDENI, W. Bl. | Pegu. |
| „ | INSIGNIS, Theob. | Upper Salween Valley. |
| „ | PARVUS, Pearson. | Sandoway. |
| „ | PULLATUS, B. | Pegu. |

RHIOSOMA, *Benson*.

Last whorl free towards the mouth, with a straight porrect tube in place of the wing of *Pterocyclos*, and a deeply cupped shelly operculum, the convexity external.

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| „ | HAUGHTONI, Benson. | Maulmain. |
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SPHRACULUM, *Benson*.

A sutural tube in addition to the wing (of *Pterocyclos*). Operculum shelly, flat or convex (cupped).

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| „ | AVANUM, W. Bl. | Ava and Pegu. |
| „ | ANDERSONI, W. Bl. | Bhamo. |
| „ | BHAMOENSE, Theob. | Bhamo. |
| „ | BITUBIFERUM, Theob. | Bhamo. |
| „ | (OPISTHOPORUS) GORDONI, B. | Maulmain. Toung-ngoo. |

JERDONIA, *W. Blanford*.

Operculum multispiral of two laminae, the inner horny, the outer shelly. Shell small, turbinate.

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| „ | PHAYREI, Theob. | Upper Salween Valley. |
| „ | <i>Cycolphorus biliratus</i> , Beddome (<i>fide</i> Hanley). | |

PUPININÆ.

Shell turritid, more or less tumid.

MEGALOMASTOMA, *Guilding*.

Operculum thin, horny, multispiral.

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| „ | SECILABRE, Gould. | Yanglaw. Tenasserim. |
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RHAPHACLUS, *Pfeiffer*.

Operculum thin, horny, multispiral. Shell thin, rugose. Mouth circular, with expanded peristome, and a short tube adnate to the peristome. Tentacles long.

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| „ | CHRYSALIS, Pir. | Farm Caves, Maulmain. |
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In this species the peristomial tube lies in the same plane with the peristome.

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| „ | PACHYSIPHON, Theob. et Stol. | Kwengan. |
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In this species the peristomial tube is bent back behind the peristome.

HYBOCYSTIS, *Bosc.*

Operculum thick, shelly, multispiral, with a well-marked scar of attachment internally. Shell thin, but tumid.

„	GRAVIDA, B.	Damathat Caves. Farm Caves.
„	<i>Obolus a blennus</i> , B. (jun.)	

PUPINA, *Vig.* *red.*

Operculum thin, horny, multispiral. Shell pupiform, lustrous; mouth circular, with a slit on each side.

„	ARULA, B.	Yunglaw. Tenasserim.
„	ARTATA, B.	Pegu and Arakan.
„	BIANFORII, Theob.	Pegu.
„	PEGUENSIS, B.	Shuay-gyng. Zwagabin.
„	HUNGERFORDIANA, G. Nevill.	Hsaddin Koo. Salween Valley.
„	NICOBARICA, Pfr.	Great Nicolar.
REGISTOMA	NICOBARICA, Pfr.	The Nicolars.

Family Diplommatinidæ.

DIPLOMMATININÆ.

DIPLOMMATINA, *Beason.*

Operculum minute, horny, retracted beyond sight from the aperture. Shell small, tumid in the middle, the penultimate whorl being constricted. Columella twisted.

„	AFFINIS, Theob.	Upper Salween Valley.
„	CARNEOLA, Stol.	Damathat Caves.
„	EXILIS, W. Bl.	Mya-let-doung. Ava. Farm Caves.
„	GLABER, W. Bl.	Akyab.
„	NANA, W. Bl.	Akouktoung on Irrawaddy R.
„	POLITUS, W. Bl.	Phounglo near Negrais.
„	POLYPLEURIS, R.	Nattoung in Western Prome. Maulmain. Sandoway.
„	PUPIFORMIS, Theob.	Upper Salween Valley.
„	PUPPENSIS, W. Bl.	Puppaloung. Ava.
„	RICHTHOFFENI, Theob. et Stol.	Toungtalon, Maulmain.
„	SCALAROIDEA, Theob.	Ava.
„	SALWINIANA, Theob.	Upper Salween Valley.
„	SPERATA, W. Bl.	Niung-jo. Arakan Hills. Maii.
(PALMATA)	ANGULATA, Theob. et Stol.	Chouktalon. South of Maulmain.
„	CRISPATA, Stol.	Damathat and Farm Caves.
CLOSTOPHIS	SANKEYI, B.	Farm Caves. Maulmain.

No second specimen has ever been discovered. It may be a distorted *Diplommatina*.

ALYCEINÆ.

ALYCÆUS, *Gray.*

Operculum subtestaceous, multispiral. Shell turbinate or depressed, constricted behind the aperture, and with a sutural tube of variable length.

„	AMPHORA, B.	Farm Caves. Kaung Caves.
„	ARMILLATUS, B.	Tendoung, near Thayet-myo.
„	AVE, W. Bl.	Hills East of Mandalay.
„	ANDAMANE, B.	Andamans.
„	BIFRONS, Theob.	Upper Salween Valley.
„	CRISPATUS, God.-Aus.	Maulmain.
„	CUCULLATUS, Theob.	Upper Salween Valley.
„	FEDDENIANTIS, Theob.	Upper Salween Valley.
„	GRAPHICUS, W. Bl.	Chuegalay sukān. Arakan Hills.
„	GLABER, W. Bl.	Akyab.

ALYCEUS HUMILIS, W. Bl.	Arakan Hills. Myanoung.
" INGRAMI, W. Bl.	Arakan Hills.
" KURZIANUS, Theob. et Stol.	Nattoung in Western Prome.
" MARGARITA, Theob.	Upper Salween Valley.
" POLITUS, W. Bl.	Phoungdo, near Cape Negrais.
" POLYGONOMA, W. Bl.	Arakan Hills.
" PYRAMIDALIS, B.	Therapon Hill, Tenasserim.
" PUSILLUS, God.-Aus.	Nattoung in Western Prome.
" RICHTHOFENI, W. Bl.	Kaugun and Farm Caves, Maulmain.
" SUCCINEUS, W. Bl.	Moditoung, Arakan Hills.
" SCULPTILIS, B.	Tondoung, near Thayet-myo.
" URNULA, B.	Mai in Arakan. Attaran Valley.
" UMBONALIS, B.	Akouktoung on the Irrawaddy R.
" VESTITUS, W. Bl.	Moditoung. Baumi. Akyab.
" VULCANI, W. Bl.	Puppadoung.

Family Cyclostomidæ.

OMPHALOTROPIS, *Pfeiffer.*

Mr. W. T. Blanford, who has recently described three species of this genus, justly remarks that it is unknown in India or Burma, being confined to the Islands, and is especially common in the Mascarene Islands and in Polynesia. The shells are perforate, with an umbilical keel more or less distinct.

" DISTERMINA, B.	Andamans.
" ANDERSONI, W. Bl.	Andamans.
" PALLIDA, W. Bl.	Andamans.
" DECUSSATA, W. Bl.	Andamans.
" CONOIDEA, Fer.	Nicobars.

Family Helicinidæ.

HELICININÆ.

HELICINA, *Lamarck.*

Operculum lunate, shelly and devoid of spiral structure. The animals of this genus possess the power, in common with the *Veritidæ* and *Auriculidæ*, of dissolving the internal or columella portion of their shells, thereby obtaining more room for the comfortable disposition of their stomachs and other organs when adult. The species are mostly insular or littoral in their distribution.

" ARAKANENSIS, W. Bl.	Bassein. Ramri and Andamans.
" ANDAMANICA, B.	Andamans. Nicobars and Cocos.
" CROCINA, B.	Toung-ngoo.
" MERGUIENSIS, Pfr.	Mergui.
" SCRUPULUM, B.	Andamans.
" DUNKERI, Zcl.	Camorta. Preparis Island.
" BEHNIANA, Pfr.	Nicobars.
" NICOBARICA, Phil.	Nicobars.

This genus may be regarded as somewhat feebly represented on the mainland or Burma proper; the species being small and the individuals not numerous. The finer and more typical forms are from the West Indies.

HYDROCENINÆ.

HYDROCENA, *Parryess.*

The shells of this genus are minute, turbinate, and generally spirally striated, and harbour under stones or adhere to rocks. The operculum is shelly and furnished interiorly with a slender spine-like process.

" BLANFORDIANA, Stol.	Chouktalon and Farm Caves.
" FRUSTRILLUM, R.	Mya-leit-doung, Ava.

HYDROCENA FRATERNA, Theob. et Stol.	Chouktalon. South of Maulmain.
„ ILLEX, B.	Phaithan Hill, Tenasserim.
„ LIRATULA, Stol.	Damathat and Toungtalon Hills.
„ PYXIS, B.	Tondoung, Thayet-myo.
„ RAWESIANA, B.	Faru Caves, Maulmain.

NIRITINA, *Lamarck.*

The *Neritinas* are mainly inhabitants of fresh or brackish waters and in Burma are particularly fine and numerous within the tidal portion of its streams. They are often externally coated with a lustrous glaze, deposited on them by running water, which entirely conceals and disguises their true colour and is not easy to remove. Their spire is often much eroded from the excess of carbonic acid in the water wherein they reside, as is the case with *Melania* and *Unio* from a like cause.

„ ARTICULATA, Gould.	Tavoy.
„ BENGALENSIS, Chem.	Pegu.
„ CORNUCOPLE, B.	Pegu.
<i>N. melanostoma</i> , Tros.	
„ DEPRESSA, B.	Pegu.
„ INDICA, Soul.	Tavoy.
„ OBTUSA, B (apud Sow.)	Pegu.
„ PULLIGERA, Lam.	Andamans.
<i>N. Knorrrii</i> , Recl.	
„ RETICULARIS, Sow.	Pegu.
<i>N. capillulata</i> , Gould.	Tavoy.
<i>N. humeralis</i> , B.	
<i>N. fuliginosa</i> , Theobald.	Ava.
<i>N. cryptospira</i> , B.	Tenasserim.
<i>N. retifera</i> , B. (apud Blanford).	
<i>N. Peguensis</i> , W. Blanford.	Pegu.
„ RUBIDA, Pease.	Andamans.
„ SMITHI, Gray.	Pegu and Arakan.

NAVICELLA, *Lamarck.*

Operculum rudimentary, shelly, concealed. Shell oval, patelliform, attached to stones or the bottoms of boats in salt or brackish water.

„ ORBICULARIS, Sow.	Andamans.
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Family **Trochidæ.**

*PHASIANELLA LINEOLATA, Gray.

* „ VENTRICOSA (?) Quoy.

Sub-Family TURBININÆ.

TURBO, *Linnæus.*

Shell top-shaped. Aperture subcircular. Smooth. Operculum convex without, shelly, with a horny base displaying a 'scar' of attachment.

The operculum is usually smooth outside, but is sometimes warty, as in *T. sarmaticus*, L., the operculum of which is actually figured in one of the Bridgewater treatises as the 'epiphragm' of *Helix pomatias*, the edible snail of Southern Europe! The loose opercula of the larger *Turbos* were a source of wonder and perplexity to the earlier naturalists, by whom they were named 'Venus navels,' from the neatly-coiled snub little twist of their muscular scars. Now-a-days we have grown much too delicate to tolerate even a 'simile' borrowed from the anatomy of a goddess, but this refinement in our tastes can hardly be held to have extended to our 'morals,' as our tables unblushingly display the advertisements of artists, in every branch of what a Chinaman would designate as the 'lie business' of personal decoration, from "curled fringes" to "dress-improvers" ('pseudo-pygæ'), and all the rest of it, with copious illustrations at which our so-called coarser ancestors would have blushed.

- *TURBO RADIATUS, Reeve.
- * ,, PETHOLATUS, L.
- * ,, PORPHYRITICUS, Gmel.
- * ,, CORONATUS, Gmel.
- * ,, ARGYROSTOMA, L.

Sub-family ROTELLINÆ.

ROTELLA, *Lamarck*.

Shell highly polished, handsomely variegated, and with a large umbilical 'callus.' Operculum thin, horny.

- * ,, sp.

A species of this genus is found buried in the sands in countless numbers along the Arakan Coast. The advancing waves wash them out, but they soon bury themselves again when the water retreats.

Order SCUTIBRANCHIATA.

Gill consisting of two series of lamellæ over the neck or under the edge of the mantle. Sexes united (Hermaphrodite). The *Scutibranchiata* embrace a vast number of species, mostly littoral in their habits, and nestling among the sea weeds and rocks along the shore. They are vegetable feeders, and comprise spiral shells, as *Nerita* and *Trochus*; patelliform shells as in *Patella* and *Fissarella*; and multivalve shells like *Chiton*.

Sub-order PODOPHTHALMA.

Eyes pedunculate. Shell and operculum spiral.

Family Neritidæ.

NERITA, *Linnaus*.

Operculum horny, solid, with a shelly coat on each side, the outer surface usually granular.

- * ,, POLITA, L. Andamans.
- * (PILA) CHRYSOSTOMA, Reeve.
- * ,, COSTATA, Chem.
- * ,, Plicata, L.
- * (THELIOSTYLA) ALBICILLA, L. Andamans.
- * ,, BERMANICA, Phil.
- * ,, SQUAMMULATA, Le Guillou.
- * ,, ATROPURPUREA, Recluz.
- * ,, OBYZARUM, Recluz.

Sub-family TROCHINÆ.

Operculum horny, multispiral.

- *DELPHINULA PERONII, Kien.
- *TROCHUS NILOTICUS, L.
- * ,, OBELISCUS, Lam.
- * ,, STELLATUS, Gmel.
- * ,, INDISTINCTUS, Gray (non Phil.).
- * ,, TRANQUEBARICUS, Chem. Andamans.
- ,, PUNCTATUS.
- *POLYDONTA SQUARROSA, Lam.
- * ,, MACULATA, L. Andamans.
- ,, INCARNATA, Phil.
- * (INFUNDIBULUM) RADIATUM, Dillwyn. Andamans.
- CLANCCULUS MICRODON, H. Adams.

MONILEA	WARNFORDI, G. and H. Nevill.	Andamans.
"	CALYFULUS, Wood.	Andamans.
"	<i>T. Masoni</i> , G. and H. Nevill.	
"	CALLIFERA, Lam.	
FORSKÄLLA	PULCHERRIMA, A. Adams.	Andamans.
EUCHELUS	FOSSALATUS, Sowerbie.	Andamans.
"	FOVEOLATUS, A. Adams.	Andamans.
*MONODONTA	TRICARINATA, Lam.	
*	" CANALIFERA, Lam.	
*	" VIELLOTI, Payraud (a Mediterranean species), Hanley MS.	

Mr. G. Nevill, however, questions the correctness of this identification.

GIBBULA	BLANFORDIANA, G. and H. Nevill.
"	STOLICZKANA, G. and H. Nevill.

STOMATELLINÆ.

Foot thick, fleshy, developed posteriorly. Operculum thin, horny, paucispiral, often wanting.

BRODERIPIA, *Gray*.

Shell non-spiral, ancyliform, ovate.

* ,, IRIDESCENS, Brod.

Family **Haliotidæ**.

Operculum none. Shell ear-shaped, with a series of marginal holes. Internally nacreous and iridescent.

*HALIOTIS OVINA, Dillwyn.

* ,, VARIA, L. Andamans.

* ,, SEMISTRIATA, Reeve.

Sub-order **EDRIOPHTHALMA**.

Eyes sessile, or on slightly raised tubercles on the outer bases of the tentacles. Operculum none. Shell symmetrical, non-spiral, aperture not pearly.

Family **Fissurellidæ**.

Shell either pierced at the apex, or grooved or fissured anteriorly.

*FISSURELLA, sp.

SCUTUS, *Montfort*.

Shell depressed, shield-shaped, more or less covered by the mantle. White. Apex at the hinder third. The animal black.

* ,, CORRUGATUS, Reeve.

Family **Tecturidæ**.

The "false limpets," as they are called, are distinguished from the *Patellidæ*, by the gill being single and placed in a cavity in the right side of the neck, instead of forming a series of laminae between the mantle and foot.

*TECTURA FLUVIATILIS, W. Blanford. Bassein River.

" BÖRNEONENSIS. Andamans.

Family **Patellidæ**.

Shell conical. Gill, a more or less complete ring on the inner surface of the mantle.

Limpets sometimes excavate (on calcareous rocks) shallow roosting places for themselves, but can crawl about over the rocks for short distances. They are largely used for bait, and are wholesome food for man.

- *PATELLA TESTUDINARIA, L.
- * ,, SACCHARINA, L.
- * ,, RADIATA, Born.
- * ,, ASTER, Reeve.

Family Chitonidæ.

Shell formed of eight transverse imbricated plates immersed in the coriaceous mantle which forms an expanded margin beyond them. Sexes united.

CHITON NICOBARICUS, Chem.

Abounds on surf-beaten rocks in company with limpets, and is gathered for food.

Order PULMONATA.

Terrestrial, marsh or fluviatile, inoperculate mollusks, which breathe air directly by means of a vascular lung chamber.

Sexes united (Hermaphrodite). With a few exceptions the members of this order are herbivorous, a few shell-less forms feed on worms and other mollusks. The tentacles are retractile by inversion, as may be noticed in the common garden snail *Helix aspersa*.

The earliest contribution to our exact knowledge of the land shells of Burma was made by Dr. Mason forwarding to Dr. Gould a collection of thirty-five species, made in Tenasserim, and, about the same time, Mrs. Vinton also forwarded to the same gentleman shells from both the Thoungyeen and Tenasserim Rivers. The largest land shell sent was *Cyclaphorus pernobilis*, Gould, a richly coloured species, which the Karens (according to Dr. Mason) call the 'primary shell,' *i.e.* the one from which the others are derived. The Burmans call it the 'quet' shell, as they say it calls out 'quet, quet.' With reference to sounds produced by snails, it may be remarked that the noise made by the common English snail, crawling on the outside of a window pane, during the still hours of night, and scraping over the glass with its shell, is alarming to the timid and has served for the foundation of many a ghost story, or of stories of mysterious sounds and occurrences which belong to that order of narratives. Another handsome shell, then first sent, was *Bulinus atricallosus*, Gould, which the Karen maidens wear as an ornament to their buxom persons and name the 'heron's dung' shell. The next considerable collection of land shells was made by myself, and most of the new shells were described by Mr. Benson in the *Annals and Magazine of Natural History*. Still later additions to our knowledge of the subject were made by Messrs. W. T. Blanford, Fedden, Stoliczka and myself, and in Upper Burma by Dr. Anderson when on the Yunnan expedition.

Sub-order GEOPHILA.

Family Oleacinidæ.

OPEAS GRACILIS, Hutton. Throughout India and Burma.
Achatina octona, Gould.

Abounds everywhere, and is often associated with *Ennea bicolor*. Animal yellow.

,, WALKERI, B. Andamans. Salween Valley.
,, TEREBRALIS, Theobald. Upper Salween Valley.
,, NICOBARICA, Mörch. Nicobars.

PROSOPEAS HAUGHTONI, B. Andamans.
Opeas Pealei, Tryon.

This heavy shell, with a thick epidermis, is sufficiently distinct from its allies to be generically separated. It seems confined to the Andamans.

PROSOPEAS ROESTORFFI, Mörch.	Nicobars. Little Coco.
„ ACHATES, Mörch.	Nicobars.
„ ACHATINACEA, Pfr.	Camorta. Sarawak.
„ COMOROENSIS, Pfr.	Comoro.

BACILLUM, *Theobald.*

This genus, type *B. obtusum*, forms a well-marked group wholly distinct from the type *G. gemma*. The shells are turritid and of a peculiar white diaphanous waxy structure, with or without a deciduous epidermis. They seem intermediate between *Opeas* and *Glessula*, with nearer relations to the former.

„ OBTUSUM, W. Blanford.	Bhamo.
„ THEOBALDI, Hanley.	Upper Salween.
Not the erroneous locality, Teria ghat, given in the Con. Ind. Pl. xii.	
„ ORTHOCERAS, God.-Aust.	Khasi Hills. Andamans! <i>vide</i> Mr. Wood-Mason's collector.

HAPALUS PLICIFER, W. Bl.	Pegu.
„ PUTUS, B.	Pegu.
„ PUSILLUS, W. Bl.	Pegu.
„ SCROBICULATUS, W. Bl.	Pegu.

GLESSULA, *Albers.*

Thin polished shells, elongated and turritid, or globose. The Burmese species are uniform in colour and devoid of any markings. They are found on the ground amid decayed vegetable matter.

„ BLANFORDIANA, G. Nevill.	Ponsee, Yunan.
„ PEGUENSIS, W. Bl.	Irrawaddy Valley. Arakan.
„ GEMMA, B.	Arakan.
„ <i>G. frumentum</i> , Reeve.	
„ PERTENUIS, W. Bl.	Toungoup, Arakan.
„ PYRAMIS, B.	Ponsee, Yunan.
„ SUBFUSIFORMIS, W. Bl.	Ponsee, Yunan.
„ TENTISPIRA, B.	Pegu.

SOPHINA, *Benson.*

These shells are thin and hyaline, with the columella thickened, notched, and forming an angle with the outer lip, and with the umbilicus ridged.

„ CALIAS, B.	Maulmain.
„ <i>S. schistostelis</i> , B.	
„ CONJUGENS, Stol.	Maulmain.
„ DISCOIDALIS, Stol.	Maulmain.
„ FORABILIS, B.	Maulmain. Tenasserim.

MACROCHLAMYS, *Benson.*

This genus comprises a vast assemblage of very varied character of what may be termed 'common snails.' The surface in some is polished, and these are furnished in many instances with processes of the mantle capable of extension over the whole shell. Some have a dull epidermis, and some few are handsomely sculptured, as *M. artificiosa*, of which, however, the animal is unknown.

„ ARTIFICIOSA, B.	Phaiethan Hill. Tenasserim.
„ ASPIDES, B.	Tenasserim.
„ ATKINSONI, Theobald.	Maulmain.
„ BIRMANA, Pfr.	Tenasserim.
„ <i>M. acerra</i> , B.	
„ CHOINIX, B.	Andamans.
„ CLIMACTERICA, B.	Arakan Hills.
„ COMPLUVIALIS, W. Bl.	Arakan Hills.
„ CONVALATA, B.	Therapon Hill. Tenasserim.

This species and the previous one are local representatives each of the other.

MACROCHLAMYS	CONSEPTA, R.	Damathat Caves. Maulmain.
„	CYCLOIDEA, Alters.	Maulmain.
„	CASSIDULA, B.	Maulmain.
„	CAUSIA, B.	Phaichthan Hill, Tenasserim.
„	DIBRICHSENI, Mörch.	Nicobars.
„	EXUL, Theobald.	Andamans.
„	<i>M. Andamanensis</i> , Tryon.	
„	GORDONLE, B.	Maulmain.
„	HONESTA, Gould.	Arakan. Pegu. Tenasserim.
„	HYPOLEUCA, W. Bl.	Arakan Hills. Pegu. Bharno.
„	INDICA, B.	Pegu (<i>vide</i> Blanford).
„	<i>M. vitrinoides</i> (auctorum) not Deshayes.	
„	<i>M. petrosa</i> , Hutton.	
„	KUMAHENSIS, Theob. et Stol.	Kumah Hill, Sandoway.
„	LEVICULA, B.	Tenasserim. Pegu.
„	MOLECULA, B.	Pegu. Martaban.
„	NEBULOSA, W. Bl.	Pegu.
„	PAUXILLULA, B.	Thayet-myo.
„	PETASUS, B.	Tenasserim.
„	PERPAULA, B.	Arakan. Pegu. Maulmain.
„	POONGI, Theobald.	Maulmain.
„	RESPLENDENS, Phil.	Mergui. Bharno (Nevill).
„	STEPHUS, B.	Andamans.
„	RAMRIENSIS, W. Bl.	Ramri.
„	ROEPSTORFFI, Mörch.	Nicobars.
„	TEXTRINA, B.	Pegu.
SITALA	ATTEGIA, B.	Pegu. Ava.
„	ARX, B.	Therapon Hill. Tenasserim.
„	CONFINIS, W. Bl.	Thayet-myo. Ava.
„	GRATULAFOR, W. Bl.	Irrawaddy Valley.
„	LIRIUNCTA, Stol.	Maulmain.
„	CONULA, W. Bl.	Arakan.
KALIELLA	FASTIGIATA, Hutton.	Arakan (<i>vide</i> Nevill).
„	BARAKPORENSIS, Pfr.	Bharno (Nevill). Pegu.
„	POLYPLEURIS, W. Bl.	Arakan Hills.

A local representative of the Khasi Hills *K. bascunda*, B.

SESARA, *Albers*.

A well-marked group of shells peculiar to Burma, but some of them bearing a considerable resemblance to the little North American *H. hirsuta*, Jay.

„	INERMIS, Theob.	Ataran Valley.
„	ATARANENSIS, Theob.	Banks of the Ataran.
„	HUNGERFORDIANA, Theob.	Salween Valley.
„	CAPESENS, B.	Maulmain.
„	INFRENDENS, Gould.	Maulmain. Tavoy.
„	<i>S. Tickelli</i> , Theob.	
„	PYLAICA, B.	Maulmain.

The three which follow belong to a different division to the above.

„	BASSEINENSIS, W. Bl.	Bassein District.
„	HELICIFERA, W. Bl.	Arakan Hills.
„	MAMMILLARIS, W. Bl.	Western Prome.
ROTULA	ANCEPS, Gould.	Pegu. Martaban.
„	ARATA, W. Bl.	Bharno.

This, if distinct, is the local representative of the last.

„	DIPLODON, B.	Khasi Hills. Bharno. Arakan.
„	INGRAMI, W. Bl.	Arakan Hills.

This is the local representative in Arakan of the last.

„	PANSA, B.	Irrawaddy Valley.
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ARIOPHANTA UNDOSA, W. Bl.	Shan Hills, east of Ava.
„ BLANFORDI, Theob.	Upper Salween Valley.
„ RETROSA, Gould.	Tenasserim.
„ <i>A. succata</i> , Pfr. juv.	
„ SATURNIA, Gould.	Tenasserim.
„ ATER, Theob.	Maulmain. Hills west of Toung-ngoo.
RHYSOTA HAUGHTONI, B.	Andamans.
TROCHOMORPHA AULOPIIS, B.	Andamans.
„ CASTRA, B.	Arakan. Pegu. Tenasserim.
„ PERCOMPRESSA, W. Bl.	Bhamo.
„ SANIS, B.	Andamans.
HELICARION, <i>Ferussac</i> .	

These are mostly large slug-like forms, with the shell sometimes membranous or rudimentary, and only seen about after, or during heavy rain. The animal is too large for retraction within its shallow depressed shell.

„ BIRMANORUM, Phil.	Mergui.
„ CHRISTIANE, Theob.	Andamans.
„ GIGAS, B.	Kyauk-hpyoo (Nevill).
„ MAGNIFICUS, God.-Aus.	Momien, Yunan (Nevill).
„ PEGUENSIS, Theob.	Pegu. Tenasserim.
„ RESPLENDENS, Nev.	Sawady and Bhamo.
„ VENUSTUS, Theob.	Martaban and Arakan Hills.

CRYPTOSOMA, *Theobald*.

Differs from *Helicarion* in the animal being completely retractile within its shell, and in forming a stout epiphragm during aestivation.

„ OVATUS, H. Bl.	Pegu (small var.).
„ PRESTANS, Gould.	Yunan. Arakan. Pegu. Tenasserim.
HYALIMAX REINHARDTI, Mörch.	The Nicobars.
„ sp.	Andamans.

LIMAX VIRIDIS, *Theobald*.

A beautiful little apple-green slug, found crawling on mangrove leaves (*Rhizophora*). The type specimen has been lost, and its systematic position is uncertain.

Family **Helicidæ**.

No caudal mucous pore or tentacular lobe.

VITRININÆ.

HELICOLIMAX ATTARANENSIS, Theob. Banks of the Attaran.

This slug (with *Sesara Atarancensis*) was discovered by myself near the perforated hill on the Attaran, and is the sole member of its sub-family at present known in Burma. A second species, *Vitrinopsis nucleata*, Stol., was found by Stoliczka at Pinang.

HELICINÆ.

PLECTOPYLIS, *Benson*.

This is a very well-marked group of flat closely-wound shells, the typical forms of which range from the Naga Hills to Tenasserim. In Ceylon they are represented by *Corilla*, which externally resembles them, but is unprovided with the curious pylaic barriers, or intricate plaits, which partially close and bar the last whorl. For full remarks on this interesting group, see Godwin-Austen, Proc. Zool. Soc. Lond. 1874, p. 608, and 1875, p. 43. It is suggested (*l.c.*) that these pylaic barriers are of service to the animals, by excluding insects, and so tending to promote the survival of the forms thus endowed; but these teleological arguments must be

accepted with extreme caution, as it is the minority who are thus gifted; and it is difficult to imagine the precise utility of a structure (that is, *quoad* any effect it may have in the preservation of the species), which is wholly exceptional, and not found to be essential to the well-being of the vast majority.

PLECTOPYLIS ACHATINA, Gray.	Farm Caves, Maulmain.
<i>P. repercutsa</i> , Gould (<i>fide</i> G.-Austen).	Tavoy. Mergui.
ANDERSONI, W. T. Bl.	Yunan.
ANGUINA, Gould.	Tavoy. Damathat Caves.
- BRACHYDISCUS, God.-Aust.	Moolyit Hill, east of Maulmain.
BRACHYPLECTA, B.	Near Maulmain.
CYCLASPIIS, B.	Damatlat and Kaugun Caves.
DENTROISA, B.	Phaic-than Hill, Tenasserim Valley.
KARENORUM, W. T. Bl.	Henzadah District.
PLECTOSFOMA, B.	Arakan. Khasi and Naga Hills.
FEDDENI, W. T. Bl.	Prome. Thayet-myo.
PERARCTA, W. T. Bl.	Mya-leit doung. Ava.
PSEUDOPHIS, W. T. Bl.	Thayet-myo.
REFUGA, Gould.	Akouktoung. Kwaydouk.
<i>P. leiophis</i> , B.	
SHANENSIS, Stöb.	Upper Salween Valley.
<i>P. trillamellaris</i> , God.-Aust.	
PLECTROTROPIS AKOUKTOUNGENSIS, Theob.	Akouktoung on the Irrawaddy R.
ARAKANENSIS, Theob.	Arakan Hills.
BOLUS, B.	Irrawaddy Valley. Pensee, Yunan.
HEMIOPTA, B.	Andamans.
HUTTONI, Pfr.	Irrawaddy Valley.
OLDHAMI, B.	Irrawaddy Valley.
PANSA, B.	Irrawaddy Valley.
PEGUENSIS, W. Bl.	Pegu.
PERPLANATA, Nevill.	Mimboo, Yunnan.
PHAYREI, Theob.	Ava.
PILIDION, B.	Maulmain.
ROTATORIA, V. d. Busch.	Irrawaddy Valley.
SIMILARIS, Fer.	Irrawaddy Valley.
SCALPURITA, B.	Irrawaddy Valley below Ava.
SCENOMA, B.	Maulmain.
TRICHOTROPIS, Nev.	Irrawaddy 2nd defile.
ZOROASTER, Theob.	Prome. Ava. Tsagain. Manwyne.
SEMICORNU BIFOVEATUM, B.	Therapon Hill, Tenasserim Valley.
A single adult shell was all that I found of this remarkable form (W. T.).	
JANIRA CODONODES, Pfr.	Nicobar Islands.
TRACHIA ANSERINA, Theob.	Shan States.
CATASTOMA, W. Bl.	Ponsi in Yunan.
PROCUMBENS, Gould.	
<i>delibrata</i> , B.	Irrawaddy Valley. Tenasserim.
GABATA, Gould.	Maulmain. Tavoy.
<i>H. Merguiensis</i> , Phil.	
HELPERI, B.	Andamans.
MERGUIENSIS, Pfr.	Maulmain. Tenasserim.
TROCHALIA, B.	Andamans.
<i>R. Bigsbyi</i> , Tryon.	
A peculiar type of shell, very different from <i>T. fallaciosus</i> , next to which it is placed in Nevill's Hand-list.	
GANESSELLA CAPITIUM, B.	Pegu and Upper Burma; also Bengal.
<i>G. hariola</i> , B.	
This rare shell is found on the ' <i>Shah bew</i> ,' <i>Phyllanthus emblica</i> , L. (W. T.).	

BULIMINÆ.

AMPHIDROMUS, *Albers.*

The shells of this group are handsome brightly coloured shells, and are either uniformly coloured or have handsome markings. The yellow *B. atricallosus*, Gould, is called, according to Dr. Mason, the 'heron's dung' shell, and is worn as an ornament by the Karens. Gould's shell is not figured in the *Conchologia Indica*.

..	ANDAMANENSIS, MOUSS.	Andamans.
..	CONTRARIUS, MULL.	Tenasserim.
	<i>A. atricallosus</i> , GOULD.	
..	JANUS, PFR.	Tenasserim (?).
	<i>A. atricallosus</i> , <i>Conchologia Indica</i> , Pl. xix. f. 5 (not of Gould).	
..	FURCILLATUS, MOUSS.	Andamans.
..	LEPIDUS, GOULD.	Mergui Archipelago.
..	MONILIFERUS, GOULD.	Tavoy.
..	SCHOMBURGHII, PFR.	
	<i>A. Andamanicus</i> , THORPE.	Andamans.
	<i>A. Theobaldianus</i> , B.	Tenasserim Valley.
	.. (sinistral race).	Thoungyeen Valley. Martaban.
..	SINENSIS, B.	Martaban. Pegu. Arakan.
	<i>A. Romieri</i> , PFR.	
..	SYLNETICUS, B.	Arakan.
PERONÆUS	NILGIRICUS, PFR.	Upper Salween Valley.

The occurrence of this shell in the Shan states, where it was procured by M. Fedden, is a remarkable fact.

..	VICARIUS, W. BL.	Upper Salween Valley.
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PUPINÆ.

CYLINDRUS	INSULARIS, Ehr.	Upper Burma.
	<i>C. pullus</i> , Gray.	
PUPA	(<i>Scopelophila</i>) AVANICA, B.	Upper Burma.
..	(<i>Scopelophila</i>) FILOSA, Stol.	Arakan Coast (on trees).
..	(<i>Scopelophila</i>) SALWINIANA, Theob.	Upper Salween Valley.
..	(<i>Papisoma</i>) LIGNICOLA, Stol.	Maulmain.
..	(<i>Leucochila</i>) CLENOPTICA, Hutton.	Upper Burma.

HYPSELOSTOMA, *Benson.*

The type of these curious little shells with their uplifted trumpet shaped mouth was found by myself adhering to limestone rocks near Thayet-myo. In their habits they are just like pupas, and it is not improbable other species may be discovered.

..	BENSONIANUM, W. BL.	Myaleitdoug, Ava.
..	DAYANUM, Stol.	Damathat Hill, Martaban.
..	TUBIFERUM, B.	Toudoug Hill, Thayet-myo.

SUCCININÆ.

SUCCINEA	ACUMINATA, W. BL.	Momein, Yunnan.
..	PPLICATA, W. BL.	Tounghap, Arakan.
..	SEMISERICA, GOULD.	Tavoy, Pegu.

CLAUSILINÆ.

CLAUSILIA, *Draparnaud.*

Burma is rich in *Clausilia*, but more species doubtless will be discovered when the adjoining countries come to be investigated. *C. bulbosus*, B., and *C. tuba*, Hanley, are remarkable forms of the genus.

..	ARAKANA, Theob. and Stol.	Arakan Hills and Maii, Sandoway.
..	BULBUS, B.	Banks of the Attaran.
..	FUSIFORMIS, W. BL.	Arakan Hills.

CLAUSILIA GOULDIANA, Pfr.	Mergui, Maulmain. Salween Valley.
„ INSIGNIS, Gould.	Tavoy.
var.	Maulmain.
„ MASONI, Theob.	Hills East of Toung-ngoo.
„ OVATA, W. Blanford.	Nattoung on the Attaran R.
„ PENANGENSIS, Stol.	Penang.
var. (?)	Andamans.
„ PHILIPPIANA, B.	Farm Caves, Maulmain.
„ TUBA, Hanley.	Upper Salween Valley.
„ THEOBALDI, W. Bl.	Toung-ngoo.
„ VESPA, Gould.	Tavoy.

STREPTAXINÆ.

ENNEA BICOLOR, Hutton.	Pegu. Tenasserim. Bhamo. Nicobars.
<i>P. mellita</i> , Gould.	

This little shell, and its constant companion *O. gracilis*, is found over the greater part of India, under stones.

„ FARTOIDEA, Theob.	Upper Salween Valley.
HUTTONELLA CYLINDRELOIDEA, Stol.	Damathat caves.
STREPTAXIS ANDAMANICUS, B.	Andamans. Great Coco.
„ BURMANICUS, W. Bl.	Pegu. Tounghoop. Toung-ngoo.
„ BLANFORDI, Theob.	Pegu.
„ BOMBAY, B.	Maulmain.
„ EXACTUS, Gould.	Maulmain. Mergui.
„ ELISA, Gould.	Mergui Archipelago.
„ HANLEYANUS, Stol.	Kwengan Hill.
„ OBTUSUS, Stol.	Chouktalon Hill, Maulmain.
„ PETITI, Gould.	Mergui.
„ SANKEYI, B.	Maulmain.
„ SOLIDULUS, Stol.	Maulmain. Ye-the-bian Hill.
„ THEOBALDI, B.	Bhamo.
„ PFEIFFERI, Zelebor.	Nicobars. Kamorta. Katchall.

Sub-order LYMNOPHILA.

Family **Limnæidæ.**

Eyes sessile at the inner bases of the tentacles. Animal aquatic, but coming to the surface to breathe air. Respiratory opening on the right side. Excretory opening on the left. Shell thin, with the outer lip simple, acute, and the columella usually with an oblique fold.

LYMNÆA ACUMINATA, Lam.	India and Burma.
<i>L. amygdalus</i> , Tros.	
<i>L. chlamys</i> , B.	
<i>L. rufescens</i> , Gray.	
<i>L. rubiginosus</i> , Mich.	

A species as variable as it is widely spread.

„ LUTEOLA, Lam.	India and Burma.
„ PEREGRINA, Mull.	Yunan. Upper Salween Valley.
„ YUNANENSIS, Newcombe.	Sanda, in Yunan.
„ ANDERSONIANUS, Nevill.	Yunan and Upper Salween Valley.
<i>L. marginata</i> , Con. Ind. (not Michaud)	

PLANORBINÆ.

Shell depressed, spiral, many-whorled. Aperture crescentic.

PLANORBIS, *Guetlard*.

Shell dextral. Foot small. Peristome thin. Tentacles long.

„	COMPRESSUS.	India. Yunan.
„	EXUSTUS, Desh.	India. Bhamo. Pegu. Tenasserim.
	<i>P. Indicus</i> , B.	
	<i>P. Coromandelianus</i> , Kust.	
	<i>P. Merguensis</i> , Phil.	
„	CONVEXIUSCULUS, Hutton.	Sanda in Yunan.
„	CALATHUS, B.	Ava.

Family Veronicellidæ.

VERONICELLA BURMANORUM, Theob. Arakan. Pegu. Yunan. Tenasserim.
See J. A. S. B. 1873, Part II. p. 34.

Family Onchidiidæ.

ONCHIDIUM	PALLIDUM, Stol.	Pegu.
„	TIGRINUM, Stol.	Pegu.
„	TENERUM, Stol.	Pegu.

The species of *Onchidium* are estuarine slugs, abounding in muddy spots within the tidal area of large rivers. The type of the genus, *O. typhæ*, B. H., abounds in the Hugli at Calcutta. For full details of the anatomy, see Stoliczka, Jour. As. Soc. Bengal, 1869, Part II. p. 88.

Family Auriculidæ.

The animals of this family are mostly marine marsh residents, harbouring under stones and fallen trees, either in mangrove swamps actually between tide-marks, or in places occasionally inundated by salt water.

Auricula inhabits mangrove swamps and is quite at home in salt water. *Pythia* is found in moist spots near the sea, but not inundated by the tide, or only within its occasional reach.

*AURICULA	AURIS-JUDÆ, L.	Coast of Burma.
*	„	GANGETICA, B.
„	PUSILLA, H. et A. Adams.	Irrawaddy Delta.
„		Arakan Coast.
*CASSIDULA	AURIS-FELIS, Brug.	Coast of Burma.
*	„	NUCLEUS, Mart.
„	LABRELLA, Desh.	Coast of Burma.
*PYTHIA	PPLICATA, Fer.	Coast of Burma.
*	„	TRIGONA, Trosch.
*	„	OVATA, Pfr.
	PLECOTREMA	CUMINGIANA, W. Bl.
		Irrawaddy Delta.
*MELAMPUS	FASCIATUS, Desh.	Coast of Burma.
	PERSA, H. et A. Adams.	
„	MELANOSTOMA, Gavi.	Coast of Burma.

Sub-order *THALASSOPHILA*.

Eyes sessile, on the front part of the frontal disk formed by the expanded tentacles.

Family Amphibolidæ.

Shell globose, umbilicated. Operculum horny, subspiral.

AMPULLARINA	BURMANA, W. Bl.	Irrawaddy Delta.
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Family Siphonariidæ.

SIPHONARIA, *Blainville*.

Shell limpet-shaped, with a siphonal groove on the right side. Animal lives within reach of the tide on rocks, like limpets, but breathes air. Respiratory orifice closed by a large fleshy lobe of the mantle (Adams).

„ sp. One or more species common on the coast.

Sub-class HETEROPODA.

Animal oceanic, predatory, bisexual.

Family Ianthinidæ.

LANTHINA, *Bolton*.

The 'violet snails' are furnished with a swimming 'raft' of cartilaginous air-sacs, beneath which the ovarian capsules are arranged. This 'raft' is an extreme modification of the operculum of other genera. When molested, these animals exude a violet-coloured fluid (similar in colour to their shells), derived, it is thought, from the '*vellette*' and other acalephs whercon they feed.

Class CEPHALOPODA.

Free oceanic mollusks. Sexes distinct. Reproduction by ova of comparatively large size. No metamorphosis.

Head distinct, furnished with limbs usually armed with pneumatic cups and sometimes claws, which are used both for locomotion and for securing their prey. Eyes well developed, and mouth furnished with a powerful parrot-like beak, capable of crushing crustacea and fish. Unisexual. There is also an oral tube or siphuncle from which water can be forcibly expelled, thereby causing the animal to dart swiftly in an opposite direction. "Their warfare," says Dr. Johnston, "though cruel is open. The long flexible arms that encircle the head are furnished with dozens of cup-like suckers often pointed with sharp recurved teeth. It must be a fearful thing for any living creature to come within their compass or within their leap; for captured by a sudden spring of several feet, made with the rapidity of lightning, and entangled in the slimy serpentine grasp of eight or ten arms, and held by the pressure of some hundreds of exhausted cups, escape is hopeless."

Order POLYPODA.

Body inclosed in the last chamber of an external chambered siphuncled shell. Limbs numerous, tentacular, without cups. Gills four.

*NAUTILUS POMPILIUS, L.

Dr. George Bennett gives the following description of the mode employed for capturing the pearly nautilus by the Fijians (*Proc. Zool. Soc. Lond.* 1859, p. 227):— "The Feejeans esteem the pearly nautilus highly as an agreeable viand, and their mode of capturing it, for the embers or for the pot, is not a little interesting. When the water is smooth, so that the bottom, at several fathoms of depth, near the border of the reef, may be distinctly seen, the fisherman, in his little frail canoe, scrutinizes the sand, and the coral masses below to discover the animal in its favourite haunts. The experienced eye of the native may probably encounter it in its usual position, clinging to some prominent ledge, with the shell turned downwards, and preparations are accordingly made for its capture. The tackle consists, first, of a large round wickerwork basket, shaped very much like a cage rat-trap, having an opening above, with a circle of points directed inwards, so as to permit of entry but preclude escape; secondly, a rough piece of native rope of sufficient length to reach the bottom; and, thirdly, a small piece of branched wood, with the branches sharpened

to form a sort of grapnel, to which a perforated dome is attached, answering the purpose of a sinker. The basket is now weighted with stones, well baited with boiled crayfish (*Palinurus*), suggested no doubt by the large quantity of the fragments of crustacea usually to be found in the crop of the Nautilus, and then dropped gently down near the victim. The trap is now either closely watched, or a mark is placed upon the spot, and the fisherman pursues his avocations on other parts of the reef until a certain period has elapsed, when he returns and in all probability finds the Nautilus in his cage feeding on the bait."

The shells of Cephalopoda are either internal, like *Spirula* and *Belemnites*, or external, like *Nautilus* and *Ammonites*. They may be either straight, like *Orthoceras*, involute, like *Spirula*, or revolute, like *Nautilus* and *Ammonites*. The term *involute*, or 'curled under the belly,' and *revolute*, or 'curved over the back,' are used with reference to the back and belly of the animal. On this subject great misapprehension has universally prevailed, and the terms 'ventral' or 'dorsal' have been applied to the *shell* without regard to the position it held *quoad* the ventral and dorsal aspects of the animal. A masterly paper by Professor Owen (in Proc. Zool. Soc. Lond. 1878, p. 955) clearly shows how erroneous the popular nomenclature is, and the following passage defines the true sense in which the terms *dorsal* and *ventral* should be used in respect to the Cephalopoda:—The dorsal aspect of a Cephalopod is determined by the position of the brain and eyes, *i.e.* by that predominating part of the brain which sends off the optic nerves. The ventral aspect is shown by the respiratory funnel. No malacologist has questioned these conclusions. The proposition might be simplified by stating that the funnel shows the 'ventral side' of the animal, and that the opposite one is the 'dorsal side.' To give a familiar application of this mode of viewing the shell of a Cephalopod, we have only to imagine a dog's tail as representing the curled siphuncle of the shell. In a terrified condition of mind, its tail will be coiled under its belly, or involutely, and will then represent the curve of the *Spirula*, *quoad* the position of the animal: but when in a joyous frame of mind, its tail will be curled jauntily over its back, or 'revolutely,' as is the curve of *Nautilus* as regards the animal which formed the shell. This explains a seeming anomaly thus described by Owen (*l.c.*): "Accordingly, all who have occupied themselves with the organization of the Cephalopods have pointed out the singular reversed positions of the mandibles, as compared with those in such vertebrate animals as repeat the cephalopodic condition of a 'beak,' as e.g. *Chelonia* and *Aves*. Instead of the dorsal, or upper mandible, being the largest and longest, so as to overlap the ventral, or under mandible, as in birds, the dorsal mandible is the smaller and shorter, and is underlapped by the larger and longer ventral mandible in all Cephalopods." Of course the real state of the case is, that the beaks of a Cephalopod are really precisely homologous to those of a hawk, the upper, or dorsal, overlapping the lower, or ventral, but these terms having been erroneously applied to the shell, the 'beaks' of the Cephalopod have seemingly (but not truly) displayed the above curious deviation. It is therefore an error to use the terms 'dorsal' and 'ventral' as synonymous with 'external' and 'internal,' as is so generally done. Of course, in all coiled shells, the convexity is external, and the concavity internal, and there is no objection to applying these terms to the *shell*; but when we speak of *ventral* and *dorsal*, we must then have regard to the animal, and discrimination is then imperative, whether the shell is dorsally revolute, or ventrally involute, our sole guide being, of course, the relation of the shell to the ventral and dorsal aspect of the animal.

Order DECAPODA.

Limbs (arms) ten. An internal shell. Two of the arms are elongated and fitted with pedunculated cups. The decapods are divided into *Chondrophora* with an internal horny pen; *Sepiophora* with a calcareous bone; and *Belemnophora* with an internal chambered shell. The size to which some members of this order grow may be gathered from the size of an *Architeuthis princeps*, Packard, which was encountered by some fishermen in Conception Bay, Newfoundland, and which is

described, together with sundry other new and rare Cephalopoda, by Prof. Owen, in the Transactions of the Zoological Society of London, vol. xi. p. 161, from which I shall quote a few particulars. "A few weeks ago" (December, 1873) "two fishermen lying off St. John's observed an object floating in the water which they took to be a portion of a wreck. On reaching it, one of the men struck it with a boat-hook, whereupon the supposed piece of wreck became alarmingly lively, 'rearing a parrot-like beak, as big as a six-gallon keg, with which it smote the boat. Next it shot out from its head two huge livid arms, and began to twine them about the boat.' Happily an axe lay handy, and with it the boatman, recovering from the surprise into which this unexpected attack had thrown himself and his mate, cut off both the arms as they lay over the gunwale, whereupon the fish backed off and ejected an immense quantity of inky fluid that darkened the water for a great distance about." This account of the Rev. M. Harvey of St. John's was accompanied by photographs of the portions of the monster thus obtained. The length of the arm cut off was 19 feet and the entire length was estimated at 39 feet. That this is not an extravagant estimate is rendered probable by the size of Squid captured in Coomb's Cove, Fortune Bay, in 1872, and measured by the Hon. T. R. Bennett, of English Harbour, Newfoundland. The length of the body, arm and tentacle of which was respectively 10, 6, and 42 feet; and of another of these monsters taken in Trinity Bay, 9½, 11 and 30 feet. Another remarkable animal was stranded by a tidal wave in November, 1874, in the Isle of St. Paul, during the residence there of the party of astronomers waiting to observe the 'Transit of Venus,' and this monster was photographed as it lay on the rocks by the artist attached to the expedition. This animal measured over 30 feet, and seems to belong to a different genus from the Newfoundland animal, and which M. Vélain proposes to name *Mouchezis* after Capt. Mouchez, commandant of the expedition.

a. *Chondrophora*.

Family **Loliginidæ**.

To this family belongs the common 'squid,' so valued as a bait for the Cod fishery of Europe. The species of this and other allied families on the coast of Burma have not been ascertained.

b. *Sepiophora*.

Family **Sepiidæ**.

Shell cellular, calcareous.

SEPIA, sp. *Pliny*.

A species on the coast is known as 'ye-jiet,' or 'water-hen,' by the Burmese.

c. *Belemnophora*.

Family **Spirulidæ**.

SPIRULA, *Lamarck*.

Shell internal, spiral, chambered and siphuncled.

* ,, PERONI, *Lam.*

Order OCTOPODA.

Limbs (arms) eight. No internal shell.

Family **Octopodidæ**.

Arms subulate. An 'ink bag' present, with which they render the water turbid when alarmed and under cover of which they retreat.

*CISTOPUS INDICUS, *Rupp.*

'Ye-myok.' Water monkey of the Burmese.

This species is very common on the Arakan coast, and is sought for as food by the Burmese in the pools left by the tide. The retreat of the animal is indicated by a small hole in the sand or gravel, with a few relics, in the shape of fragments of crabs, scattered around. A crushed crab is used as a bait, firmly bound round with string, the ends of which are wound round the fisherman's left wrist. The bait is held in front of the hole and is soon perceived by the animal in ambush, who protrudes some of its arms and endeavours to drag the crab into the hole; this the fisherman prevents by firmly planting his knuckles in the sand, and the *Cistopus* in a little time emerges from his retreat and fastens on the crab. With his right hand the fisherman now drives a sharp spike of bamboo through the animal's body and secures it.

Family Argonautidæ.

ARGONAUTA, *Linnaeus*.

Males smaller than the females. Females secrete a symmetrical shell for the protection of the ova, and which has no muscular attachment to the soft parts of the animal. The argonaut swims swiftly in a reversed position with the 'shell' firmly clasped by the arms.

„ OWENII, Adams and Reeve.

The Cephalopoda are not only interesting as being the most highly endowed of all invertebrates, but as comprising the only species of that class of creatures which by their size and strength are capable of proving formidable to man and the higher animals. It is true, that as a rule the large Cephalopods, of whose dimensions and powers we have only lately acquired anything like a precise knowledge, are fortunately rare, and do not evince any disposition to molest mankind; but their ability to rival the shark in destructiveness is undoubted, did their numbers or habits force them obtrusively on our notice. At the present day, however, they are of service, rather than otherwise, to mankind, and a European species, common in the Mediterranean, yields the valuable pigment sepia, whilst almost any species will serve as a most attractive bait, and some species are habitually sought for and so used by fishermen. In the East, moreover, dried cuttle fish are much esteemed as food, and can be bought in Rangoon or any large bazaar in China, and I have little doubt, that were the delicacy introduced into England it would be duly appreciated, and that, 'soused cuttle fish' or 'kippered squid' would prove an acceptable addition to the breakfast-table.

Sub-Kingdom VII. VERTEBRATA.

Red-blooded animals, with the mass of the nervous centres inclosed in a bony axis. Sexes distinct. Jaws invariably above and below, never lateral. The muscles always external to the bones.

ICHTHYOLOGY.

REGARDING Fish in the light of a food supply for the masses, there is, perhaps, no part of the East where this item forms so important a feature of the national dietary as in Burma, which mainly arises, of course, from the Buddhist faith, which indisposes the people to the use of butcher's meat, which is replaced by Ngā-pī, or the fish paste so universally used as a condiment with rice by all classes of society in Burma. This being so, the following remarks will not be regarded out of place, taken from Dr. Day's Report on 'Freshwater Fish and Fisheries of India and Burma,' p. 15:—"The fishes, which are chiefly useful as food in the fresh-waters of India, belong to the order *Physostomi*, especially in its Siluroid, Cyprinoid, and Herring families; as well as those which are included in the order *Acanthopterygii*, subdivided by some authors into two. The other orders which furnish examples to the fresh waters are only employed as food by the very poorest classes, or even entirely rejected.

In the sub-class TELEOSTEI, the spiny-rayed or ACANTHOPTERYGIAN orders of fishes are not found in any great numbers in the inland fresh waters of India, but are mostly confined to the plains, either within, or but a short distance removed from tidal reach, or above the sea-level. The larger the river, the greater the probability of these fishes extending their range up it. There are some genera which possess species that are able to exist some time after their removal from the water, and even to dive down and remain in the mud of tanks during the dry season, re-appearing with the returning rains. These hard-rayed fishes, which are taken in the fresh waters, mostly belong to the following 18 genera, some of which are marine, others not so:—1 *Lates*, 2 *Ambassis*, 3, *Corvina*, 4 *Mugil*, 5 *Equula*, 6, *Gobius*, 7 *Euctenogobius*, 8 *Periophthalmus*, 9 *Eleotris*, 10 *Badis*, 11 *Nandus*, 12 *Catopra*, 13 *Anabas*, 14 *Polyacanthus*, 15 *Trichogaster*, 16 *Ophiocephalus*, 17 *Rhynchobdella*, 18 *Mastacembalus*.

The foregoing 18 genera are divisible into two distinct classes; *first*, those which entirely belong to the fresh waters. *Secondly*, those which are marine, and only ascend rivers for predaceous or breeding purposes. Of the true fresh-water ones the first four are monogamous—*Anabas Thomassi*, *Polyacanthus eupanus*, *Trichogaster fasciatus*, and *Ophiocephalus gachua*, and perhaps also *Gobius giuris* and *Euctenogobius striatus*, all of which appear peculiarly adapted for tanks and 'engs,' as they live in the grass along their edges, where the larger varieties lie in wait for frogs, or other animals, whercon they prey, whilst the four first named genera,

being air-breathers, have only to raise their mouths out of water to take in their modicum of air.

Others of these genera, as *Ambassis* (sp.), *Badis*, *Nandus*, *Catopa*, *Rhynchobdella* and *Mastacembalus*, are apparently polygamous.

Of the whole of these *Acanthopterygians*, but few are generally distributed through the inland tanks far from the sea-level, or beds of large rivers: these exceptions are the little *Ambassis*, a goby, *Gobius giuris*, the small *Badis*, the percid *Nandus*, the 'walking fishes' *Ophiocephalus*, and the spined eels, *Rhynchobdella* and *Mastacembalus*.

Of the second, or marine division, of this order of fishes, some, as *Lates calcarifer*, *Corvina coitor*, and *Equula*, though marine, ascend rivers at certain seasons to obtain food, sometimes going long distances up their course; thus I have taken *L. calcarifer* at Mandalay, about 650 miles from the sea, evidently following the shoals of *Clupea palasah* for predaceous purposes.

Fishes of the order *Physostomi*, or those in which the air-vessel communicates with the pharynx by means of a pneumatic duct, contain the largest proportion of the Indian fresh-water fishes. One of these families (*Silurida*) is destitute of scales, whilst they are present in the *Cyprinida*, which have no teeth in the jaws or palate, and also in the herrings (*Clupeida*), the majority of which have a trenchant abdomen (as the hilsa, *Clupea palasah*), or generally a few minute teeth in the jaws or palate. The *Notopterida*, which also belong to this order, furnish some species which are esteemed by the natives.

The Siluroid family *Silurida* are commonly known as Cat-fishes, because they generally possess a number of long barbels arranged around the mouth. These fishes mostly prefer muddy to clear water, as such conceals their presence. The more developed and numerous these barbels, the better adapted these fish seem to be for an inland and muddy fresh-water residence, whilst, on the contrary, those which are strictly marine do not appear to be so well furnished with these appendages. Siluroid fishes are also generally armed with strong spines in the fin of the back, and the pectoral fins, and which as a rule are serrated: with these, severe wounds are often inflicted, which renders the handling of them dangerous. The Siluroid fishes which are captured in the fresh waters mostly belong to the following 25 genera, excluding *Chava*, some of which are marine:—1 *Akysis*, 2 *Erethistes*, 3 *Macrones*, 4 *Rita*, 5 *Arius*, 6 *Pangasius*, 7 *Pseudotropius*, 8 *Callichrons*, 9 *Wallago*, 10 *Olyra*, 11 *Silurus*, 12 *Clarias*, 13 *Saccobranchus*, 14 *Siluridia*, 15 *Ailia*, 16 *Ailichthys*, 17 *Eutropichthys*, 18 *Sisor*, 19 *Gagata*, 20 *Hemipimelodus*, 21 *Bagarius*, 22 *Pseudocheneis*, 23 *Glyptosternum*, 24 *Amblyceps* and 25 *Ecostoma*. Of these the following eighteen are wholly resident in the plains and do not extend into the hills, and of these the first eight have the air-vessel free in the abdominal cavity and not inclosed in bone, *Erethistes*, *Rita*, *Arius*, *Pangasius*, *Pseudotropius*, *Callichrons* and *Wallago*, whilst the next ten have it more or less inclosed, *Clarias*, *Saccobranchus*, *Siluridia*, *Ailia*, *Ailichthys*, *Eutropichthys*, *Sisor*, *Gagata*, *Hemipimelodus* and *Bagarius*. Three genera, extending from the plains into the hills (destitute of Alpine sources), possess an air-vessel lying free in the abdominal cavity, *Akysis*, *Olyra* and *Silurus*; whilst four genera, extending into the hills (with or without Alpine sources), possess an inclosed air-vessel, and the first two are moreover furnished with a thoracic adhesive apparatus, *Pseudocheneis*, *Glyptosternum*, *Amblyceps* and *Ecostoma*.

From the foregoing observations it appears that the majority of the genera of Indian fresh-water Siluroids have their air-vessel inclosed in bone, whilst it is not so inclosed in any of the marine forms; that among the Siluroids of hilly regions, those which ascend rivers having Alpine sources have the air-vessel inclosed in bone, whilst those which ascend rivers not snow-fed do not appear of necessity to have their air-vessel thus protected."

These observations of Dr. Day are of great interest, but for fuller particulars reference must be made to his admirable reports. The following observations are, however, condensed from his chapter on the 'respiration of fishes.' Fishes may, as regards their respiration, be divided into water-breathers and air-breathers, the former never requiring direct access to the air; the latter rapidly dying of suffocation if denied it. In

the water-breathers, as the carps, and the majority of fish in general, respiration is effected by means of the gills, the aeration of the blood being effected in them by contact with the air held in suspension in the water, whence the well-known necessity of constantly changing the water wherein fish are kept, and any obstruction to the free action of the gills, as a bandage over them, or an excess of mud suddenly added (as during freshes) or noxious solutions, rapidly induces asphyxia, and the fishes die suffocated. Air-breathers, on the contrary, do not seem to be much inconvenienced by their gills being closed, if they are allowed to come to the surface and inspire air directly by their mouths, but, on the contrary, soon die of suffocation, though their gills are left free to act, unless they are also allowed access to the air as well. Among these air-breathers are the *Anabas scandens*, or climbing perch, and the species of the Acanthopterygian genera *Polyacanthus*, *Trichogaster*, and *Ophiocephalus*, all of which possess a cavity above the gills (analogous to the lung chamber in some mollusks) for the reception and storing of air for respiratory purposes. "In Burma," says Dr. Day, "the fishermen appear to be practically acquainted with the fact of some fish, especially *Ophiocephalidae*, being air-breathers, as they are in the habit of removing the water from a tank and covering the mud with a cloth for two or three days, after which the cloth is removed and the dead or half-suffocated fish picked up out of the mud."

The shape and modifications of the air-vessel afford a most interesting subject for study, whether it is free, or encased wholly or partially in bone, and a series of preparations of this organ, showing its varied form, would be equally valuable and interesting, and one by no means difficult in a country like Burma to make. Of accessory breathing organs Dr. Day thus writes, "In some of the silurids there exists an accessory breathing apparatus; thus the *Clarias* possesses a dendritic one on the convex side of the second and fourth branchiæ, which has much the appearance of a bunch of red stick coral; this is received into a cavity posterior to that existing solely for the gills. In the *Saccobranchus*, or scorpion-fish, a long air-vessel of a pulmonic character (in addition to the air-vessel proper, which is inclosed in bone) extends throughout the length of the muscles of the back, and anteriorly opens into the gill-cavity.

In the eel-like *Synbranchida*, the *Amphipnous cuchia* has a pulmonic sac for the reception of air, connected with the gill-cavity."

These curious contrivances, so wholly unknown to most people, go far to explain the sudden appearance of fish after rain, in dried-up ponds, as air-breathing fish, as the water dries up, bury themselves in the mud and æstivate in a torpid condition beneath the hard surface crust, and in India fish are often thus dug up by villagers from the dried-up beds of tanks. This probably is the most common cause for the anomalous appearance of fish after rain; but there are two others. Some fish, as the *Anabas scandens* and some eels, and perhaps more fish than we are aware of, will travel over damp grass or through moist ditches, during the night, from one piece of water to another, or in search of a more suitable residence, and may in doing so be surprised by daylight in queer places. On this migratory instinct Dr. Day observes (*l.c.* 30), "This migratory propensity of some of the fishes of the East was no secret to the ancient Greeks, who frequently commented upon it, and although the truth of their statements was impugned by the Romans, the accuracy of their facts is above dispute." Lastly, real showers of fish too may be actually produced by a whirlwind or waterspout, sucking up the contents of a pond or stream, and distributing it broadcast in some distant spot.

In the last edition of this work, Dr. Mason enumerated the following fish, viz.: Large scaled fish 30, small scaled 15, carp 45, flat fish, herrings and eel fish 51, cartilaginous fish 9, tortoise fish 4, and eels 9—in all 163 species. The present list, compiled from that splendid contribution to our knowledge of this subject, Dr. Day's 'Fishes of India,' embraces over 470 species. But even this large addition to the fishes of Burma is far from exhaustive, as the great majority of fish from the Eastern seas are unquestionably found on the coast, but I have extracted few from Dr. Day's work save those which are stated in it or in his Reports to have been captured in Burmese waters.

The following fish are enumerated by Dr. Mason as producing isinglass in Burma: *Lates calcarifer*, *Sciæna coitor*, *S. diacanthus*, *S. miles*, *Sciænoïdes bauritus* and *Polynemus Indicus*; but the following remarks, extracted from Dr. Day's reports, will show that the above by no means comprise all the fishes in Burma capable of producing that substance. Isinglass is produced by fish of two distinct orders, the best being furnished by the *Acanthopterygian* families *Percidæ* and *Polynemidæ*, and an inferior product by the *Physostomous Siluridæ*. Of the seven recognized species of *Polynemus*, only two produce isinglass, and they are distinguished from the others by possessing five pectoral appendages. Other *Acanthopterygian* fishes producing isinglass are *Sciæna axillaris*, several species of *Serranus* and *Otolithus* and *Sciænoïdes pama*. The air-vessels of the siluroïd eat fish, which yield an inferior isinglass, are entirely different from the last. They are like short rounded bags, with an open mouth, this being where they have been torn away from their adhesions to the vertebræ. Chief among these fish is the *Rita ritoides*, C. and V., or *Pomelodus rita*, Ham. Buch., which attains a large size and is found far up rivers. Other fish yield similar 'sounds' belonging to the genera *Arius*, *Ostrogeniosus* and *Macrones*.

The great thing to be observed in the preparation of isinglass is the complete purification and separation, whilst fresh, of the silvery membrane of the air-vessel from its muscular attachments and all blood and mucus, and the rapid drying of the same in the air. Any neglect in this first process causes a fishy flavour to be perceptible in the product, which seriously reduces its value, and cannot be subsequently got rid of.

Another important product that may be here noticed is fish oil, either of a common sort, adapted for various industrial uses, or of a pure quality for medicinal use. This pure oil, which passes for 'cod liver oil,' is prepared from the livers of Chondropterygians or cartilaginous fish, as sharks and saw-fish. The larger the liver the greater proportion of oil it yields, small ones giving one-third and large ones one-half their weight of oil. Dr. Day records one liver of a shark which weighed 290 lbs., and another of a saw-fish of 185 lbs. weight. To prepare the best oil, fit for medicinal purposes, the livers are cut into pieces of 4 lbs. each, placed in pots with enough water to cover them to 1½ inch and gradually heated to 130. It is now stirred, and any froth skimmed off, and the vessel placed to cool. The oil which collects on the surface is now removed, and subjected to repeated strainings through long cloth and flannel. The oil should have no deposit, be of a light clear straw colour, and an odour resembling pure cod-liver oil.

The following observations on the wholesomeness of Indian fish are condensed from Dr. Day's Report. The great majority of fish, both marine and fresh water, may be regarded as wholesome, though there is great difference in fish as regards flavour, and the abundance or paucity of bones contained in them. Some marine fish are occasionally poisonous, as *Clupea venenosa* of the Seychelles, and *Clupea thrissa* of the West Indies. *Clupea humeralis*, at the Antilles, is so poisonous (from feeding on *Physalia*, as it is thought), that it is said to have occasioned death in a few minutes, and even the common herring (*Clupea harengus*), such a sweet and excellent fish ordinarily, is occasionally very irritating when eaten in the North Sea, after it has fed on some minute red worm, which is at times very abundant there. Some fresh-water fish, especially the smaller vegetable feeders among the *Cyprinidæ*, are liable to cause visceral derangements, especially those species found in hill streams, and particularly so with strangers, the same fish being eaten with impunity (from habitude probably) by residents. I myself once had a violent attack of English cholera (being at the time in perfect health), brought on by making a hearty breakfast off some small fish in the Kangra Hills, and I perceived nothing wrong with the fish whilst eating them.

Speaking of a mountain barbel, *Oreïnus sinuatus*, commonly eaten in Chumba, by both Europeans and natives, Dr. Day remarks: "One of my native servants, who tried one, declined a second attempt, as he was unwell for 24 hours subsequently"; and in some of the Punjab rivers similar deleterious effects have been recorded. Some people, too, are constitutionally unable to eat fish, through some idiosyncrasy, without any reference to the excellence of the fish, and I know an instance of a

lady (no other than the "placens uxor" of the writer) who is very fond of fish, and could once eat it, but can do so no longer without being made violently ill by it. Occasionally it happens, too, that a perfectly wholesome fish may, from the nature of what it has lately fed on, be rendered temporarily unwholesome. Thus many 'scari,' or parrot fishes, are held to be unwholesome at Mauritius between December and April, from it is supposed their feeding on the coral polypes; and fishes which have fed on poisonous or stinging medusæ are supposed to be rendered poisonous by so doing. To come nearer home, some fish are eaten by the Andamanese which are regarded as poisonous in Burma. A more remediable cause of unwholesomeness, however, in fresh-water fish, is where they have access to the filth of towns and have gorged themselves at the outfall of a latrine. This, however, is a palpable source of contamination, and is alluded to by Juvenal in his Fifth Satire, where he contrasts the fish the wealthy host himself eats with that set before his poor retainers—

"Vos anguilla manet, longæ cognata colubræ
Aut glaciæ adpersus maculis Tiberinus, et ipse
Vernula riparum, pinguis torrente cloaca,
Et solitus mediæ cryptam penetrare suburæ."

In like manner there is a wonderful difference in the quality of the flesh of the same species of fish, depending on whether it has been taken from a clear running stream, or a muddy and sluggish one. Season also has great influence on the wholesomeness of fish, as, after spawning, many fish are out of condition, and more or less unwholesome, and the roe of some species (as the English barbel) is apt to violently disagree with some stomachs, a circumstance humorously alluded to by old authors. Some fish seem to become unwholesome with age, though the young are not so, as the *Caranx fallax*, or horse mackerel, which in some places it is illegal to sell for food if more than 2½ lbs. in weight.

As a rule, therefore, it may be held that the most wholesome fish may become deleterious or actually poisonous, if caught soon after having fed on foul or deleterious substances, and with this proviso all the fishes belonging to the carp and cat-fish families (*Cyprinidæ* and *Siluridæ*) are good for food, and of these the Mahseer is perhaps our finest fresh-water fish for the table. Of marine fish, those ornamented with gaudy colours are to be distrusted, as the Parrot fish, *Scari* and *Balistes*, and at Bourbon and Mauritius *Ostracion cornutum* and *Balistes betula* are regarded as highly poisonous. The *Tetrodons* or puff fishes, so called from inflating themselves with air, when captured, are usually considered poisonous, but according to Dr. Day are eaten and relished by the Andamanese. At the Cape of Good Hope, however, a spotted *Chatodon* has caused so many deaths that warnings are issued to ships regarding its use. In Japan a species of this genus is made use of to effect suicide. In Burma, however, the large yellow *Xenopterus naritus* is caught for food and considered good eating. All cartilaginous fish, as sharks, skates and saw-fish, are considered wholesome food, and their fins even rank in China as delicacies. The Torpedo, however, is an exception, and would seem not to be eaten.

All the herrings or *Clupeidæ*, would seem to be good for food, with the exceptions above noted. The hilsa, *Clupea palasah*, which ascends the large rivers of India to spawn, is one of the richest and most esteemed fish, but in Burma it is avoided by sick people and its use is supposed (erroneously no doubt) to induce or aggravate skin diseases. I think this dislike of the hilsa may originate from a prejudice the Burmese have against the smell of heated oil or grease, which they suppose produces fever. Any one therefore who wishes to fry any rich dish, takes it outside the village, that the fumes of the simmering oil may not cause illness to her neighbours. A rich oily fish like the hilsa could not be broiled without giving out such fumes, and hence it probably comes to be considered unwholesome.

All eels, *Murænidæ*, are wholesome, but the appearance of many is repulsive, and being ostensibly devoid of scales neither Jews nor Mahomedans will eat them.

As regards the effect of a fish diet on the health, and especially as tending to produce leprosy and skin diseases, Dr. Day pertinently remarks that leprosy is

unknown among the Burmese, who are large consumers of fish, both fresh, and in the form of tainted fish-paste, neither is it known among the ichthyophagous Andamanese, whereas in India it is equally common among both the classes who do and those who do not eat fish. The wounds inflicted by the spines of various sorts, with which many fish are armed, are usually angry and painful; but this is mainly due to their jagged character, though in some degree perhaps intensified by the mucous with which they are covered. In one instance, however, a veritable poison organ exists in a fish from Guatemala, *Thalassophryne reticulata*, a sort of 'lump-fish,' which is armed with a hollow fin spine (analogous to the poison fang of serpents), from which a poisonous mucus is on pressure ejected.

Class PISCES.

Vertebrata with extremities modified into fins, and which breathe by means of gills, sometimes supplemented by a pulmonary air-sac. Vertebrae biconcave.

Sub-class TELEOSTEI or ELEUTHEROBRANCHII.

Skeleton osseous. A long gill cover, or opercle, protecting a unilocular gill opening.

Order ACANTHOPTERYGII.

Family Percidæ.

Branchiostegals 7. Pseudobranchiæ present. Anterior portion of the dorsal fin spinous.

LATES, *Cuvier et Valenciennes*.

Preorbital and shoulder bone serrated. Teeth villiform on jaws, vomer, and palatine bones. Tongue smooth. Two dorsal fins united at their bases, the first with 7 or 8 spines, the anal with 3. Caudal rounded.

L. CALCARIFER, Bloch.

L. heptadactylus.

The 'Cockup,' or 'Bekti.' Ka-ka-dit (juv.), Ka-tha-boung (adult).

B. vii.; D. 7-8 $\frac{1}{11-12}$; P. 17; V. $\frac{1}{6}$; A. $\frac{3}{8-9}$; C. 17; Ltr. 6- $\frac{1}{15}$.

Colour grey, with a dash of green along the back, and silvery below. During the monsoon it is tinged purplish.

The air-vessel is thin, but yields a good isinglass. It is excellent eating when caught away from the vicinity of large rivers. It salts well, and from it some of the best "tamarind fish" is prepared.

Inhabits the sea, estuaries, and tidal rivers, and Mason says it ascends the Irrawaddy 120 miles.

CROMILEPTES, *Swainson*.

Branchiostegals 7. Pseudobranchiæ. Preopercle with its vertical limb finely serrated, its horizontal one entire. Teeth fine, in jaws, vomer and palate. Dorsal fin elevated, with 10 or 11 spines. Anal with 3. Caudal rounded.

C. ALTIVELIS, Swain.

B. vii.; D. $\frac{1}{8}-\frac{1}{10}$; P. 18; V. $\frac{1}{6}$; A. $\frac{3}{9-10}$; C. 17.

Scalcs cycloid, about 22 rows between the base of the sixth dorsal spine and the lateral line.

Colour greyish, lighter below, covered with round white-edged black spots, larger on the body, dorsal and caudal fins.

The Nicobars.

SERRANUS, *Cuvier*.

Branchiostegals 7. Pseudobranchiæ. Preopercle with its vertical limb more or less serrated, its horizontal one generally entire. Dorsal fin single, with 8 to 12 spines. Anal with 3. Caudal square or rounded.

The flesh of the *Serrani* is good, but coarse in large fish. They yield a small amount of isinglass.

S. MERRA, Bloch.

B. vii.; D. $\frac{1}{15} \frac{1}{17}$; P. 18; V. $\frac{1}{5}$; A. $\frac{3}{5}$; C. 17.

Preopercle rounded, its vertical border coarsely but evenly serrated. Small canine teeth in both jaws. The outer row of teeth in the maxilla and inner in mandible, slightly larger than the rest. Dorsal spines rather strong, the fourth the highest.

Colour reddish brown, covered with large brown spots, save on the pectoral fins. Markings usually hexagonal with pale interspace. A dark semilunar mark over base of pectoral.

The Andamans, etc.

S. HEXAGONOTUS, Forster.

B. vii.; D. $\frac{1}{15} \frac{1}{17}$; P. 16; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 17.

Vertical limb of preopercle finely serrated for its upper two-thirds, more coarsely below.

Upper canines stronger than lower. Other teeth as in *S. merra*. Dorsal spines moderate, the fourth longest.

Colour reddish brown, with a pale hexagonal reticulation.

The Andamans.

S. MACULATUS, Bloch.

B. vii.; D. $\frac{1}{17} \frac{1}{18}$; P. 18; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 17.

Preopercle strongly and evenly serrated on its vertical border, its angle produced and carries 7 or 8 coarse denticles.

Small canines above and below. Other teeth as in *S. merra*.

Colour deep grey, with distant round black spots on the head, pectoral and ventral fins, and vertical oval ones on the body, becoming linear behind. Dorsal and caudal black edged.

The Andamans.

S. FLAVO-CERULEUS, Lacép.

B. vii.; D. $\frac{1}{15} \frac{1}{17}$; P. 17; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 17.

Preopercle finely serrated, save at the angle, where it is almost spinate. Teeth as in *S. maculatus*. Dorsal spines strong, third longest.

Colour of head and body a deep purplish blue. Fins and tail yellow, and some yellow on snout, maxilla, chest, and opercular spines. Ventral and caudal with fine black tips.

The Andamans.

This is a lovely and scarce fish, likened by Jerdon to a living sapphire.

S. FASCIATUS, Forsk.

B. vii.; D. $\frac{1}{15} \frac{1}{17}$; P. 18; V. $\frac{1}{6}$; A. $\frac{3}{8}$; C. 17.

Preopercle strongly serrated on its vertical border, coarser at the angle, above which it is emarginate. Canines in both jaws, and other teeth as in *S. merra*. Colour reddish, or yellowish, with 5 dark vertical bands, and a fine black edge along the dorsal fin.

The Andamans.

S. TUMILABRIS, Cuv. et Val.

S. summana, Cuv. et Val. (*nec* Forsk.).

S. Hoeverii, Bleeker.

B. vii.; D. $\frac{1}{15}$; P. 17; V. $\frac{1}{6}$; A. $\frac{3}{8}$; C. 19.

Vertical limb of preopercle slightly emarginate, angle rounded; the whole finely serrated, more coarsely so at the angle. Canines in both jaws, the teeth of the outer row in the maxilla, and the inner in the mandible, rather larger than in the villiform bands. Dorsal spines equal beyond the third. Caudal rounded. Colour, greyish olive, darker on the back. Body and head covered with unequal pearly-white spots. A black line on the maxilla. Fins blackish, white bordered. The dorsal white spotted.

Coast of Burma.

S. MALABARICUS, Bloch.

S. Bontoo, Cuv. et Val.

Nga-touk-tu. Arakan.

B. vii.; D. $\frac{11}{16}$ — $\frac{17}{17}$; P. 19; V. $\frac{1}{5}$; A. $\frac{3}{8}$ — $\frac{3}{9}$; C. 15.

Vertical limb of preopercle slightly emarginate, finely serrated, but more coarsely at its rather square angle, where there are from 4 to 7 coarse denticles. One or two canines in either jaw, the upper usually largest, the rest as in *S. merra*. Colour brownish, fading to grey or dirty white on the belly, wholly covered during life with yellow or orange spots, and sometimes five vertical bands as well.

Russell records one taken at Vizagapatam in January, 1786, as having measured 7 feet in length, 5 in girth, and which weighed upwards of 300 pounds.

S. SALMOIDES, Lacép.

B. vii.; D. $\frac{11}{16}$ — $\frac{17}{16}$; P. 18; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 17.

Preopercle with its vertical margin serrated, lower limb entire, and 5 or 6 denticles at the angle. Small canines in both jaws, the rest as in *S. merra*. Colour dark reddish brown, black spotted over head, fins, and body, with some ill-defined bands on body.

The Andamans.

S. SUMMANA, Forsk.

B. vii.; D. $\frac{11}{16}$ — $\frac{17}{16}$; P. 17; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 17; Lr. $\frac{1}{9}$ — $\frac{2}{9}$.

Preopercle with a shallow emargination above its angle, its vertical border finely serrated, its lower entire. Third to fifth dorsal spines longer than the others. Moderate canines in both jaws, the rest as in *S. merra*. Colour brownish, the body and vertical fins covered with small round white dots, and a black spot over the maxillary.

Common at the Andamans.

S. FUSCIGUTTATUS, Forsk.

S. dispar, Playfair.

B. vii.; D. $\frac{11}{14}$ — $\frac{17}{16}$; P. 19; V. $\frac{1}{5}$; A. $\frac{3}{8}$ — $\frac{3}{9}$; C. 17.

Preopercle usually convex, lower limb entire, the rest serrated, more coarsely so at the angle. Small canines in both jaws, the outer row in the maxilla, and the inner in the mandible, larger than the villiform bands. Dorsal spines strong, from the third, of equal length, rays longer. Colour greyish, with various-sized brown spots irregularly disposed, these spots on the head are sometimes hexagonal. Pectoral and caudal banded. Some narrow white lines cross the lower jaw.

The Andamans.

S. ANGULARIS, Cuv. et Val.

S. glaucus, Day.

B. vii.; D. $\frac{11}{16}$ — $\frac{17}{17}$; P. 17; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 17.

Preopercle serrated, angle slightly produced with two or three denticulations. Canines in both jaws, upper largest. Other teeth as in *S. fuscoguttatus*. Colour greyish, becoming dirty white on the belly. Head and body closely yellow spotted. Fins also spotted and with a black margin edged with white.

The Andamans.

S. MINIATUS, Forsk.

S. cyanostigmatoides, Bleeker.

B. vii.; D. $\overline{15}^{\circ} \overline{16}$; P. 18; V. $\frac{1}{5}$; A. $\frac{3}{9}$; C. 17.

Vertical limb of preopercle finely serrated, and usually somewhat emarginate above its angle. The fourth or fifth dorsal spine the longest. Uniform scarlet. Body, cheeks, opercles, dorsal, caudal and anal fins covered with large blue spots.

The Andamans.

S. GUTTATUS, Bloch.

S. argus, Bloch.

B. vii.; D. $\overline{15}^{\circ} \overline{16}$; P. 18; V. $\frac{1}{5}$; A. $\frac{3}{9}$; C. 17.

Vertical limb of preopercle rounded and finely serrated, lower limb entire. Dorsal spines strong, increasing to the fourth and fifth. Reddish brown, and generally darker vertical bands. Head, body and fins covered with numerous small blue spots. Dorsal, anal and caudal white bordered.

The Andamans.

S. LEOPARBUS, Lacép.

S. Homfrayi, Day.

B. vii.; D. $\overline{15}^{\circ} \overline{16}$; P. 17; V. $\frac{1}{5}$; A. $\frac{3}{9}$; C. 17.

Vertical limb of preopercle rounded and very finely serrated. Teeth as in *S. fasciatus*. The fifth dorsal spine the longest. Body whitish, covered with rounded or oval red spots. A dark band from the eye to the upper opercular spine, behind which it ends in a black spot. Tail black banded. Caudal with a white or blue spot at its outer angle and terminally banded. Colours vary, red or yellow predominating.

The Andamans.

S. BOELANG, Cuv. et Val.

B. vii.; D. $\overline{15}^{\circ} \overline{16}$; P. 15; V. $\frac{1}{5}$; A. $\frac{3}{9}$; C. 17.

Preopercle with its vertical border and a little beyond the angle finely serrated. Dorsal spines behind the third, equal. Small canines in both jaws, the villiform bands of comparatively small size. Colour purplish with from 8 to 9 vertical bands on the body, not so wide as the interspaces, and that on the tail darkest.

The Andamans.

GAMMISTES, Cuvier.

Opercle and preopercle unserrated, but spinate. Teeth villiform in the jaws, vomer, and palate; no canines. A barbel, more or less rudimentary on the chin. Two dorsal fins, the anterior with 7 spines. Scales minute and buried in the epidermis.

G. ORIENTALIS, Bleeker.

B. vii.; D. 7, $\overline{15}^{\circ} \overline{16}$; P. 16; V. $\frac{1}{5}$; A. 9-11; C. 17.

Caudal rounded. Colour, a deep chestnut brown, with from 3 to 7 white longitudinal bands, anteriorly continued on to the head.

The Andamans.

LUTIANUS, Bloch.

Branchiostegals 7. Preopercle serrated, with or without a notch on its vertical border. Villiform teeth both in jaws, vomer and palate. Canines in the upper jaw, and smaller ones anteriorly placed in the lower, and a row of canine-like teeth laterally. Dorsal fin single, with 9 to 13 spines. Pectorals pointed. Scales moderate, or small, with one or two enlarged rows over the nape.

S. FULVUS, Forst.

B. vii.; D. $\frac{1}{15}$; P. 17; V. $\frac{1}{5}$; A. $\frac{3}{9}$; C. 17.

Small curved canines in the upper jaw. An outer row of numerous canine-like teeth in either jaw. A band of villiform teeth on the palatines, and on a triangular spot on the vomer.

Vertical limb of preopercle with a very deep emargination, and a produced rounded angle; above the notch the limb is serrated, and on the angle almost spinate.

Dorsal spines strong, fourth longest, from which they decrease to the last. Scales in oblique rows above the lateral line, and horizontal ones below it. Colour uniform yellowish red, with a dark spot in the axil. A dark mark across the anal. Caudal black, edged with a white margin.

The Andamans.

L. BIGUTRATUS, Cuv. et Val.

B. vii.; D. $\overline{11}^{\overline{11}}\overline{13}$; P. 16; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 17.

Vertical limb of preopercle finely serrated, with a moderately deep emargination to receive an ill-developed interopercular knob, angle rounded, lower limb almost entire. A large canine on either side of the premaxillary, and between them two smaller curved teeth, and some similar ones along the upper jaw. In the lower jaw an outer row of curved canine-like teeth, becoming larger posteriorly. Dorsal spines weak, third and fourth longest. Scales as in *L. fulvus*. Colour above yellowish-grey, becoming yellowish-white on the sides and belly. A broad black band from the eye to the middle of the caudal, dividing the dark back from the paler sides, and a less marked one lower down. A pearly spot below the middle of the spinous dorsal, and a second under the rayed part of the fin.

The Andamans.

L. CHRYSOTENIA, Bleeker.

B. vii.; D. $\frac{1}{3}^{\frac{1}{3}}$; P. 16; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 17.

Preopercle finely serrated throughout, its angle rounded, but not produced, and with a very shallow emargination. No interopercular knob. A pair of large curved canines above, and a row of curved canine-like teeth in both jaws, more closely set, but smaller in the upper. Villiform teeth on vomer in a lanceolate or T-shaped patch, in a band in the palate, and a patch on the tongue. Scales as in *L. fulvus*. Dorsal spines weak, third longest. Colour olive green. Three dark bands from the eye, the lowest bordered below with a golden band, with a fourth dark band beneath. Belly golden. A deep black spot in the pectoral axil. Colours vary somewhat.

The Nicobars.

L. ARGENTIMACULATUS, Gmel.

To-go-re-dah. Andamans.

B. vii.; D. $\overline{13}^{\frac{1}{3}}\overline{17}$; P. 16; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 17.

Preopercle with a shallow emargination to vertical limb, a rounded angle and oblique lower limb. Vertical border finely serrated, angle and lower border more coarsely. Large canines in the premaxillaries, and a row of canine-like teeth in either jaw, the mandibular ones largest. Villiform teeth on the palate, and in a scabrous patch on the tongue. Scales in horizontal rows. Dorsal spines increase to the third and decrease from the fifth. Cherry-red, darker on bases of scales. Upper edge of spinous dorsal orange. Sometimes the fins are dark spotted.

The Andamans.

L. JOHNI, Bloch.

Nga-pa-ni.

B. vii.; D. $\overline{13}^{\frac{1}{3}}\overline{17}$; P. 16; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 17.

Vertical limb of preopercle finely serrated, more coarsely on its produced and rounded angle. Lower limb with a few serrations and crenulations. Teeth much as in the last species. Scales above the lateral line are parallel with the dorsal profile, below it, horizontal. Yellowish, paler on the belly, and a large black finger-mark on the lateral line between the 22nd and 31st scales. A dark line along each row of scales. Fins dashed with red. Grows to a foot or more.

Burma.

L. QUINQUELINEATUS, Bloch.

B. vii.; D. $\overline{13}^{\frac{1}{3}}\overline{14}$; P. 16; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 17.

Preopercle with a shallow emargination above its angle. Vertical limb finely serrated, lower, entire. A very strong curved canine on either side of the premaxillary with an intermediate smaller pair. An outer row of curved canine-like teeth in both jaws, largest in the *lower*. Villiform teeth in a narrow band on the palatines, on a Δ patch on the vomer, and along the centre of the tongue. Scales as in *L. fulvus*. Dorsal spines moderate, fourth longest. Colour, five or six blue bands run from the eye down the back and sides. A dark mark at the base of the pectoral and another below the commencement of the soft dorsal.

The Andamans.

L. GIBBUS, FORSK.

B. vii.; D. $\frac{1}{1}$ ⁰; P. 18; V. $\frac{1}{3}$; A. $\frac{3}{8}$ ³₉; C. 17.

Vertical limb of preopercle with a very deep emargination, succeeded by a broad and deep angle, equal to half its height. Above the notch the serrations are fine; over the angle, and a little way on the lower limb, they are coarse. Large canines in the premaxillaries. An outer row of curved canine-like teeth in both jaws, the posterior ones above, directed slightly forwards. Villiform teeth on a band on the palatines, and on a Δ area on the vomer. None on the tongue. Colour crimson. Scales as in *L. fulvus*. Dorsal and anal fins black with a dark basal band, and edged with white margin. Pectorals and ventrals yellow. Caudal dark purple. Grows at least 16 inches.

The Andamans.

L. QUINQUELINEARIS, Bloch.

B. vii.; D. $\frac{1}{3}$ ¹₀⁰₁₆; P. 16; V. $\frac{1}{3}$; A. $\frac{3}{8}$ ³₉; C. 17.

Vertical limb of preopercle deeply emarginate, with a rounded angle. Vertical and lower limbs serrated. Upper canines moderate and curved. An outer row of canine-like teeth in both jaws, largest in the *upper*. Villiform teeth as in *L. gibbus*. Dorsal spines moderate, fourth longest. Scales as in *L. fulvus*. Colour olive yellow, with five blue bands down the body from the eye. Fins yellow. A deep black mark below the dorsal, and some dark lines on the nape.

The Andamans.

L. DECUSSATUS, Cuv. et Val.

B. vii.; D. $\frac{1}{3}$ ¹₀⁰₁₄; P. 15; V. $\frac{1}{3}$; A. $\frac{3}{8}$; C. 17.

Vertical limb of preopercle with a shallow emargination, and finely serrated as far as the angle. One or two large curved canines in the premaxillaries, and an outer row of curved canine-like teeth in both jaws, rather larger, less curved, and wider apart below. Villiform teeth as in *L. gibbus*. Third, fourth, and fifth dorsal spines longest. Scales as in *L. fulvus*. Colour whitish, with six longitudinal black bands down the body, decussated by six ill-marked vertical ones over its upper third. A deep black spot at the root of the caudal. A white band across the occiput. Fins greyish-white, edged in front.

The Andamans.

AMBASSIS, *Cuvier et Valenciennes*.

Branchiostegals 6. Body compressed, more or less diaphanous. Lower limb of preopercle with a double serrated edge. Two dorsal fins, the first with seven spines. A forwardly directed recumbent spine in front of the dorsal.

Small fishes a few inches in length.

A. NAMA, Ham. Buch.

B. vi.; D. $7 \frac{1}{3}$ ¹₁₇; P. 13; V. $\frac{1}{3}$; A. $\frac{3}{14}$ ³₁₇; C. 17.

Blunt serrations along the horizontal limb of preopercle and on preorbital. Lower jaw longer than the upper. Large curved canines in lower jaw. Colour yellowish olive covered all over with minute black dots, which are collected on the shoulder into a vertical oblong patch. Summit of head and top of eyes black. Fins orange. Upper half of first dorsal black. Second dorsal black-edged. Caudal dark. Anal with a black mark over the base of spines.

India and Burma in fresh water.

A. RANGA, Ham. Buch.

B. vi.; D. $7 \frac{1}{13} \frac{1}{13}$; P. 11; V. $\frac{1}{3}$; A. $\frac{2}{11} \frac{2}{16}$; C. 17.

Vertical limb of preopercle sometimes entire, more usually finely serrated, or sometimes coarsely. Teeth villiform in jaws, vomer, and palate. Colour olive with a dark shoulder mark composed of spots, the remains of a band in the young. The young are bright yellow with four or five dark vertical bands.

India and Burma in fresh water.

A. BACULIS, Ham. Buch.

Ngā-zin-zāt.

B. vi.; D. $7 \frac{1}{13}$; P. 12; V. $\frac{1}{3}$; A. $\frac{2}{13}$; C. 17.

Colour yellowish olive. A golden spot on the occiput. This species differs from *A. nama* in its higher body, its lower jaw shorter than the upper, and its possessing no canine or enlarged teeth.

India and Burma in fresh water.

A. NALUA, Ham. Buch.

Kyoung-mā-sā.

B. vi.; D. $7 \frac{1}{10} \frac{1}{11}$; P. 15; V. $\frac{1}{3}$; A. $\frac{2}{9} \frac{2}{10}$; C. 15.

Vertical limb of preopercle entire, save a few serrations above the angle. Teeth villiform in jaws, vomer, and palate, and a narrow median band on the tongue. Colour silvery, with a burnished lateral band. A dark band along either lobe of tail.

India. The Andamans, in fresh, brackish, or salt water.

A. COMMERSONI, Cuv. et Val.

A. macracanthus, Bleeker.

B. vi.; D. $7 \frac{1}{9} \frac{1}{11}$; P. 13; V. $\frac{1}{3}$; A. $\frac{2}{9} \frac{2}{10}$; C. 15.

Vertical limb of preopercle entire, double edge of lower limb serrated, with two or three coarser teeth at the angle. Dorsal spines strong, transversely lined, second longest. Teeth villiform in the jaws, and in a Δ -shaped row in the vomer, and some on the palatines. Colour silvery, with purplish reflexions. A bright silvery line from the eye to the tail. Interspinous web between the second and third dorsal spines, dark.

The Andamans.

A. INTERRUPTA, Bleeker.

B. vi.; D. $7 \frac{1}{9} \frac{1}{10}$; P. 13; V. $\frac{1}{3}$; A. $\frac{2}{9} \frac{2}{11}$; C. 18.

Vertical limb of preopercle entire. Second spine of dorsal nearly half the length of body of adult. Colour silvery, with a narrow lateral band. Second spine of the dorsal bright orange, the web between it and the third black. Tail as in *A. nalua*.

The Andamans in salt water.

A. UROLENIA, Bleeker.

B. vi.; D. $7 \frac{1}{9} \frac{1}{10}$; P. 13; V. $\frac{1}{3}$; A. $\frac{2}{9} \frac{2}{10}$; C. 18.

Vertical limb of preopercle entire, save two serrations above the angle. Second spine of dorsal longest. Colour silvery, with a burnished lateral band. The interspinous membrane between the second and third dorsal spines black. Tail as in *A. nalua*.

The Andamans, in salt water.

Although, remarks Day, this genus (*Ambassis*) consists of little bony fishes which rarely exceed six inches and are usually far less, still they have their economic uses, and are eaten by the poor, and owing to their conformation are easily dried without salt. They are also freely consumed by larger fish. At Pinang, Cantor remarks, they are used with the refuse of the market for manure.

ΑΡΟΓΟΝ, *Lacépède*.

Branchiostegals 7. Teeth villiform in jaws, vomer, and palate. No canines. Tongue smooth. Two separate dorsal fins, the first with six or seven spines.

A. WASSINKI, Bleeker.

B. vii. ; D. $7\frac{1}{2}$; P. 14 ; V. 1 ; A. 2 ; C. 17.

Lower jaw slightly longer. Preopercle serrated throughout on its outer edge ; the other bones of the head and shoulder entire. Third and fourth dorsal spines longest. Colour brilliant golden, with a black head. Fins orange. A silvery median band on the top of the head, and three silvery bands down each side of the body, and a fourth from the gape to below the base of the pectoral.

The Andamans.

This fish, Day remarks, is common on the coral reefs, and on the water being struck, they crowd into the coral for shelter, apparently afraid that the splash has been caused by some large carnivorous fish.

A. ATRITUS, Cuv. et Val.

B. vii. ; D. $7\frac{1}{2}$; P. 12 ; V. $\frac{1}{2}$; A. $\frac{2}{3}$; C. 17.

Jaws of equal length. Preopercle entire. First dorsal spine very short, the third and fourth the highest. Colour, body and head spotted and marbled all over with brown. A circular black spot on the opercle, inclosed by a narrow white ring, visible even in the fry.

The Andamans.

A. SANGIENSIS, Bleeker.

B. vii. ; D. $6\frac{1}{2}$; P. 13 ; V. $\frac{1}{2}$; A. $\frac{2}{3}$; C. 17.

Outer edge of preopercle very finely serrated. Dorsal spines weak, the third generally longest. Colour golden, tinged with red. A wide brown band from the snout, through the eye, ending on the opercle, or in a black spot behind the shoulder. A round black spot on the tail, and a minute black spot close behind the base of the last dorsal ray. Upper half of first dorsal black.

The Andamans.

A. ORBICULARIS, Cuv. et Val.

B. vii. ; D. $6\frac{1}{2}$; P. 12 ; V. $\frac{1}{2}$; A. $\frac{2}{3}$; C. 17.

Lower jaw the longer. The outer edges of both limbs of the preopercle serrated, as is also the shoulder-bone, the other bones of the head entire. The second and third dorsal spines slightly higher than the fourth. Caudal forked, its three outer rays rather spinate and projecting. Colour olive brown. A dark zone round the body in front of the first dorsal and behind the ventral. Head black-spotted. Dark spots on tail and first dorsal. Ventral nearly black.

The Andamans.

A. CERAMENSIS, Bleeker.

B. vii. ; D. $6\frac{1}{2}$; P. 14 ; V. $\frac{1}{2}$; A. $\frac{2}{3}$; C. 17.

Upper jaw slightly the longer. Opercle serrated over its outer edge. The third dorsal spine is slightly the longest. Caudal notched. Colour greenish brown, with some dark spots on the head. A narrow blackish-brown band from the head to the base of the caudal, where it ends in a round black blotch ; anteriorly the band is margined above and below by a bluish-white streak. A brown blotch on the shoulder. The interspinous web between the second and third dorsal spine is black.

The Nicobars.

CHEILODIPTERUS, *Curier et Valenciennes.*

Branchiostegals 7. Preopercle with a double edge. Villiform teeth in jaws, vomer, and palate. Canines usually present in both jaws, and lateral canine-like ones also. Two dorsal fins, separated ; the first with six spines.

C. LINEATUS, Forsk.

B. vii. ; D. $6\frac{1}{2}$; P. 13 ; V. $\frac{1}{2}$; A. $\frac{2}{3}$; C. 17.

Outer edge of preopercle serrated ; finely on vertical limb, and more coarsely on the horizontal. Canines and canine-like teeth in both jaws. Dorsal spines weak, the

second and third equal. Caudal forked. Colour silvery-red, with horizontal bands along the head and body, varying from 7 to 10. A black spot at the base of the caudal, which is light-edged. Fins red. The first dorsal interspace between second and third spines black.

The Andamans.

C. QUINQUELINEATUS, Cuv. et Val.

Much resembles the last, of which it might be a variety, but the lateral bands are five only. A black spot at the root of the tail surrounded with a bright yellow annulus.

The Nicobars.

DUCES, Cuvier et Valenciennes.

Branchiostegals 6. No canines. A single dorsal fin with ten spines.

D. ARGENTEUS.

B. vi.; D. $\frac{1}{9}-\frac{0}{10}$; P. 15; V. $\frac{1}{5}$; A. $\frac{3}{10}-\frac{3}{11}$; C. 17.

Preopercle evenly serrated on its horizontal limb. Dorsal spines not very strong, the fifth and sixth highest. Caudal forked. Colour bluish, becoming silvery white on the sides and belly. Dorsal greyish-black along its upper third, and white margined. Caudal milk-white with a central black band, and two oblique yellowish-black ones. Grows to 6 inches or more.

The Andamans.

THERAPON, Cuvier.

Branchiostegals 6. Villiform teeth in both jaws, the outer sometimes larger, and deciduous ones on the vomer and palatines. Dorsal single, more or less notched. Air-vessel constricted.

T. JARBEA, Forsk.

Nga-sa-ba-sā.

B. vi.; D. $\frac{1}{9}-\frac{1}{10}$; P. 13; V. $\frac{1}{5}$; A. $\frac{3}{8}-\frac{3}{9}$; C. 17.

Vertical limb of preopercle with 12 to 14 serrations, the two at the angle being the strongest, on the lower limb about 8 weaker ones. An enlarged outer row of teeth in the jaws, and fine ones generally present on the vomer and palatines. Dorsal spines moderately strong, the third and fourth longest. Colour bluish-grey, becoming white on the belly, with a tinge of gold on the cheeks and snout. Three longitudinal reddish-brown bands down the body, slightly convex below, sometimes a fourth occurs on the belly. Dorsal interspinous web milk-white, black-marked between the third and sixth spines. First three dorsal rays black-tipped. Caudal with two oblique bands across each lobe. Grows to 13 inches or so.

Arakan.

This fish, remarks Tickell, is called the paddy cater in Arakan, from its young being so often seen in the inundated rice-fields.

DIGRAMMA, Cuvier.

Body oblong, compressed. Mouth small, protractile. Lips thick and folded back. Preopercle serrated, 4 or 6 open pores below the mandible, but no groove. Teeth in jaws. No canines or palatine teeth. Air-vessel simple.

D. CRASSISPINUM, Rüpp.

D. altum, Day.

B. vii.; D. $\frac{1}{10}-\frac{1}{10}$; P. 17; V. $\frac{1}{5}$; A. $\frac{3}{7}$; C. 17.

Dorsal spines strong, the alternate ones thicker on one side; the fourth highest. Slaty-grey, with a violet tinge over the head and a brassy one over the body. Fins nearly black. Some coppery spots on the body and a tinge of the same over the spiny dorsal. Grows to 2 feet, and is good eating.

The Andamans.

SCOLOPSIS, Cuvier et Valenciennes.

Branchiostegals 5. A single dorsal fin with ten spines. Air-vessel simple, unconstricted.

S. BILINEATUS, Bloch.

B. v. ; D. $\frac{10}{9}$; P. 16 ; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 17.

Vertical limb of preopercle serrated, and its angle produced and rounded. Teeth villiform. Dorsal spines not strong, increasing in height to the fourth. Colour, a white band from the snout to the base of the dorsal; a second from above the orbit to beyond the dorsal; a third from the upper edge of the eye to the lateral line. A broad black-bordered yellow band from the mouth to the commencement of the soft dorsal, with a yellow blotch below the same fin, which is edged anteriorly with black. Anal black anteriorly, white behind.

The Andamans.

S. GHANAM, Forsk.

B. v. ; D. $\frac{10}{9}$; P. 17 ; V. $\frac{1}{3}$; A. $\frac{2}{3}$.

Scaleless portion of the head covered with numerous small pores. Vertical limb of preopercle strongly serrated, and more coarsely on its produced angle. Teeth fine. Dorsal spines rather weak, increasing to the fifth. Colour olive, with four yellowish-white bands, the third of which bifurcates at the shoulders into two, one above, the other below the lateral line. A black spot in the pectoral axil. The anterior scales below, mostly black-spotted at their base. A violet mark at the base of either lobe of the tail.

The Andamans.

S. MONOGRAMMA, Cuv. et Val.

B. v. ; D. $\frac{10}{9}$; P. 17 ; V. $\frac{1}{3}$; A. $\frac{2}{3}$.

Upper surface of head flat and scaled nearly to the nostrils. Vertical limb of preopercle, and its rounded and produced angle, evenly serrated. Dorsal spines slender, increasing to the fourth. Colour olive, with a black band, one scale broad, from the snout, through the eye to the tail, only rising above the lateral line behind the end of the dorsal. Fins immaculate.

The Andamans, where common.

S. CANCELATUS, Cuv. et Val.

B. v. ; D. $\frac{10}{9}$; P. 15 ; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 17.

Scaleless portion of the head studded with fine open pores. Vertical limb of preopercle serrated, more coarsely superiorly, and at its slightly produced and rounded angle. Teeth fine. Dorsal spines weak, increasing to the fifth. Colour grey above, whitish below. A white band to the commencement, and another below it, to the end of the dorsal. A third white band from the eye as far as the end of the pectoral, and a fourth from the eye to the tail. Some irregular white vertical bands cross the back. A black spot between the first and third dorsal spines.

The Andamans.

S. CILIATUS, Lacép.

B. v. ; D. $\frac{10}{9}$; P. 17 ; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 17.

A prominent ridge, with serrated edge, on the maxilla. Vertical edge of preopercle serrated, most strongly at the angle, which is not produced. Teeth villiform. Dorsal spines slender, increasing to the fifth. Colour greenish olive above, paler below. A silvery white band along the side from the head to the commencement of the soft dorsal. The scales below the lateral line gold spotted. Fins reddish.

The Andamans.

SYNAGRIS, Günther.

Branchiostegals 5 or 6. One scaleless dorsal fin, with 10 spines and 9 rays. Air-vessel not constricted, but notched posteriorly.

S. NOTATUS, Cuv. et Val.

B. vi.; D. $\frac{10}{9}$; P. 15; V. $\frac{1}{5}$; A. $\frac{3}{2}$; C. 17.

Preopercle entire. Opercle with a small flat spine. Teeth villiform in the upper jaw, with four large curved canines in either premaxillary, and laterally an outer row of conical teeth of moderate size. In the mandible, villiform teeth in the front and six well-developed canine-like ones, and a lateral row of conical teeth, small behind. Dorsal spines weak, increasing to the fifth. Caudal forked, upper lobe the longest. Colour rosy, with a brilliant spot on the first five scales below the lateral line, the upper half red, the lower yellow; 5 or six longitudinal yellow bands below the lateral line, and 3 silvery white ones. Fins pinkish, with a yellow band along the bases of the dorsal and anal.

The Andamans.

APRION, *Cuvier et Valenciennes*.

Preorbital entire. Preopercle serrated. Canines anterior. Villiform teeth in jaws, vomer, and palate, and an outer row of canine-like ones laterally. Dorsal fin single, with 9 to 11 spines. Anal with 3. Caudal deeply forked.

A. MULTIDENS, Day.

B. vii.; D. $\frac{10}{11}$; P. 16; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 16.

Dorsal spines slender, the fifth longest. Colour rosy, with six longitudinal yellow bands along the body. A golden band from the snout to the inferior angle of the eye and another across the forehead.

Common at the Andamans, where it reaches a large size.

DATNIOIDES, *Bleeker*.

Branchiostegals 6. Premaxillaries very protractile. Preopercle serrated. Villiform teeth in jaws without canines. Vomer, palate and tongue edentulous. A single dorsal with 12 stout spines. Air-vessel simple.

D. POLOTA, Ham. Buch.

Ngā-kyā and Nyā-wet-mā.

B. vi.; D. $\frac{12}{13}$; P. 19; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 17.

Brown, with several cross bands.

Grows to a foot, and is eaten by the poorer classes.

Inhabits tidal rivers and estuaries in Burma.

GERRES, *Cuvier*.

Branchiostegals 6. Mouth very protractile and descending when produced. Preopercle rarely serrated. Villiform teeth in the jaws. The dorsal fin capable, wholly or partially, of reception into a scaly sheath. The dorsal spines 9 or 10, the rays 10 or 11. Caudal forked. Air-vessel simple.

G. OBLONGUS, Cuv. et Val.

B. vi.; D. $\frac{9}{15}$; P. 17; V. $\frac{1}{5}$; A. $\frac{3}{2}$; C. 17.

Preopercle entire. Dorsal spines not very strong, compressed, the second curved and much the highest. Caudal deeply forked. Colour silvery, eye golden.

The Andamans.

G. ABBREVIATUS, Bloch.

B. vi.; D. $\frac{9}{15}$; P. 15; V. $\frac{1}{5}$; A. $\frac{3}{2}$; C. 17.

In Andamanese specimens the angle and lower limb of preopercle is crenulated, but not serrated, whilst in specimens from the Malay Archipelago it is entire. Dorsal spines strong, the second longest, and curved. Caudal deeply forked, the upper lobe slightly the longer. Scaly sheaths of dorsal and anal well developed. Colour silvery white, darkest along the back, each scale with an indistinct spot, forming longitudinal bands. Fins yellowish. Dorsal with a blackish edge, and a spot on each spine and ray just above the sheath.

The Andamans.

G. FILAMENTOSUS, Cuv. et Val.

Ngā-wet-sāt.

B. vi. ; D. $\frac{9}{5}$; P. 15 ; V. $\frac{1}{3}$; A. $\frac{3}{7}$; C. 17.

Preopercle entire, with rounded angle. Teeth fine in the jaws. Dorsal spines of moderate strength, the second prolonged, sometimes in the adult extending to the caudal. Colour silvery, with rows of short oblong horizontal bluish spots along the upper half of the body, continuous below the scales in lines. Snout black. A basal black spot on each dorsal spine and ray. Caudal greyish externally. Fins yellow, web dotted. The young have vertical bands, the alternate ones shorter. Grows to 8 inches or more.

Coast of Burma.

G. LUCIDUS, Cuv. et Val.

B. vi. ; D. $\frac{9}{5}$; P. 15 ; V. $\frac{1}{3}$; A. $\frac{3}{7}$; C. 17.

Preopercle entire. Teeth fine. Dorsal spines of moderate strength, and not curved, the first very short, the third longest. Colour silvery, with an indistinct dark vertical band over the nape; a second below the dorsal spines and two more below the soft dorsal. Snout black. Fins canary-yellow. The upper half of the web between the second and fifth dorsal spines black, the rest of the fin dark-edged with black margin. A median row of dark spots down the dorsal. Caudal grey-edged, the inferior lobe with a very narrow white edge and white tip.

Coast of Burma.

It is, remarks Day, the most common Indian species, visiting the coasts in enormous numbers.

The different species of *Gerres* are but little esteemed as food, on account of their numerous bones and deficiency of flavour, and are consequently principally consumed fresh by the poorer classes. They are also extensively salted and dried.

Family *Chætodontidæ* (SQUAMIPINNES).

Mouth generally small. Teeth villiform or setiform, with neither incisors nor canines. Soft portion of dorsal exceeds its spinous. Ventrals thoracic, with 1 spine and 5 rays. Air-vessel present, generally simple.

A. *No palatine teeth.*

CHELODON, Cuvier.

Branchiostegals 6. Body elevated and strongly compressed. Spinous and soft portions of dorsal continuous.

a. *Anal with 4 spines.*

C. PLEBEIUS, Gmel.

B. vi. ; D. $\frac{14}{3} \frac{4}{17}$; P. 15 ; V. $\frac{1}{3}$; A. $\frac{3}{16} \frac{3}{16}$; C. 17.

Colour yellow, with a black, white-edged ocular band. A black, white-edged ocellus at the base of the caudal.

The Andamans.

b. *Anal with 3 spines.*

C. FALCULA, Bloch.

B. vi. ; D. $\frac{12}{24} \frac{2}{24} \frac{13}{24} \frac{3}{27}$; P. 15 ; V. $\frac{1}{3}$; A. $\frac{3}{22} \frac{3}{23}$; C. 17.

Snout produced. Teeth brush-like. Colour of head and body red-lilac-purple, turning to primrose posteriorly, and on the fins. A dark, white-edged ocular band, narrower than the orbit, runs vertically through the eye and in front of the dorsal. A black triangular blotch with its base on the first 4 or 5 dorsal spines and its apex on the lateral line, and a second having its base on the last 3 spines. A black band

on the base of the tail. Body vertically barred with 12 or 14 black lines. Soft dorsal with a narrow black margin. Caudal with a black and white posterior edge. Anal with a black submarginal line. The disposition and white margining of the black bands is variable.

The Nicobars.

C. pictus, Forsk.

Nga-gyeng-kyouk.

B. vi.; D. $\frac{1}{2} \frac{2}{3}$; P. 15; V. $\frac{1}{5}$; A. $\frac{20^3}{22}$; C. 17.

Teeth brush-like. Snout with a black band. A dark band descends from in front of the dorsal through the eye to the chest. The body is traversed anteriorly and superiorly by numerous black lines (8), which ascend from the head to the dorsal, and it is traversed posteriorly and inferiorly by similar descending lines, impinging at right angles on the lowest of the ascending ones. A black band involves the posterior portion of the body. A crescentic black band anteriorly convex and a subterminal linear one on the tail.

The Andamans.

C. vagabundus, L.

Pah-noo-dah. Andamans.

B. vi.; D. $\frac{1}{2} \frac{2}{3} - \frac{1}{2} \frac{3}{4}$; P. 15; V. $\frac{1}{5}$; A. $\frac{20^3}{22}$; C. 17.

Teeth brush-like. Dorsal spines moderate, with deeply notched web. Colour markings much as in *C. pictus*, but the anterior ascending lines are less numerous (6), and the posterior descending ones more marked and numerous than in that species (*vide* Day's Plates, xxvi. f. 6, xxvii. f. 1). The black ocular band white-edged. Dorsal and anal fins black-margined. Tail banded as in *C. pictus*.

The Andamans.

C. auriga, Forsk.

B. vi.; D. $\frac{1}{2} \frac{1}{3} - \frac{1}{2} \frac{3}{4}$; P. 15; V. $\frac{1}{5}$; A. $\frac{20^3}{21}$; C. 17.

Teeth brush-like. Ocular band brown, edged anteriorly with white. The linear body-markings as in *C. pictus*, only the ascending lines are reduced to 5 and the descending to 6, followed by three angular bands. A prominent black ocellus on the soft dorsal. Anal with a fine submarginal band, with a white outer edge. Upper and hind margin of anal edged with black. Two dark lines on the caudal inclose a crescentic area anteriorly convex.

The Nicobars.

C. lunula, Lacép.

C. biocellatus, Cuv. et Val.

B. vi.; D. $\frac{1}{2} \frac{1}{3} - \frac{2}{26}$; P. 19; V. $\frac{1}{5}$; A. $\frac{18^3}{20}$; C. 17.

Ocular band of a deep chestnut, edged with white and wider than the orbit. A second brown band passes from the first five dorsal spines and unites with the occipital one. A third band from fifth and sixth dorsal spines gradually widens and goes as low as the base of the pectoral fin. A band along the base of the soft dorsal passes over the free portion of the tail. Caudal with a dark band in its posterior third. Dorsal and anal with a dark edge, margined with white. In the young the ocular band is edged with white and a white-edged black ocellus occurs on the soft dorsal.

The Andamans.

C. melanotus, Bl. Schn.

Nga-hpā-kheh (*vide* Gazetteer).

B. vi.; D. $\frac{1}{2} \frac{2}{3}$; P. 15; V. $\frac{1}{5}$; A. $\frac{18^3}{20}$; C. 17.

Colour yellowish, with a narrow black ocular band descending to the chest. The upper fourth of the body stained with black and ascending black lines through each row of scales. A black band at the base of the tail interrupted in the middle.

Fins yellow. A narrow black submarginal band, exteriorly white-edged, along the anal and soft dorsal. A yellow band, black bordered externally down the caudal. A short black band at the base of the first five anal rays.

Presumably common on the coast if it possesses a vernacular name.

CHELMO, *Cuvier*.

Snout produced as a long round tube by the horizontal elongation of the premaxillaries and mandible, which are laterally connected by a web, the gape of the mouth anteriorly being small. Day includes two species of this genus as inhabiting the seas of India (*C. longirostris* and *C. rostratus*), and adds, "Due to this tubular elongation of the snout, these fishes are able to employ it as a blow-pipe, from which they discharge globules of water at insects flying above them." I know not if these are the only fishes which ejaculate a drop of water at passing insects, but some fish is common in the tidal rivers of Burma which captures insects on the sides of boats by bombarding them in this fashion, as I have repeatedly witnessed. These fishes have all the aspect of a *Chatodon*.

HEXIOCHUS, *Cuvier et Valenciennes*.

Branchiostegals 5. Body elevated and strongly compressed. Teeth villiform. A single dorsal fin. The fourth dorsal spine is elongated and filiform. Air-vessel present.

H. MACROLEPIDOTUS, *Artedi*.

Pah-do-dah. Andamans.

B. vi.; D. $\frac{11}{1} - \frac{12}{2}$; P. 17; V. $\frac{1}{2}$; A. $\frac{17-3}{17-18}$; C. 17.

The filamentous prolongation of the fourth dorsal spine reaches to the tail or beyond. Colour pearly-white, with a dark purplish band over the snout; another over the eyes. A third broad one extends from the first three dorsal spines, and posterior two-thirds of the opercle downwards, and includes the whole of the ventral fin, and extends back to the anal. The last band commences at the summit of the fifth dorsal spine, passes down to the base of the seventh, and ends in the posterior third of the anal. Pectoral, soft dorsal, and caudal fins bright yellow.

The Andamans.

The colour of the ground and the bands of this species is occasionally seen transposed. In the Plate xxviii. f. 3 (Fishes of India) the last band is shown to commence from the sixth dorsal spine, not the fifth, as stated in the text.

HOLACANTHUS, *Lacépède*.

Branchiostegals 6. Body compressed and usually much elevated. A single dorsal fin. Air-vessel with two horns posteriorly.

a. Scales small.

H. NICOBARIENSIS, *Bl. Schn.*

B. vi.; D. $\frac{13}{2} - \frac{14}{1}$; P. 19; V. $\frac{1}{2}$; A. $\frac{20-3}{20-21}$; C. 18.

Colour variable. In the young it is deep blue, with slightly curved vertical bands, alternately white and bluish-white, the former broader. Caudal white, with or without a black outer margin. In some specimens there are reticulated blue lines between the broad white postocular band and one descending from the centre of the spinous dorsal. In the adult the vertical bands are more curved with the convexity forwards. In some (the type) a white spot forms the centre round which the body bands curve.

The Nicobars. Seas of India, etc.

H. ANNULARIS, *Gmel.*

Ngū-lyk-pyā, Arakan.

B. vi.; D. $\frac{13}{20} - \frac{13}{21}$; P. 20; V. $\frac{1}{2}$; A. $\frac{19-3}{19-21}$; C. 17.

Colour sienna, with a blue ring on the shoulder. Six or seven arched blue bands radiate from the head and converge towards the tail. A narrow blue interorbital

band is continued behind the eyes over the opercle, curving up its hind edge towards the ring. A second across the snout, passes under the eye, across the opercle, and joins the third on the body. Pectoral yellow, with a blue band at its base. Dorsal and anal dark. The six body bands are continued on to the former, where some intermediate blue lines also occur. Dorsal edged above with blue. Anal with three blue lines and a light blue margin. Caudal yellow, with a narrow orange tip.

Coasts of Burma.

H. XANTHOMETOPON, Bleeker.

B. vi.; D. $\frac{13}{17}$; P. 17; V. $\frac{1}{8}$; A. $\frac{3}{17}$; C. 17.

Colour blue. Cheeks and opercles with many black-edged gold spots. Some fine black lines on lips and chin. A broad yellow interorbital band. Body violet, each scale with a brilliant blue spot. A yellow spot on the shoulder. Dorsal, caudal and pectoral fins yellow, with a black spot at the bases of the last seven dorsal rays. Caudal black-edged. Ventral and anal white, with a blue edge.

The Andamans.

SCATOPHAGUS, *Cuvier et Valenciennes*.

Branchiostegals 6. Body compressed and elevated. Two dorsal fins united at their bases, the first having 10 or 11 spines, and an anterior recumbent one directed forwards. Air-vessel simple.

S. ARGUS, Gmel.

Gnā pa-thwōn. Po-ra-dah. Andamans.

B. vi.; D. $10 \frac{1}{16} \frac{1}{17}$; P. 20; V. $\frac{1}{8}$; A. $\frac{1}{11} \frac{1}{16}$; C. 16.

Teeth villiform in the jaws. Dorsal spines strong, each alternate one thicker on one side, interspinous web deeply notched, fourth spine the highest. The anterior rays the longest, but not equalling the fourth spine. Colour purplish, becoming white on the belly. Large round blackish or greenish spots on the body, most numerous along the back, and varying in size and tint. First dorsal fin brownish blue, having a few minute spots. Second dorsal yellowish, with slight brown marks on the web.

Coasts of Burma.

This fish is a foul feeder, and consequently not in much request for food. When caught however out at sea, it is well flavoured enough, according to Tickell.

EPHIPPIUS, *Cuvier*.

Branchiostegals 6. Body much compressed and elevated. Dorsal with 8 or 9 spines, receivable into a groove at their base, and several elongated and flexible, with the interspinous web deeply cleft, and a deep notch between the spinous and soft parts of fin. Air-vessel bifurcate anteriorly and with two long horns posteriorly.

E. ORBIS, Bloch.

Kol-lid-dah. Andamans.

B. vi.; D. $\frac{8}{19} \frac{9}{20}$; P. 19; V. $\frac{1}{8}$; A. $\frac{3}{15}$; C. 19.

The facial profile very elevated, rising abruptly from the snout to the dorsal fin. The third, fourth, and fifth spines are elongated and filiform, especially the third. Colour, back and head greyish-green, sides and belly silvery, shot with pink. Fin webs diaphanous, finely dotted with black, rays bluish white. The young have a dark orbital band, a second over the nape, and two over the belly.

The Andamans.

DREPANE, *Cuvier et Valenciennes*.

Branchiostegals 6. Body much compressed and elevated. Snout short. Dorsal with 8 or 9 spines receivable into a groove at their base, and anteriorly a concealed spine directed forwards. Interspinous web deeply notched. Pectorals long and falciform. Air-vessel posteriorly produced into two horns.

D. PUNCTATA, Gmel.

Ngā-sheng-na.

B. vi.; D. $\frac{8}{2} \frac{9}{1-2}$; P. 17; V. $\frac{1}{3}$; A. $\frac{3}{18} \frac{3}{19}$; C. 15.

Colour silvery, with a golden gloss and tinge of purple, with or without vertical bands and black spots. Edges of fins grey, and a grey band along the middle of the dorsal.

Coast of Burma.

A. *Villi-form teeth in jaws, vomer and palate.*

TOXOTES, Cuvier.

Branchiostegals 7. Body oblong, compressed, back depressed. Snout rather produced. Lower jaw the longer. A single dorsal, with 4 or 5 strong spines. Air-vessel simple.

T. MICROLEPIS, Blyth.

Ngā-kyā-mā.

B. vii.; D. $\frac{6}{3}$; P. 12; V. $\frac{1}{3}$; A. $\frac{3}{17}$; C. 19.

The three posterior dorsal spines the longest. The dorsal commences slightly in advance of the anal. Colour golden, with two to four rows of black oblong blotches, or stripes along the sides, mostly above the lateral line. Dorsal blotched with black and dark-edged. Anal dark. Caudal yellow. Grows to a foot in length.

Rivers and estuaries of Burma.

T. CHATAREUS, Ham. Buch.

B. vii.; D. $\frac{6}{12} \frac{6}{13}$; P. 13; V. $\frac{1}{3}$; A. $\frac{3}{16} \frac{3}{17}$; C. 17.

The fourth dorsal spine the longest. The dorsal commences slightly in advance of the anal. Colour silvery shot with gold, dorsal profile greenish brown. Six or seven oblong spots between the eye and the end of the dorsal fin, some black blotches on the soft dorsal, anal edged below with black.

Rivers and estuaries of Burma.

J. JACULATOR. Pall.

B. vii.; D. $\frac{4}{11} \frac{4}{12}$; P. 15; V. $\frac{1}{3}$; A. $\frac{3}{15} \frac{3}{17}$; C. 17.

Dorsal spines strong, the third the longest. The dorsal commences over the anal. Colour brownish shot with golden. Four triangular black blotches pass down from the back to the lateral line, most developed in the young. Fins dark. Grows to a foot in length.

The Andamans.

Family Mullidæ.

Branchiostegals 4. Pseudobranchiæ. Two stiff barbels below the chin belonging to the hyal apparatus. Two dorsal fins, well apart. Ventral with one spine and five rays.

UPENOIDES, Bleeker.

Teeth in both jaws, on the vomer and palatine bones.

U. VITTATUS, Forsk.

Chah-ti-ing-nd-dah. Andamans.

B. iv.; D. $8 \frac{1}{2}$; P. 15-17; V. $\frac{1}{3}$; A. $\frac{1}{3}$; C. 15.

Colour chestnut on the back, golden below. Two or three bright yellow bands along the sides. First dorsal fin black tipped, and with two blackish bands. Pectoral pinkish edged with white; upper caudal lobe crossed by 5 or 6 yellowish-brown bars, having dark edges and with a black tip, whilst the lower lobe is white tipped and has three oblique dark bars. An air-vessel present.

The Andamans.

U. TRAGULA, Richardson.

B. iv.; D. 7-8 $\frac{1}{2}$; P. 13; V. $\frac{1}{2}$; A. $\frac{1}{2}$; C. 15.

Colour silvery, head and body spotted with brown; a brown band down the side. Dorsal fin dark banded. Each lobe of caudal with 5 or 6 oblique black bars. Grows to about 5 inches.

The Andamans.

MULLOIDES, *Bleeker*.

Palate edentulous. Teeth in the jaws in several rows.

M. FLAVOLINEATUS, Lacép.

B. iv.; D. 7 $\frac{1}{2}$; P. 17-19; V. $\frac{1}{2}$; A. $\frac{2}{3}$; C. 15.

First three dorsal spines equal. Colour, upper surface of the head and back reddish chestnut, becoming whitish on the sides, and tinged with yellow on the belly. A narrow yellow band from above the eye to the snout, joined by a second from below the eye. A brilliant gold band from behind the eye to the tail. Fins caraceous, a yellow band along the base of the second dorsal; lower lobe of tail grey. Grows to nearly a foot.

The Andamans.

UPENEUS, *Bleeker*.

Palate edentulous. A single row of teeth in either jaw.

U. MACRONEMUS, Lacép.

B. iv.; D. $\frac{8}{9}$; P. 16, V. $\frac{1}{2}$; A. 7; C. 15.

First dorsal spine very short; third and fourth equal, longest. Last dorsal and anal rays very elongated. Colour, a black band down the side from the snout to just past the end of the second dorsal and behind it, a black blotch at the base of the tail. Some scales on the sides gold-spotted. A purplish stripe from eye to snout. First dorsal violet. Second dorsal with a deep black band along its base. Ventral blackish externally, reticulated internally. Caudal black-edged. Grows to 9 inches or so.

Gulf of Martaban (Amherst).

U. INDICUS, Shaw.

U. spilurus, Day.

B. iv.; D. $\frac{8}{9}$; P. 16; V. $\frac{1}{2}$; A. $\frac{9-11}{7}$; C. 15.

First dorsal spine very short, third and fourth equal, longest. Last dorsal ray not elongated. Colour purplish red, with a large oval shining golden blotch on the lateral line, between the dorsal fins. A blackish, pale-centred mark at the base of the tail. Belly yellow spotted, or lined. A broad purple band from eye to snout, with a narrow violet one on either side. Checks pink, variegated with yellow and tortuous blue lines. A dark spot at the gape. Dorsal fin purplish, streaked with blue. Anal yellow banded. Fins pinkish, except the caudal, which is greenish, with purplish rays. Grows to 16 inches.

The Andamans.

The marine 'mulletts' are most of them excellent fish for the table, and some species, as the 'red mullet' of Europe, is so highly esteemed as to be dressed with its entrails and excrement unremoved, to suit the perverted and uncleanly taste of the epicure, as is the case with the woodcock, whence the red mullet is also known as the 'woodcock of the sea.'

Family **Nandinæ**.

Branchiostegals 5 or 6. Dorsal fin single. Anal with 3 spines. Air-vessel present.

A. *Pseudobranchia* present.

PLESIOPS, *Cuvier*.

Branchiostegals 6. Villiform teeth on the jaws, vomer and palatines. Tongue edentulous.

P. NIGRICANS, Rüpp.

B. vi. ; D. $\frac{1}{7}\frac{2}{8}$; P. 21; V. 1; A. $\frac{3}{8}$; C. 16.

Dorsal spines much shorter than the rays. Soft dorsal pointed and elongate. Colour brownish, each scale on the body with a blue centre. Some scales on head and shoulders with several blue spots. Opercle with a large black, blue edged ocellus. Dorsal and anal fins blue banded. Dorsal, caudal and anal fins white margined. Soft dorsal and anal radiately streaked with blue. Caudal transversely blotched with blue. The Andamans, where common.

B. *Pseudobranchiæ absent.*

BADIS, Bleeker.

Branchiostegals 6. Villiform teeth on the jaws, vomer, and palatines. Tongue edentulous.

B. BUCHANANI, Bleeker.

Pyin-leh-ngā-bye-nā and Ngā-mi-loung.

D. $\frac{1}{7}\frac{6}{10}$; P. 12; V. $\frac{1}{5}$; A. $\frac{3}{6}\frac{3}{8}$; C. 16.

Soft dorsal rather elevated and pointed. Colour variable, barred black and red. In Burma the body has six vertical bands, each composed of four transverse black blotches one above the other. A large blotch on the shoulder and another on the tail. Grows to $3\frac{1}{2}$ inches.

Fresh waters of Burma and Upper Burma.

NANDES, Cuvier et Valenciennes.

Branchiostegals 6. Villiform teeth on the jaws, vomer, palatines and tongue.

N. MARMORATUS, Cuv. et Val.

B. vi. ; D. $\frac{1}{1}\frac{2}{13}$; P. 16; V. $\frac{1}{5}$; A. $\frac{3}{7}\frac{3}{9}$; C. 15.

Dorsal spines rather strong, their base exceeding three-fourths of the fin. Soft dorsal similar to anal and almost square. Colour greenish brown with brassy lustre, vertically marbled with three broad pitchy bands, with another, or black blotch on the tail. Some black lines radiate from the eye. Narrow band of spots across the soft dorsal anal and caudal fins. Grows to 7 inches.

Fresh and brackish waters in Burma.

PRISTOLEPIS, Jordan.

Branchiostegals 6. Teeth villiform on jaws and palate, villiform or globular on vomer. Obtusely globular on the tongue, presphenoid and sometimes the vomer.

P. FASCIATUS, Bleeker.

B. vi. ; D. $\frac{1}{1}\frac{2}{13}$; P. 15; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 14.

Globular teeth on the vomer, base of the tongue and roof of the mouth. Dorsal spines strong; the central rays longest. Caudal rounded. Air-vessel large. Colour dull greenish, with a black spot on the axilla. Fins slate-coloured, except the pectoral, which is yellow, with a black spot over the upper part of its base. The young are banded. Grows to 8 inches or more.

Fresh waters of Burma.

Family Sparidæ.

Branchiostegals 5 to 7. Pseudobranchiæ well developed. Palate edentulous (save in *Pimelopterus*). Cutting or conical teeth in front of the jaws, with or without a lateral series of molars. A single dorsal.

LETHRINUS, Cuvier.

Villiform teeth in the anterior portion of the jaws, with canines in front. Lateral teeth in a single row, and either conical or rounded. Dorsal, with 10 spines and 9 rays, receivable into a basal sheath.

L. ORNATUS, Cuv. et Val.

B. vi.; D. $\frac{1}{2}$ ⁰; P. 13; V. $\frac{1}{2}$; A. $\frac{3}{8}$; C. 17.

Four conical canines in either jaw. The first five upper lateral teeth conical and pointed, the rest with globular crowns. Teeth of mandible similar but smaller. Colour greenish-olive, with six or seven yellow horizontal bands. The opercular web red. Caudal edged with red. A violet band across the base of the pectoral.

The Andamans.

L. HARAK, Forsk.

Po-tang-dah. Andamans.

B. vi.; D. $\frac{1}{2}$ ⁰; P. 12; V. $\frac{1}{2}$; A. $\frac{3}{8}$; C. 17.

The first four teeth of the lateral row conically obtuse, the rest are large and rounded. Colour greenish-olive, with an oblong blackish blotch below the lateral line, opposite the dorsal.

The Andamans.

CHRYSOPHRYS, Cuvier.

Branchiostegals 6. Three or four rows laterally of molars in either jaw. A single dorsal fin with from 11 to 13 spines.

C. BERDA, Forsk.

Ngā-wā. (Moo-roo-kee-dah. Andamans.)

B. vi.; D. $\frac{1}{11}$ — $\frac{1}{12}$; P. 15; V. $\frac{1}{2}$; A. $\frac{3}{8}$ — $\frac{3}{10}$; C. 17.

Six incisors in front of either jaw. Three or four rows of molars in the lower jaw and four or five in the upper, the last of the inner series being the largest. Colour silvery-grey. Scales darker at their bases. Usually a black shoulder spot. Dorsal web black edged, as are the caudal and anal. Grows to 30 inches, is excellent food, and is called in Madras the 'black rock-cod.'

The Andamans.

Family Cirrhitidæ.

CIRRHITES, Cuvier.

Branchiostegals 6. Preoperele denticulated. Operele unarmed. Villiform teeth in both jaws. No teeth on the palatines. A single dorsal.

C. FORSTERI, Bl. Schn.

B. vi.; D. $\frac{1}{11}$; P. 7 + vii.; V. $\frac{1}{2}$; A. $\frac{3}{8}$; C. 15.

Anterior nostril rather valvular and fringed. Strong canines on either side of the symphysis of upper jaw. Two large and some small lateral canine-like teeth in the mandible. A triangular patch of villiform teeth on the vomer. Colour reddish, head, chest, and base of pectoral fins with black spots, a broad dark band along the middle of the body, to the upper half of the caudal fin. A wide yellow band from above the pectoral to the lower half of the caudal. Upper edge of last half of the spinous dorsal black, continued as a black band along the base of the soft dorsal. Grows to 18 inches, and is a firm-fleshed and wholesome fish.

The Andamans.

Family Scorpænidæ.

Branchiostegals 5 to 7. Pseudobranchiæ. Teeth in villiform bands. A single dorsal fin in two distinct portions. Ventrals thoracic.

MYRIODON, Barneville.

Branchiostegals 7. Operele spinate. Preoperele denticulated, with spinous teeth on the lower limb directed forwards. Villiform teeth in jaws, vomer, and palatines.

M. WAIGIENSIS, Quoy et Gaim.

B. vii.; D. $1\frac{1}{5}$; P. 14; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 16.

No spines on the head or groove below the eye. Interorbital space convex. A nasal tentacle half the diameter of the orbit. Dorsal spines strong, increasing to the fourth. Colour reddish, marbled with brown. Some dark marks radiate from the eye. All the fins spotted or banded with brown or black.

The Nicobars.

SEBASTICHTHYS, Gill.

Differs from *Sebastes* in having no palatine teeth.

S. STRONGIA, Cuv. et Val.

B. vi.; D. $11\frac{1}{2}$ $\frac{1}{5}$; P. 19; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 15.

Supraorbital ridge spined. Two spinate lines run posteriorly from the orbit. Two strong spines on the lower margin of preopercle, and a spiny ridge from the angle of preopercle to below the orbit. Three strong spines on preorbital, and a very strong one on the shoulder. Two tentacles above the orbit and several more about the head. Dorsal spines strong, increasing to the ninth. Colour brown, banded with darker. Fins irregularly banded in dotted lines.

The Andamans.

SCORPENA, *Artedi*.

Branchiostegals 7. Head large, with a scaleless groove on the occiput, and armed with spines and usually skinny flaps. Villiform teeth on jaws, vomer, and palatines. A single dorsal fin deeply notched between the two portions. Pectoral large. No air-vessel.

S. HAPLODACTYLUS, Bleeker.

B. vii.; D. $11\frac{1}{5}$; P. 5 + xii.; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 15.

Interorbital space deeply concave, no groove below the eyes. Numerous spines and several fleshy tentacles about the head. A strong spine above the base of the pectoral. Dorsal spines increase to the fourth and decrease to the eleventh. Soft dorsal slightly higher than the spinous. Colour brownish black, banded and marbled with darker. Anal dark banded basally. Two vertical bands on the caudal, which is dark-margined, edged with white.

Andamans.

SCORPENOPSIS, *Heckel*.

Characters of *Scorpena*, but without palatine teeth.

S. OXYCEPHALA, Bleeker.

B. vii.; D. $11\frac{1}{5}$; P. 6 + xii.; V. $\frac{1}{3}$; A. $\frac{2}{3}$; C. 13.

Interorbital space deeply concave. A deep groove below the front third of the orbit. A groove across the occiput, with one anterior and two posterior spines. Three strong spines and a tentacle on the orbit. A strong turbinal spine. A tentacle to the front nostril. Preorbital ridged and spined. Opercle and temporal ridge spined. A spine above the base of the pectoral. A large tentacle at the gape, and some small ones on the preopercle and lateral line. The third dorsal spine slightly longer than the fourth. Colour reddish, clouded with brown and black spotted. Dorsal anteriorly dark banded. Fins blotched.

The Nicobars.

PTEROIS, *Cuvier*.

Branchiostegals 7. Head as in *Scorpena*, but without an occipital groove, and without palatine teeth. A deeply-notched dorsal fin, with 12 to 13 spines. Air-vessel large.

P. ZEBRA, Cuv. et Val.

B. vii.; D. $12\frac{1}{17}$; P. 17; V. $\frac{1}{5}$; A. $\frac{2}{5}$; C. 14.

Interorbital space deeply concave, traversed by two low ridges, ending in a spine. Preopercle with 3 spines on its vertical border. Orbit spined and serrated. Turbinal spines present. Stellate ridges on the preorbital. A long tentacle on the orbit, and a large fleshy tentacle over the gape. Dorsal spines increase to the seventh. Caudal wedge-shaped. Body banded with narrow intermediate ones. A black blotch, white centred on the axilla. Dorsal spines annulated with black. Soft dorsal and anal black spotted. Caudal sinuously banded. Pectoral and ventral fins banded.

The Andamans.

P. VOLITANS, L.

Cheeb-ta-dah. Andamans.

B. vii.; D. 12 $\frac{10-11}{11}$; P. 14; V. $\frac{3}{3}$; A. $\frac{2-3}{3}$; C. 14.

Interorbital space deeply concave, two-ridged, and with the nape scaleless. Preopercle with 2 or 3 spines along its vertical border, and 3 more along its lower limb. Turbinal spines present. A long tentacle over the orbit, and fleshy tentacles along the lower edge of the preorbital. The first 10 dorsal spines high. Reddish, with vertical brown bands, having narrower and lighter intermediate ones. Three or four bands radiate from the eye. A black spot with white centre in the axilla. Dorsal spines annulated with black.

The Andamans.

P. CINCTA, Rüpp.

B. vii.; D. 11 $\frac{11-12}{11-12}$; P. 16; V. $\frac{3}{3}$; A. $\frac{3}{3}$; C. 15.

Interorbital space very concave. Orbital margin serrate, and orbital tentacle very long. Occipital and temporal ridges spinate. Several flesh tentacles on the head. The eighth and ninth dorsal spines the highest. Pectoral reaches to end of caudal or farther. Colours, a deep brown white-edged band from the eye to the end of the interopercle, another encircles the neck, and there are six more on the body, which looks as if traversed vertically by milk white bands. A black mark in the axilla. Ventrals grey. Caudal spotted. Snout pale.

The Andamans.

APISTUS, *Cuvier*.

Head and body rather compressed. Branchiostegals 6. No occipital groove. A mandibular barbel. A single dorsal fin. Villiform teeth in jaws, vomer, and palate. Air-vessel constricted. A cleft behind the fourth gill. Scales small.

A. CARINATUS, Bl. Schn.

B. vi.; D. $\frac{1+1+6}{10}$; P. 12 + 1; V. $\frac{1}{1}$; A. $\frac{2}{2}$; C. 12.

Upper surface of head roughened with two lines diverging to the occiput. Preorbital and preopercle spinate. A long barbel on the mandible followed by a shorter one. The dorsal spines increase to the sixth and decrease to the fourteenth. Colour greyish on the back, rosy on the belly. Pectorals black. Appendages milk white. Dorsal diaphanous, black edged. A deep black blotch from the eighth to the fourteenth spine. Three oblique brown streaks on the soft dorsal. Upper pectoral ray white. Caudal with four black vertical bands. Anal grey, yellow margined.

The Andamans.

GYMNAPISTUS, *Swainson*.

Characters much as in *Apistus*, but scales rudimentary or absent.

G. NIGER, Cuv. et Val.

Pom-tho-cho-rogue-dah. Andamans.

B. vi.; D. 3 $\frac{10-11}{10-11}$; P. 10; V. $\frac{1}{1}$; A. $\frac{2}{2}$; C. 9.

Preorbital with a very strong sharp spine. Preopercle spinate. Dorsal web continuous, but the third and fourth spines a trifle distant. Scales absent, save as rough patches here and there. Colour brownish black, caudal yellowish white, striated with brown, with a terminal dark band, white-edged.

The Andamans.

AMBLYPISTUS, *Bleeker*.

Branchiostegals 5 or 6. Head and body strongly compressed. No occipital groove. Strong and sharp preorbital and preopercular spines. Teeth as in *Apistus*. A single dorsal. Scales rudimentary or none. Air-vessel present.

A. TENIANOTUS, *Lacép.*

B. vi.; D. $1\frac{1}{8}-1\frac{1}{6}$; P. 12; V. $\frac{1}{5}$; A. $\frac{3}{7}-6$; C. 12.

Profile over the snout almost vertical. Preorbital, preopercle and opercle spinate. Dorsal high anteriorly, its second spine highest. All the articulated fin rays branched. Colour reddish, with irregular brownish spots. A brown mark between the fifth and sixth or seventh dorsal spine.

The Andamans.

A. MACRACANTHUS, *Bleeker*.

B. vi.; D. $1\frac{1}{9}-1\frac{1}{6}$; P. 12; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 12.

Five spines in the preopercle and two on both the opercle and preorbital. Barbels none. Dorsal commences before the eyes, and is high anteriorly; the first three spines slightly distant from the rest, and the second highest. All the articulated fin-rays branched near their extremities. A few scattered and imbedded scales. Colour brownish black, the pectoral white bordered.

The Andamans.

COCOTROPUS, *Kaup*.

Branchiostegals 6. Head and body strongly compressed. No occipital groove. Preorbital and preopercle with a strong blunt spine. A single dorsal. Articulated fin-rays unbranched. Villiform teeth on jaws and vomer only. Scales absent.

C. ECHINATUS, *Cantor*.

B. vi.; D. $1\frac{1}{11}$; P. 11; V. $\frac{1}{5}$; A. $\frac{2}{8}$; C. 12.

Anterior profile nearly vertical. Body and head studded with small blunt prickles. Colour buff, with five brown lines radiating from the eye. Upper edge of dorsal purple. Body brown blotched, and fins brown dotted. Two white spots on the tail.

The Andamans.

PELOR, *Cuvier et Valenciennes*.

Branchiostegals 7. Head irregular. Villiform teeth in jaws and vomer only. Scales absent. Head, body, and fins covered with skinny appendages. Dorsal spine single, its three anterior spines a little distant from the rest. Air-vessel small.

P. DIDACTYLUM, *Pall.*

B. vii.; D. $1\frac{3}{8}-1\frac{1}{6}$; P. 10+11; V. $\frac{1}{5}$; A. 11-12; C. 12.

Lower jaw the longer, and provided with fleshy tentacles. Interorbital space concave, and with a transverse ridge; an occipital depression and groove below the eyes. Blunt spines on orbit. Occipital and temporal ridges spinate. A turbinal spine. Second dorsal spine longest. Skinny appendages on the deeply cleft dorsal web. Colour brownish-grey, dirty-white below. Head and body with five spots. Caudal yellow, with a dark vertical band at the base, and a second across its terminal third.

The Andamans.

Family **Teuthidæ.**

Branchiostegals 5. Pseudobranchiæ well developed. Body oval and strongly compressed. A single row of cutting incisors in either jaw. Palate edentulous. One dorsal. Anal with 7 spines. Scales minute. Air-vessel present.

TEUTHIS, *Linnaeus*.

Teeth small, denticulate. Dorsal with 13 spines, and one anterior and horizontal.

T. VIRGATA, Cuv. et Val.

Tah-meer-dah, Andamans. Ngā-pron-ka, Arakan (generic).

B. v.; D. $\frac{13}{10}$; P. 17; V. $\frac{2}{3}$; A. $\frac{7}{5}$; C. 17.

Dorsal spines strong, increasing to the fifth and decreasing from the seventh. Colour, some oblique blue lines and spots on the snout. Upper two-thirds of body coppery yellow, covered with round blue spots. A brown blue-edged band descends from before the dorsal through the eye to below the jaws, and a second from the sixth and seventh dorsal spines to the base of the pectoral. Fins yellowish.

The Andamans.

T. JAVA, L.

B. v.; D. $\frac{13}{10}$; P. 18; V. $\frac{2}{3}$; A. $\frac{7}{5}$; C. 19.

Dorsal spines strong, increasing to the fourth, and occupying five-sevenths of the entire fin. Head, back, and sides dark neutral tint, paler on the belly, and covered with pale rounded spots, elongated on the sides and belly. Sometimes the cheeks are reticulated. Fins immaculate.

The Andamans.

T. VERMICULATA, Cuv. et Val.

Chow-lud-dah. Andamans.

B. v.; D. $\frac{13}{10}$; P. 16; V. $\frac{2}{3}$; A. $\frac{7}{5}$; C. 17.

Dorsal spines strong, the first three highest. Back bluish green, sides light brown, belly white. The whole head and body lined with undulating bluish lines, broadest on the belly. Caudal fin brown-lined.

The Andamans.

T. MARMORATA, Quoy et Gaim.

B. v.; D. $\frac{13}{10}$; P. 18; V. $\frac{2}{3}$; A. $\frac{7}{5}$; C. 17.

Dorsal spines moderate, increasing to the fourth and decreasing from the seventh. Brownish, back and head covered with vermiculate blue lines, which become sinuously longitudinal on the sides. Pectorals yellow. Other fins with sinuous brown lines.

The Andamans.

T. CONCATENATA, Cuv. et Val.

Thar-oar-dah. Andamans.

B. v.; D. $\frac{13}{10}$; P. 18; V. $\frac{2}{3}$; A. $\frac{7}{5}$; C. 18.

Dorsal profile more convex than abdominal. A broad shallow interorbital groove, laterally ridged. Dorsal spines increase to the fifth, and decrease to the twelfth. Scales larger than ordinary. Colour dark greyish-brown, covered with light orange spots, smaller on the belly. A broad blue band from the orbit to the gape, and another passes along the preopercle. Tail brown-spotted.

The Andamans.

T. MARGARITIFERA, Cuv. et Val.

B. v.; D. $\frac{13}{10}$; P. 17; V. $\frac{2}{3}$; A. $\frac{7}{5}$; C. 17.

Dorsal and abdominal profiles similar. Dorsal spines increase to the fifth and decrease to the thirteenth. Upper caudal lobe longest. Colour brownish olive, with small blue spots on the back and sides. A dark oval shoulder mark, and dark lines on spinous dorsal. Soft dorsal and anal brown-spotted.

The Andamans.

T. ORAMIN, Bl. Schn.

T. albopunctata, Tem. et Schl.

B. v.; D. $\frac{13}{10}$; P. 16; V. $\frac{2}{3}$; A. $\frac{7}{5}$; C. 17.

Dorsal spines increase to the fourth and decrease to the thirteenth. Scales very minute. Colour olivaceous, with indistinct longitudinal stripes on the body. Belly

silvery. A round black shoulder spot and a black spot over the eye. Back with numerous pearly-white spots. Dorsal fin brown-spotted. Caudal vertically barred and black-edged. Anal black-spotted. Pectorals orange.

The Andamans.

Family Berycidæ.

Branchiostegals from 4 to 8. Pseudobranchiæ present. Form oblong or rather elevated and compressed. Head with large muciferous cavities. Teeth more or less villiform in both jaws. Dorsal, when single, having the spinous portion less than the soft, or with isolated spines in front.

MYRIPRISTIS, *Cuvier*.

Branchiostegals 7 or 8. Teeth villiform on jaws, vomer, and palatines. Two dorsal fins. Tail forked. Air-vessel contracted near its centre.

M. MURDJAN, *Forsk.*

Sparus, sullanceroo-kuntce, *Russell*.

B. viii.; D. 10 $\frac{1}{4}$ $\frac{1}{15}$; P. 15; V. $\frac{1}{2}$; A. $\frac{1}{12}$ $\frac{1}{13}$; C. 19.

Lower jaw slightly the longer, with a rough wart on either side of the symphysis. Mandible furrowed by 10 or 12 grooves. Upper surface of head roughened by 3 or 4 raised lines, which divide and subdivide, each ending in a small spine. Dorsal spines increase to the third, the three next being equal to it. Colour roseate. Gill openings deep brownish black or like coagulated blood. A dark mark in the axilla. A dark vertical band through the eye. Dorsal, caudal, anal and ventral fins edged with milk-white.

The Andamans.

HOLOCENTRUM, *Artdi*.

Branchiostegals 8. Villiform teeth on jaws, vomer, and palatines. Two dorsal fins. Tail forked. Air-vessel oval and simple.

H. ANDAMANENSE, *Day*.

B. viii.; D. 11.15; P. 17; V. $\frac{1}{2}$; A. $\frac{1}{3}$; C. 22.

Preoperele denticulated, with a large fluted spine at its angle. Third to fifth dorsal spines highest. Colour uniform rosy scarlet.

The Andamans.

Family Polynemidæ.

Branchiostegals 7. Pseudobranchiæ. Body oblong. Eyes large, more or less covered by an adipose membrane. Mouth on the lower side of a prominent snout. Two dorsal fins. Seven free and articulated appendages below the pectoral. Air-vessel variable in form, present or not.

POLYNEMUS, *Linnæus*.

Teeth villiform on the jaws, palatines, vomer and pterygoid bones.

A. *Air-vessel none.*

P. PARADISEUS, *J.*

Ngā-pong-na. The mangoe-fish.

B. vii.; D. 7 $\frac{1}{15}$ $\frac{1}{18}$; P. 15 + vii.; V. $\frac{1}{2}$; A. $\frac{1}{12}$; C. 19.

Snout overhangs the mouth. Seven free rays below the pectoral, the three upper ones being the longest, and about twice the length of the fish. Colour golden, with a tinge of grey on the back and fins. Grows to 10 inches.

Coasts of India and Burma, entering rivers to spawn during the S.W. monsoon and the cold months.

It is highly esteemed as a delicacy, especially the roes, and called 'mangoe fish' by Europeans, or 'tapsi mäch,' of which name Buchanan observes: "Those

who officiate in the temple of *Sib* are called *Tapasi* in the vulgar dialect, and *Tapasiri* in Sangscritta, that is to say, penitents. They ought not to shave, on which account a fish called *Mangoe* fish by the English in Calcutta, which has long fibres proceeding from near its head, is called by the same name." So '*tapsi*' is a vulgar corruption of '*Tapasiri*'?

P. TETRADACTYLUS, Shaw.

Ngā-ta-yaw. (To bro-dah. Andamans.)

B. vii.; D. 8 $\frac{1}{13}$ — $\frac{1}{15}$; P. 17 + iv.; V. $\frac{1}{5}$; A. $\frac{2}{15}$ — $\frac{3}{17}$; C. 17.

The four free pectoral rays reach nearly to the vent. Colour silvery green, becoming yellowish-white on the sides and belly. Dorsal and caudal greyish, minutely black-dotted. Ventral and anal pale orange in their outer halves. Pectoral filaments white. A dark mark on the opercle. Grows to over 6 feet and over 300 lbs., and is excellent eating.

Coasts of India and Burma, ascending rivers freely.

B. *Air-vessel present.*

P. INDICUS, Shaw.

P. *sele*, Ham. Buch.

Lukwah, Arakan. Ka-koo-yan, Burma. (Kwai-yeng, Tavoy.)

B. vii.; D. 8 $\frac{1}{13}$ — $\frac{1}{14}$; P. 15 + v.; V. $\frac{1}{5}$; A. $\frac{2}{11}$ — $\frac{3}{12}$; C. 17.

Five free pectoral rays, the longest reaching nearly to the anal. Caudal deeply lined with usually filamentous ends. Colour, back purplish-black, belly silvery-white dashed with gold. Dorsals and anal stained with black. Grows to 4 feet, but is rarely seen over 20 lbs. A large fish yields two ounces of rough isinglass. Air-vessel oval and thick, occupying the whole length of the belly, and posteriorly prolonged among the caudal muscles.

Coasts and embouchures of large rivers of India and Burma.

P. PLEBEIUS, Gmel.

B. vii.; D. 8 $\frac{1}{13}$; P. 17 + v.; V. $\frac{1}{5}$; A. $\frac{2}{11}$; C. 17.

Five free pectoral rays, the longest reaches just beyond the ventral. Colour golden, greyish along the back. Dark lines along each row of scales. Anal greyish. Ventral white internally, externally grey. Fins grey-edged. Air-vessel narrow, elongate, and simple.

Coasts of India and Burma.

It is important to observe that the only species of *Polynemus* which yield isinglass (air-vessels) are those possessed of 5 free pectoral rays or filaments.

Family *Sciænidæ*.

Branchiostegals 7. Muciferous system on the head well developed. Teeth in villiform bands, but neither cutting nor molar-like teeth. Two dorsal fins, the second the most developed.

SELENA, *Cuvier*.

Teeth villiform, with an outer enlarged row in the premaxillaries, and sometimes an inner enlarged row in the mandible. No distinct canines. Anterior dorsal with 9 or 10 spines, posterior with 23 to 32 rays.

A. *An enlarged inner row of teeth in the mandible.*

S. MILES, Lacép.

Corvina soldado.

Ka-loung-boung.

B. vii.; D. 9-10 $\frac{1}{26}$ — $\frac{1}{30}$; P. 17; V. $\frac{1}{5}$; A. $\frac{2}{7}$; C. 17.

Five pores on the inferior surface of the mandible. Snout not overhanging.

Dorsal spines weak, and twice as long as the rays. Caudal wedge-shaped. Colour greyish, darkened with green, on the back, and white on the belly. Vertical white. Outer edges of fins sometimes dark. Grows to 2 feet in length.

Coasts of India and Burma.

S. corror, Ham. Buch.

Johnius coitor.

Ngā-ta-dum, and Ngā-pok-theng.

B. vii.; D. 10 $\frac{1}{2}$ $\frac{1}{2}$ — $\frac{2}{3}$; P. 17; V. $\frac{1}{3}$; A. $\frac{2}{7}$; C. 17.

One central and two lateral orifices below the symphysis of the mandible. Snout prominent and swollen superiorly; upper jaw somewhat the longer. Dorsal spines weak, the second to the fourth longest. Caudal wedge-shaped. Silvery shot with gold and purple. Upper half of first dorsal blackish. Soft dorsal, caudal and anal dark externally, and a dark basal band on the anal. Grows to a foot.

Inhabits the larger rivers of India and Burma, descending to the sea at certain seasons.

S. DIACANTHUS, Lacép.

Johnius diacanthus and *chaptis*.

B. vii.; D. 10 $\frac{1}{2}$ $\frac{1}{2}$ — $\frac{1}{2}$; P. 18·19; V. $\frac{1}{3}$; A. $\frac{2}{7}$; C. 17.

Upper jaw a little the longer. Five open pores under the symphysis of the mandible. Dorsal spines weak, increasing to the third and fourth. Caudal wedge-shaped. Brownish grey, shot with silver along the back, and fading below the lateral line to silvery grey. Head glossed with purple. Fins yellowish, with black dots. Eyes golden. Grows to 5 feet in length.

Burma, ascending rivers.

This is one of the fishes which Mason describes as yielding isinglass.

S. ANEUS, Bloch.

Chal-burn-dah. Andamans.

B. vii.; D. 10 $\frac{1}{2}$ $\frac{1}{2}$ — $\frac{1}{2}$; P. 18; V. $\frac{1}{3}$; A. $\frac{2}{7}$; C. 17.

Snout not overhanging, and with a small pore on either side just above the free edge of the skin. Mandible slightly advanced, with a small open pore on either side of the symphysis. Caudal squarish. Colour silvery-grey, white on the belly. First dorsal black-tipped, or stained with grey. Second dorsal greyish. Pectoral, ventral, and anal fins yellowish. Air-vessel oval, extending the whole length of the belly, but yields an inferior isinglass.

The Andamans, where not rare.

B. *No row of enlarged teeth in the mandible.*

S. GLAUCUS, Day.

B. vii.; D. 10 $\frac{1}{2}$ $\frac{1}{2}$ — $\frac{1}{2}$; P. 16; V. $\frac{1}{3}$; A. $\frac{2}{7}$; C. 17.

Snout rounded and overhanging. Snout with three pores across its base, and five along its free border, which has a distinct lateral lobe. Five open pores below the mandibular symphysis. Caudal rounded. Colour greyish-green on the back, silvery below, and fine brown spots everywhere. A diffused bluish blotch on the opercles, a dark spot at the base of the pectoral. First dorsal black, second dorsal, caudal, and last half of pectoral profusely clouded with brown spots. Scales etenoid, except on mouth and checks. Grows to a large size.

The Andamans.

S. CARUTTA, Bloch.

B. vii.; D. 10 $\frac{1}{2}$ $\frac{1}{2}$ — $\frac{1}{2}$; P. 17; V. $\frac{1}{3}$; A. $\frac{2}{7}$; C. 17.

Colour purplish brown, becoming golden below, paler along the lateral line. Head glossed with purple. Scales cycloid, except a few between the pectoral fin and lateral line. Grows to nearly a foot.

These two species closely resemble one another, save in the character of their scales. The air-vessels of *S. glaucus* and *S. sina* are largely prepared on the West coast of India and Sind, where they are called 'soor' fish, which name is written 'seer' by McClelland, who erroneously refers it to a *Polynemus*, whereas, according to Day, it refers to *S. sina* or *S. glaucus*. 'Soor' means 'pig.'

SCLENOIDES, *Blyth*.

Eyes small. An outer row of distinct curved conical teeth in the upper jaw, becoming canine-like anteriorly, and a similar inner row in the lower jaw. Villiform teeth interiorly in the upper and exteriorly in the lower jaw. Air-vessel generally with a horn-like process on either side.

S. PAMA, Ham. Buch.

Ngā-pyek. Called 'whiting' by Europeans in Calcutta.

B. vii.; D. $10 \frac{1}{40 \frac{1}{33}}$; P. 17; V. $\frac{1}{2}$; A. $\frac{2}{7}$; C. 17.

Snout not much swollen, with two open pores anteriorly and two more on the free edge of the skin. Lower jaw slightly shorter, and with a small symphyseal open pore. Dorsal spines weak, with filamentous ends, the third and fourth longest. Caudal wedge-shaped, its central rays much the longest. Colour brown, lighter below. Head shot with gold and purple. Fins yellowish. The upper half of dorsal and caudal grey. Grows to 5 feet in length.

Coasts of India and Burma.

S. BIATRITUS, Cantor.

Otolithus biauritus.

B. vii.; D. $9 \frac{1}{27 \frac{1}{33}}$; P. 19; V. $\frac{1}{2}$; A. $\frac{2}{7}$; C. 17.

Upper jaw overlaps the lower. Five open pores along the free edge of the skin of the snout. Four small open pores below the mandible. Dorsal spines weak, the fourth highest. Caudal wedge-shaped. Colour light brown above, tinged with gold on the belly; head shot with purple. Grows to $3\frac{1}{2}$ feet or more.

Indian seas.

According to Cantor this fish yields an isinglass highly esteemed by the Chinese.

To this family belongs the genus *Pogonias*, one or more species of which possess the power of emitting musical sounds. Musical fish, so called, have been noticed in Burma by the Rev. C. Parish, but the species has not been identified, and if one species possessing pharyngeal teeth makes those sounds, it is more than likely that several species possess the power. For further remarks on this subject see Appendix (Musical Fish)

Here follows the family of Xiphiidæ or Sword-fishes. These fish grow to between 5 and 6 feet, and are armed with a pointed bony rostrum or 'sword' with which they sometimes transfix the sides of ships, driving their sword through the copper sheathing and the wooden planks beneath. They are said to attack whales, and it seems not unlikely that the Xiphias rushes at a ship supposing it to be a helpless cetacean, and does not discover its error till it has got the worst of the encounter and lost its snout in the shock.

Family Trichiuridæ.

Branchiostegals 7 or 8. Body elongated and compressed. Teeth in jaws or palate, several being strong and conical. Scales none or rudimentary. Air-vessel present. No prominent papilla behind the vent.

TRICHIURUS, *Linnaeus*.

Branchiostegals 7. Body very elongate, strongly compressed, ribbon-shaped, tapering to a fin-less point at the tail. Teeth in jaw and palatines, those in the maxillaries being arched and very strong, whilst the lateral ones are lancet-shaped. A single dorsal the whole length of the back. Scales none. Air-vessel present.

T. HAUMELA, Forsk.

Ngā-ta-khwōn-kha. (Pa-pa-dah, Andamans.)

B. vii.; D. 127-133; P. 11.

Lower jaw considerably the longer. Two pairs of large curved and barbed canines in the upper jaw, and a pair of similar but smaller ones over the mandibular symphysis, and in advance of the snout when the mouth is closed. The anal fin in the shape of small spines, often concealed. Colour grey on the back, silvery on sides and belly. Fins pale yellow. The upper half of the dorsal dark. Grows to 2 feet or so.

Jerdon says this species is delicate eating when fresh.

Cantor describes it as giving off, at certain seasons, a vivid phosphoric light.

The Andamans.

Family Acanthuridæ.

Branchiostegals from 4 to 7. Pseudobranchiæ. Body oblong, or elevated and compressed. Teeth on both jaws in a single compressed row. Palate edentulous. A single dorsal fin. Scales minute. The side of the tail in adults armed with one or more bony plates or spines. Air-vessel present.

ACANTHURUS, *Blainville.*

Branchiostegals 5. A movable spine exists in a groove on the side of the free portion of the tail just below the lateral line.

A. *Broad teeth fixed in the jaws. 8 or 9 dorsal spines.*

A. LINEATUS, L.

B. v.; D. $\frac{8}{28}-\frac{9}{31}$; P. 15; V. $\frac{1}{5}$; A. $\frac{3}{27}$; C. 17.

Six or seven lobed incisors on either side of upper jaw. Caudal spine lancet-shaped, with a posterior process. Colour, head, and upper two-thirds of body canary yellow, traversed by nine or ten oblique blue bands, from the head to the back and tail. Lower third of body reddish-grey. Other blue bands pass upwards and backwards, from the eye to the body bands. Upper ray of pectoral blue, and inside it a short white line, and an arched white band on the lower half of the pectoral on its lower side. Outer ray of ventral blue, its inner ones red. Caudal with a central semilunar blue band and blue margin. Grows to about 18 inches.

The Andamans.

A. TRIOSTEGUS, L.

B. v.; D. $\frac{0}{23}-\frac{0}{23}$; P. 15; V. $\frac{1}{5}$; A. $\frac{3}{22}$; C. 17.

Eight lobate incisors on either side of upper jaw, and 9 or 10 on either side of lower. Caudal spine with a sharp posterior process. Colour greenish, with a brownish tinge on the back. A vertical dark band along the snout, one through the orbit, four down the body, and two blotches at the base of tail, one above, the other below the lateral line. Fins darkish.

The Andamans, where common.

B. *Setiform movable teeth dilated at their extremities. 8 dorsal spines.*

A. STRIGOSUS, Bennett.

B. v.; D. $\frac{8}{28}-\frac{8}{30}$; P. 17; V. $\frac{1}{5}$; A. $\frac{3}{27}$; C. 17.

Teeth setiform, movable, and with their outer third dilated and spoon-shaped, with three deep clefts in each. 21 on the upper and 20 on the lower jaw. Caudal spine with a sharp posterior process. Colour, body horizontally lined with narrow bluish lines on a yellow ground. Many red spots on the head, especially round the eyes. Dorsal and anal fins lined, and a light median vertical band on the caudal.

The Andamans.

c. Broad teeth fixed in the jaws. 1 to 4 dorsal spines.

A. VELIFER, Bloch.

B. v.; D. $\frac{3}{2} - \frac{4}{3}$; P. 17; V. $\frac{1}{6}$; A. $\frac{3}{2} - \frac{3}{4}$; C. 17.

Six lobate incisors on each side of the upper jaw. Dorsal very elevated, fourth dorsal ray highest. Scales rudimentary. Colour greyish, with nine vertical white-edged bands from the back to the belly. Head sometimes white-spotted. Four curved blue or white bands on the dorsal, six on the anal and four on the caudal. Caudal pale-spotted. Grows to over 16 inches.

The Andamans.

Family Carangidæ.

CARANX, *Lacépède*.

Branchiostegals 7. Pseudobranchiæ. Dentition feeble. Two dorsal fins, the first bearing 8 weak spines and a recumbent spine directed forwards in front of it. Scales minute. Lateral line curved anteriorly, and posteriorly straight, and armed with large plate-like scales. Air-vessel bifurcate posteriorly.

A. *Teeth on the palate. No fulets.*

C. MELAMPYGUS, Cuv. et Val.

B. vii.; D. 8 $\frac{1}{2} - \frac{1}{3}$; P. 22; V. $\frac{1}{6}$; A. 2 $\frac{1}{2} - \frac{1}{3}$; C. 19.

Lower jaw rather the longer. An outer row of enlarged teeth in the upper jaw. Straight portion of lateral line with keeled scales, the largest $\frac{1}{2}$ the height of body, and 34 to 36 in number.¹ Colour greenish gold along the back, silvery along the belly. Sometimes the body is black-spotted.

The Andamans.

C. CRUMENOPHTHALMUS, Bloch.

B. vii.; D. 8 $\frac{1}{2} - \frac{1}{3}$; P. 21; V. $\frac{1}{6}$; A. 2 $\frac{1}{2} - \frac{1}{3}$; C. 21.

A single row of teeth in both jaws, some also on the vomer, palatines and tongue. Lateral line a very flat curve, with keeled scales behind the centre of the dorsal, and which are strongest opposite the termination of the dorsal, the largest equal $\frac{1}{2}$ the height of body. Colour silvery above, golden below. Sometimes an opercular spot. Caudal black-tipped. Grows to a foot or more.

The Andamans.

C. BOOPS, Cuv. et Val.

B. vii.; D. 8 $\frac{1}{2} - \frac{1}{3}$; P. 19; V. $\frac{1}{6}$; A. 2 $\frac{1}{2} - \frac{1}{3}$; C. 17.

Lower jaw and teeth as in *crumenophthalmus*. Plates on lateral lines commence from sixth dorsal spine, and at their broadest equal $\frac{1}{4}$ the height of the body, and are 46 in number. Colour silvery, darker on the back and shot with gold on the belly. A small opercular spot. Dorsal and caudal dark-spotted.

The Andamans.

C. AFFINIS, Rüpp.

B. vii.; D. 7·8 $\frac{1}{2}$; P. 24; V. $\frac{1}{6}$; A. 2 $\frac{1}{2} - \frac{1}{3}$; C. 17.

Lower jaw slightly projects. Teeth villiform in more than one row in either jaw near the symphysis, laterally in a single row of moderately large ones. Teeth also on the vomer, palatines, and tongue. Lateral line with a long irregular curve, which straightens below the sixth dorsal ray; the plates commence from the fifth to the eighth scale of the straight portion, 42 to 47 in number (the largest being $\frac{1}{7}$ of height of body). Colour silvery on the back, golden on the belly. A series of short vertical bands as wide as the interspaces crosses the lateral line along its entire length. A black shoulder spot extending to the opercle. Fins yellow. Anal white-edged. Second dorsal anteriorly white, and posteriorly dark-tipped.

The Andamans.

¹ The number of scales given on the lateral line refers to the keeled scales only.

C. COMPRESSUS, Day.

B. vii.; D. 8 $\frac{1}{22}$ $\frac{1}{24}$; P. 21; V. $\frac{1}{3}$; A. 2 $\frac{1}{16}$ $\frac{1}{20}$; C. 21.

Lower jaw the longer. Teeth villiform in both jaws, and on vomer, palate, and tongue. Lateral line a very gradual curve. The keeled scales are most developed on the free portion of the tail, where the largest equal $\frac{1}{28}$ of height of body, and are 13 in number. Colour silvery, with a minute opercular spot. Vertical margin of preopercle dark.

The Andamans.

C. OBLONGUS, Cuv. et Val.

Ro-thnl-dah. Andamans.

B. vii.; D. 8 $\frac{1}{21}$ $\frac{1}{22}$; P. 21; V. $\frac{1}{3}$; A. 2 $\frac{1}{18}$ $\frac{1}{19}$; C. 18.

Lower jaw the longer. Teeth in a narrow villiform band in the upper jaw or in two rows, with the outer slightly enlarged. In the lower in a single row, except in front, where they are largest, and have a few villiform teeth behind them. Teeth also on vomer, palatines, and tongue. Keeled scales over the whole of the straight portion of the lateral line, the largest equal $\frac{1}{3}$ of the height of the body, 34 to 40 in number. Colour of adults olive above, white below. Fins yellow. Caudal orange, with its terminal half black, but white-tipped.

The Andamans.

C. ARMATUS, Forsk.

B. vii.; D. 6·8 $\frac{1}{20}$ $\frac{1}{21}$; P. 21; V. $\frac{1}{3}$; A. 2 $\frac{1}{16}$ $\frac{1}{17}$; C. 19.

Lower jaw the longer. Teeth villiform in both jaws, with an outer somewhat enlarged row on the premaxillaries; they are also present on the vomer, palatines and tongue. Lateral line makes a low curve and straightens below the centre of the second dorsal. Keeled plates commence in the last half of the straight portion, but are small and 20 in number. Colour, top of head and back bluish-green, sides of the head and body golden with purple reflexions. A spot on the opercle. First dorsal black, second and anal yellowish, with dark edges. The young vertically banded.

The Andamans.

B. *No teeth on the palate. No finlets.*

C. NIGRIPINNIS.

B. vii.; D. 7·8 $\frac{1}{23}$ $\frac{1}{24}$; P. 23; V. $\frac{1}{3}$; A. 2 $\frac{1}{20}$ $\frac{1}{21}$; C. 19.

Lower jaw somewhat the longer. Teeth in both jaws of equal size in a single row. A few on the tongue, but none on vomer or palatines. Lateral line straightens behind the fourth dorsal ray. The largest scales on it equal $\frac{1}{2}$ the height of the body and they number 55 to 60. Colour silvery, shot with gold. First dorsal black. Anal white-edged. A dark band along the second dorsal, with its upper anterior corner white.

The Andamans.

CHORINEMUS, Cuvier et Valenciennes.

Branchiostegals 7 or 8. Pseudobranchie. Teeth in jaws, vomer, palatines, and tongue. Two dorsal fins, with an immovable procumbent spine in front. First dorsal composed of a few free spines. Posterior dorsal and anal rays detached or nearly so. Dorsal scales mostly lanceolate. Air-vessel bifurcate posteriorly.

C. TOLU, Russell.

B. viii.; D. 7 $\frac{1}{19}$ $\frac{1}{20}$; P. 20; V. $\frac{1}{3}$; A. 2 $\frac{1}{17}$ $\frac{1}{18}$; C. 19.

Teeth comparatively large, in a single in the upper jaw and in two rows in the lower, the outer one directed somewhat outwards, and a pair of canine-like teeth on either side of the mandibular symphysis. The last 8 or 10 rays of both soft dorsal and caudal, semidetached. Colour of back greenish, shot with blue. Belly silvery. Six or eight indistinct vertical spots along the lateral line. Grows to eighteen inches.

The Andamans.

C. LYSAN, Forsk.

The 'Madagascar Mackerel.' Ngā-pyek.

B. viii.; D. 7 $\frac{1}{19}$ $\frac{1}{20}$; P. 19; V. $\frac{1}{2}$; A. 2 $\frac{1}{17}$ $\frac{1}{18}$; C. 19.

Teeth anteriorly in two rows, posteriorly in one row in the premaxillaries. In the lower jaw in two rows. Some of the anterior teeth in both jaws rather enlarged. Also teeth in a triangular spot on the vomer, and in a pyriform band on the palatines; also on the tongue. The anterior part of the soft dorsal and anal elevated, the last 8 or 10 rays semidetached. Colour, six or eight large round grey spots like finger marks on the side. Summit of soft dorsal black.

Tavoy coast.

Mason says he has measured these fish over 2½ feet.

PSETTUS, *Cuvier et Valenciennes*.

Branchiostegals 6. Pseudobranchiæ. Body much compressed and elevated. Teeth villiform in jaws, vomer, palatine, and tongue. A single dorsal fin with 7 to 8 spines. Ventrals rudimentary. Scelos small. Air-vessel bifurcated posteriorly.

P. ARGENTUS, L.

Ngā-poo-zwōn. (Oo-chra-dah. Andamans.)

B. vi.; D. $\frac{1}{28}$ $\frac{3}{30}$; P. 17; V. $\frac{1}{3}$; A. $\frac{3}{28}$ $\frac{3}{30}$; C. 17.

Ventrals placed close together like two spines, the rays being minnte. Colour silvery, with purplish reflexions, especially about the anal fin. The back yellowish green, turning after death to plumbeous. A black band from the nape to the eye. A second from the first three dorsal spines to the opercle. Dorsal and anal stained black in part. Caudal yellow, margined behind with black. Grows to 7 inches or more.

The Andamans.

PLATAX, *Cuvier et Valenciennes*.

Branchiostegals 6. Pseudobranchiæ. Body compressed and much elevated. Teeth setiform, trilobed at their summits; some present on the vomer. A single dorsal fin with 3 to 7 spines, which are nearly hidden. Ventrals well developed. Air-vessel simple.

P. VESPERTILO, Bloch.

B. vi.; D. $\frac{6}{30}$ $\frac{6}{37}$; P. 17; V. $\frac{1}{3}$; A. $\frac{3}{26}$ $\frac{3}{28}$; C. 17.

Dorsal anteriorly rounded and longer than its base. Ventral extends to the middle of the anal. Anal $\frac{1}{2}$ as long as the dorsal. Colour brownish, fins black, and last $\frac{2}{3}$ of pectoral yellow. In the young there is a narrow vertical ocular band, a second curved one descending behind the base of the pectoral, a third in front of the tail, and a fourth at its base. The allied species *P. toira* grows to 20 inches and is excellent eating, as is the present one probably.

The Andamans.

EQUULA, *Cuvier et Valenciennes*.

Branchiostegals 5 to 6. Pseudobranchiæ. Body oblong or elevated and strongly compressed. Mouth very protractile. Minute teeth of equal size in the jaws. Palate edentulous. A single dorsal with 8 to 10 spines and 15 to 17 rays. Air-vessel two-horned anteriorly.

E. EDENTULA, Bloch.

Ngā-pi-mā. Burma.

B. v.; D. $\frac{8}{15}$ $\frac{8}{16}$; P. 20; V. $\frac{1}{3}$; A. $\frac{3}{14}$; C. 17.

Supraorbital edge serrated. Chest without scales. Mandible very concave. Second dorsal spine arched and compressed. The third and fourth spines anteriorly serrated on their lower portion. Colour silvery, greyish along the lateral line. Fine vertical lines from the back down the sides. The soft dorsal greyish on its upper edge. Base of pectoral grey. Grows to over 8 inches.

Burma (ascending tidal rivers).

E. Blochi, Cuv. et Val.

B. v. ; D. $\overset{8}{\underset{6}{1}}$; P. 18 ; V. $\frac{1}{2}$; A. $\overset{3}{\underset{1}{1}}$; C. 17.

Supraorbital serrated. Chest sealed. Second dorsal spine longest, third and fourth serrated anteriorly below. Colour silvery, with a dark blotch over the nape, and a black mark between the third and sixth dorsal spines. Vertical zigzag yellow lines during life on the back and sides. Base of pectoral dark behind.

Akyab.

E. brevirostris, Cuv. et Val.

B. v. ; D. $\overset{8}{\underset{6}{1}}$; P. 18 ; V. $\frac{1}{2}$; A. $\overset{3}{\underset{1}{1}}$; C. 17.

Supraorbital edge serrated. Chest scaleless. Dorsal spines strong and compressed, the third and fourth strongly serrated over their lower half and quarter respectively. Spinous dorsal with a black blotch from the third to the seventh spines. A brown blotch on the nape. Pectoral black at its base posteriorly. A narrow yellow band from above the eye to the centre of the tail.

E. insidiatrix, Bloch.

B. v. ; D. $\overset{8}{\underset{6}{1}}-\overset{6}{\underset{7}{1}}$; P. 18 ; V. $\frac{1}{2}$; A. $\overset{3}{\underset{1}{1}}$; C. 17.

Supraorbital edge finely serrated. Chest sealed. Dorsal spines weak. The first minute, the second, third, and fourth subequal: Colour, back bluish silver, belly whitish silver, the whole slightly glossed with gold. A dark mark in the axilla, and sometimes a black streak from the eye to the throat, which meets its fellow. Three or four horizontal lines of bronzy black spots forming vertical bands along the upper half of the body. Spinous dorsal tipped with black. Ventral white. Pectoral yellow. Caudal yellowish, stained at the end with brown.

Akyab and coast of Burma, ascending tidal rivers.

E. rucoides, Ham. Buch.

Pyn-leh-ngā-zyn-zat, or Pyn-leh-ngā-hpyu-theh.

B. v. ; D. $\overset{8}{\underset{6}{1}}$; P. 18 ; V. $\frac{1}{2}$; A. $\overset{3}{\underset{1}{1}}$; C. 17.

Supraorbital edge serrated. The second dorsal spine longest. Scales much (2 or 3 times) larger than in *E. insidiatrix*, but deciduous and often wanting. Colours much as in the last.

Coast of Burma. This is oftener captured in tidal rivers and estuaries than the last.

GAZZA, Rüppell.

Resembles *Equula*, but possesses a pair of upper canine-like teeth.

G. minuta, Bloch.

B. v. ; D. $\overset{8}{\underset{6}{1}}$; P. 17 ; V. $\frac{1}{2}$; A. $\overset{3}{\underset{1}{1}}$; C. 19.

Supraorbital edge serrated. A row of pointed teeth in the premaxillaries and a pair of canine-like ones at the symphysis. In the mandible, villiform teeth with an outer row of large conical ones. Colour silvery, with irregular bluish or yellowish lines descending over the back. The axilla black.

The Andamans.

To this family, Carangidæ, belong the curious fishes known to seamen as pilot-fish (*Naucreates*), several of which may be frequently seen in close attendance on sharks when swimming round a vessel. Why the 'pilot fish' should thus accompany the shark is not known.

Family Stromateidæ.

Branchiostegals 5 to 7. Pseudobranchiæ. Barbed teeth extend into the œsophagus. The long dorsal fin without spines (or rudimentary ones only).

STROMATEUS, *Artedi*.

(Pomfrets.)

Teeth small, in a single row in the jaws. Palate and tongue edentulous. Oesophagus armed with numerous barbed teeth. A single long dorsal and anal fin, with rudimentary spines anteriorly. Ventrals if present thoracic. Air-vessel absent.

S. NIGER, Bloch.

Ngā-pa-moung. The "black pomfret." (Ko-lig-dah. Andamans.)

B. vii.; D. $\frac{5}{42} \frac{5}{44}$; A. $\frac{3}{36} \frac{3}{39}$; C. 19.

The lower jaw longer. Ventral fins in the young only. The last portion of lateral line keeled as in *Caranx*; colour deep brown, with blue reflexions. Cheeks, opercles, and belly pale or brownish neutral. Dorsal and anal greyish brown, blackish towards the margin. Pectorals and caudal brownish, edged with black. Iris brownish blue (in the young grey). Dorsal and anal fins black. Tail yellow, with three brown cross bands.

Grows to two feet, and is excellent eating.

The Andamans.

S. SINENSIS, Euphrasin.

Ngā-mu. The "white pomfret."

B. vi.; D. $\frac{0}{43} \frac{0}{50}$; P. 25; A. $\frac{0}{39} \frac{0}{42}$; C. 19.

The lower jaw longer. No ventral fins, even in the young. No keeled scales on the lateral line. Colour above, deep neutral tint; below, brownish grey with metallic reflexions, and silvery on the belly. Body dotted with brown spots, the larger ones with a central silvery dot. Fins silvery grey, dark-margined. Iris copper-coloured, and brown-dotted.

S. CINEREUS, Bleeker.

The "grey pomfret."

B. vii.; D. $5 \cdot 9 \frac{1}{38} \frac{1}{43}$; P. 27; A. $5 \cdot 6 \frac{1}{32} \frac{1}{41}$; C. 19.

Snout projects. Lower caudal lobe much the longer. Colour above, greyish neutral tint with purplish reflexions; below, white, minutely black-dotted, as are the dorsal and anal. Iris silvery. Grows to over a foot, and is the most highly esteemed for food of any.

Here follows the family of Coryphænidæ or Dolphins, comprising the genera Coryphæna and Mene, which inhabit the Eastern seas.

Family Scombridæ.

Branchiostegals 7 or 8. Pseudobranchiæ. Two dorsal fins. The infraorbital bones do not articulate with the propele. Scales, if present, small.

SCOMBER, *Artedi*.

Eyes with adipose eyelids. Behind the dorsal and anal fins 5 or 6 finlets. Ventrals thoracic. Two slight keels on either side of the root of the caudal.

S. MICROLEPIDOTUS, Rüpp.

Ngā-young-gyi. (Look-wah-dah. Andamans.)

B. vi.; D. $8 \cdot 10 \frac{1}{11} + v \cdot vi$; P. 21; V. $\frac{3}{5}$; A. $\frac{1}{11} + v \cdot vi$; C. 24.

Lower jaws slightly the longer. Teeth minute in both jaws, in the upper disappearing with age except near the symphysis, where they are usually persistent. None on vomer or palate. Dorsal spines weak and receivable into a groove. The second to the eighth subequal. Post-dorsal and post-anal finlets opposite and similar. Colour, back greenish, sides and belly iridescent. A row of 16 spots along the back, close to the dorsal fin. Head spotted, sides shot with bluish purple. Caudal and

pectoral bright yellow. Dorsal yellowish, tipped with black. Ventral and anal finely dotted with black. In large specimens of 12 inches from the Andamans there are 5 to 8 longitudinal bands, the uppermost broken up into spots, and usually a golden band along the lateral line and two more below it. Grows to 10 inches on the coast—or, if the Andaman specimens are the same species, to 12 or more.

S. BRACHYSOMA, Bleeker.

B. vii.; D. $10 \frac{1}{11} + v.$; P. 22; V. $\frac{1}{2}$; A. $\frac{1}{11} + v.$; C. 21.

Resembles *S. microlepidotus*, except that there are two shining light spots above and behind either eye, and the spinous dorsal is posteriorly edged with black.

The Andamans.

The 'scombers' or Mackerels deposit their eggs in the open sea, hence their young are rarely seen on the coast.

Here follows the genus *Thynnus*, embracing the 'Tunnies' and 'Bonitos,' which are excellent for food. They are very voracious, remarks Day, and may often be observed in 'schools' pursuing the *Exocoeti* (flying fish) or *Clupeidae* (Sardines), etc. As food they are moderately approved of, as when fresh their flesh sometimes causes visceral derangement, but they are largely salted or dried, both in Europe and Asia.

CYMBIUM, Cuvier.

'Seer fishes.'

Branchiostegals 7. Pseudobranchiæ. Teeth large and strong in the jaws. Villiform on the vomer, palatines, and tongue. Two dorsal fins. Seven or more finlets behind the soft dorsal and anal fins.

The seer fishes of India, remarks Day, are considered among the most delicate of the marine forms for the table. Under a foot in length, they are apt to be dry, but when from $1\frac{1}{2}$ to $2\frac{1}{2}$ feet in length are at their best. Above this size, again, their flesh becomes coarse. They also salt well, and make excellent 'tamarind fish,' as fish are called when prepared or pickled with tamarind pulp.

C. GUTTATUM, Bl. Schn.

C. lineolatum, Cantor.

Kün-shat.

B. vii.; D. $16\cdot17 \frac{4}{14} - \frac{5}{15} + viii.\cdot x.$; P. 21; V. $\frac{1}{2}$; A. $\frac{3}{17} - \frac{3}{19} + vii.\cdot ix.$; C. 26.

Teeth lancet-shaped, laterally compressed, distant 10 to 12 in either jaw, longer in the lower. The keel on the lateral line well developed. Colour bluish above, silvery below. Three rows of round or horizontally oval spots along the back and sides. The dorsal web, from the first to the eighth spine, black, the rest pure white, edged with black. Grows to 3 feet or so.

Tavoy coast.

Four other species inhabit the Indian seas: *C. Kuklii*, Cuv. et Val.; *C. interruptum*, Cuv. et Val.; *C. Commersonii*, Lacép.; and *C. lineolatum*, Cuv., which last, Mason says, is largely dried at Tavoy.

Last in the family of 'Scombers' comes the singular genus *Echeneis* or 'sucking fish,' with flat heads, covered by an adhesive or pneumatic disk. This disk is formed by a modification of the first dorsal fin, and by its means the fish attaches itself firmly to any smooth surface. They commonly attach themselves to sharks, so as to have been regarded as parasitic on those creatures. They were also supposed to be endowed with the power of arresting vessels at full speed, which is a fable no doubt founded on their attaching themselves frequently to them.

"Parva Echeneis adest (mirum) mora puppibus ingens."—*Ovid*, *Halieuticon*.

A curious use to which the *Echeneis* is sometimes put is to catch turtle and large fish. A cord is fastened round the fish's tail, and it is then 'slipped' as it were at the turtle. The terrified fish at once fixes on the turtle, which is then hauled up and secured. This curious method of fishing is said to have been found in use in Cuba by Columbus, and is also stated by Dampier and Commerson to be

practised on the coasts of Natal, Mozambique, and Madagascar. Cantor says that they are regarded as a powerful manure for fruit trees, whence it would seem they must be far from rare in the Malayan seas. Day enumerates four species from the tropical seas:—*E. neucrates*, L.; *E. remora*, L.; *E. brachyptera*, Lowe; and *E. albescens*, Tem.

Next to the scorpers, Day places the URANOSCOPIDÆ, or 'mud fishes,' divided into two genera, *Uranoscopus* and *Ichthyoscopus*, the former possessing two dorsal fins, the latter but one. These repulsive fish bury themselves in the mud, with only the top of the head (whereon are the eyes) and mouth exposed ready to ingulph within their vertical and capacious jaws any animal which may unwarily pass over them, much as the ant-lion does, among insects. Day enumerates two species, *Uranoscopus guttatus*, Cuv. et Val. and *Ichthyoscopus inermis*, Cuv et Val.

Family Trachinidæ.

Body elongated, posteriorly compressed. The preopercle articulates with the suborbital bones.

PERCIS, Bloch. *Schneider*.

Branchiostegals 6. Pseudobranchiæ. Lower jaw the longer. Villiform teeth in the jaws, with an outer enlarged row and canine-like ones. Teeth on the vomer, but not on the palatines. Two dorsal fins, soft dorsal and anal similar. Air-vessel none.

P. PUNCTATA, Cuv. et Val.

B. vi.; D. 5: 21·22; P. 16·17; V. $\frac{1}{5}$; A. $\frac{1}{17} \frac{2}{18}$; C. 15.

Snout sharp. Eight curved teeth above the symphysis of the mandible. Fourth dorsal spine longest. Caudal cut square. Colour whitish, with reddish-brown vertical bands above the lateral line. A golden line from below the orbit to the base of the dorsal, and another from the eye to the snout. Spinous dorsal sometimes black-spotted. Soft dorsal with three rows of spots on the rays. Caudal banded, and with sometimes an ocellus at the base. Anal yellowish, and ventrals slaty.

The Andamans.

P. HEXOPHTHALMA, Cuv. et Val.

B. vi.; D. 5: 19·21; P. 17; V. $\frac{1}{5}$; A. 17·18; C. 15.

Snout somewhat pointed. Teeth in outer row above enlarged, as are 8 or 10 of the anterior ones in the mandible, and some of the middle lateral teeth. Fourth dorsal spine longest. Caudal cut square, with its upper ray a little prolonged. Colour above, greyish brown, with irregular vertical grey lines, also one or two narrow longitudinal lines along the side, and three or more white spots, with a black centre along the belly. Some black lines about the eye. A black spot at the base of the first dorsal. Three rows of black spots along the soft dorsal. Dorsals black-edged, and a black blotch on the caudal followed by a white one.

The Andamans.

SILLAGO, *Cuvier*.

Branchiostegals 6. Pseudobranchiæ. Upper jaw the longer. Villiform teeth in jaws, with an outer conical row on the vomer also, but none on the palatines. Two dorsals. Soft dorsal and anal similar. Air-vessel simple.

S. DOMINA, Gill.

B. vi.; D. 9 $\frac{1}{26} \frac{1}{27}$; P. 24; V. $\frac{1}{5}$; A. $\frac{1}{26} \frac{1}{27}$; C. 19.

Head depressed, pyriform, cheeks swollen. Four central teeth in upper jaw largest. Vomerine teeth in a semicircle. First dorsal spine small. Second curved and extends to beyond the caudal, or in large specimens to its base. Scales strongly etenoid. Colour greenish shot with purple. Grows to 10 inches or more.

Burma, ascending tidal rivers.

S. SIHAMA, Forsk.

Ngā-rui. Arakan. Ngā-pa-lwe. Burma. (Thol-o-dah. Andamans.)

B. vi.; D. 10-11 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$; P. 20; V. $\frac{1}{2}$; A. $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$; C. 19.

General form as in *S. domina*, but the second and third dorsal spines subequal. Colour olive green above, lighter below, with a brilliant purple reflexion. A silvery longitudinal band. Dorsal and anal minutely black-dotted. Grows to a foot, or rarely (*vide* Leschenault) to 3 feet.

The Andamans and coast of Burma.

This fish is called "Whiting" at Madras, and is given to nursing mothers, being regarded as more nourishing even than sharks' flesh.

S. MACULATA, Quoy et Gaim.

B. vi.; D. 11 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$; P. 17; V. $\frac{1}{2}$; A. $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$; C. 18.

Dorsal spines weak, the third to the fifth subequal. Colour grey on the back, white on the belly. Some blackish blotches and a silvery band on the side. Upper half of first dorsal black. Outer edge of soft dorsal and anal dark, and a grey band superiorly along the soft dorsal. Grows to 9 inches or more.

The Andamans.

These fishes (*Sillago*, which have much the appearance of *Sciæna*) may be captured throughout the year, and are light and wholesome food.

Family Pseudochromidæ.

PSEUDOCROMIS, Rüppell.

Branchiostegals 6. Pseudobranchiæ. Lower jaw the longer. Jaws with a single row of lateral teeth. An outer enlarged row anteriorly in the premaxillaries, and canine-like teeth in the mandible. Teeth on the vomer and palate. A single dorsal. Air-vessel present.

P. XANTHOCHR, Bleeker.

B. vi.; D. $\frac{3}{2}$ $\frac{3}{2}$; P. 17; V. $\frac{1}{2}$; A. $\frac{3}{2}$; C. 17.

Dorsal spines short, the third longest. Caudal rounded. Colour dull olive. Soft dorsal yellow-spotted above, brown-spotted below. Caudal terminally yellow, and brown-spotted at its base.

The Andamans.

Family Batrachidæ.

Branchiostegals 6. Pseudobranchiæ. Head large and muciferous system well developed. Gills 3. Opercles armed. Teeth conical, moderate or small. Scales when present small. Air-vessel present.

BATRACHUS, Bloch. Schneider.

Character of family. No canine-like teeth. Two dorsals. Air-vessel divided into two lateral parts.

B. GANGENE, Ham. Buch.

B. vi.; D. 3:20-22; P. 21; V. $\frac{1}{2}$; A. 16-18; C. 15.

Snout broad, depressed, surrounded by tentacles, and there are others round the eye, and finer ones on the head. The first dorsal triangular, the second spine longest. Colour reddish brown, dark marked. Grows to a foot or more.

Burma, in mud of estuaries.

These fish are esteemed poisonous in Pinang, and are not even used, says Cantor, in consequence, for manure; but they are eaten by the poor in Bombay, according to Day. In one fish of this family, *Thalassophryne reticulatus*, from Panama, Dr. Günther discovered a poison organ structurally as perfect as in serpents, each operculum terminating in a long perforated spine, the canal traversing which communicated with a sac at its base full of a poisonous secretion; a specialized

adaptation of a part of the muciferous system. Capt. Dow (P. Z. S. 1865, p. 167) declared that the natives were aware of the emission of a poison from these organs, which gave rise to fever, but without fatal effects. A slight pressure at the base of the spine would cause the fluid to be projected a foot or more from its orifice.

Family *Pediculati*.

Branchiostegals 5 to 6. Pseudobranchiæ absent. Gill opening reduced to a small foramen in or near the axilla. Teeth minute.

These fishes inhabit the Indian littoral, but are economically unimportant.

ANTENNARIUS, *Cuvier*.

Three dorsal spines, the first modified into a tentacle. Teeth on palate. Gill opening lateral. Air-vessel present.

A. HISPIDUS, Bl. Schn.

B. vi.; D. 3:12; P. 10; V. 5; A. 7; C. 9.

First dorsal ray erectile, as long as the second, and ending in a fleshy exerescence, which Sir Emerson Tennent compares to a worm or piece of meat. Second and third rays with skinny posterior flaps. Colour yellow, with brown spots and streaks.

A. NUMMIFER, Cuv.

B. vi.; D. 3:12; P. 10:13; V. 5; A. 7; C. 9.

First dorsal spine not so long as the second. Colour greyish-brown tinged with purple. A black ocellus, with a yellow edge behind the base of the pectoral, and another behind the seventh and eighth dorsal rays. Fins black-spotted.

A. MARMORATUS, Bl. Schn.

B. vi.; D. 3:12; P. 9:10; V. 5; A. 7; C. 9.

The first dorsal short, ending in a small knob, with a minute tentacle. Colour reddish-yellow marbled with brown, and brown spots radiating from the eyes. Sides and belly white-spotted. A very variable species.

HALIEUTEA, *Cuvier et Valenciennes*.

No teeth on palate. Gill opening on the upper surface of body. No air-vessel.

II. STELLATA, Wahl.

B. vi.; D. 4; P. 13; V. $\frac{1}{2}$; A. 4; C. 9.

A retractile tentacle above the mouth, with a trefoil extremity. Body spinous. Colour pinkish. Grows to 8 inches.

Family *Cottidæ*.

Branchiostegals (5) 7. Pseudobranchiæ. Infraorbital bones articulate with the preopercle. Teeth villiform. No canines. Two dorsals. Ventrals thoracic.

PLATYCEPHALUS, *Bl. Schn.*

Lower jaw the longer. Villiform teeth in jaws, vomer, and palatines, with sometimes larger ones intermixed. Two dorsal fins, with an isolated spine anteriorly. Air-vessel absent.

P. INSIDIATOR, Forsk.

Ngā-bhoo-reng-gyee. Arakan. (A-ra-wad-dah or Chou-nr-dah. Andamans.)

B. vii.; D. 1:7:13; P. 17; V. $\frac{1}{2}$; A. 13; C. 15.

Lateral line smooth. A spine at the antero-superior angle of the orbit. Nostrils patent, but not tubular. Three stellate "raised grooves" on the preorbital. Two strong spines at the preopercular angle, and two on the opercle. Sometimes a fine spine between the dorsals. Colour brownish above, dirty white below. Fins spotted.

Caudal yellow, with a deep black band, obliquely white-bordered above, and white-bordered below.

The Andamans and Arakan coast.

P. serratus, Cuv. et Val.

B. vii.; D. 1:8; 11:12; P. 19; V. 3; A. 11; C. 13.

Crests on the head bones serrated, but spineless. A finely denticulated ridge from the eye to the preopercle, and a less distinct smooth one above it. Scales with rough borders. Reddish brown above, belly white. Six or eight irregular brown bands along the sides. Fins grey, with black points. A black blotch on the top of the dorsal. Ventrals bluish above, white below. Grows to 7 inches.

The Andamans.

Family Cataphractidæ.

Head and body more or less angular, covered with plates, or keeled scales.

PEGASUS, *Linnaeus*.

Branchiostegals 1. Pseudobranchiæ absent. Gill opening narrow, in front of pectoral. Body broad and depressed, covered with anchylosed plates. No teeth. A short dorsal and anal. Pectorals horizontal and long, anterior rays shortest. Air-vessel absent.

P. DRACONIS, L.

B. i.; D. 5; P. 11; V. 2; A. 5; C. 8.

Belly flat. Body with two median and two lateral ridges. Three cross ridges. Tail composed of eight rings. Lateral edges of snout denticulated. Body with brown reticulations. Snout and last caudal ring black.

The Andamans.

Family Gobiidæ.

A. Gobiina.

Ventrals forming a disk, united along their whole extent, or their basal halves only. Two dorsals.

GOBIUS, *Artedi*.

Branchiostegals 5. Pseudobranchiæ. Ventrals adherent to the abdomen only at their bases. Simple teeth in one or more rows above, and two or more below.

A. Lateral recurved canines in the mandible.

G. BYNOENSIS, Richardson.

B. v.; D. $6\frac{1}{10}$; P. 19; V. $\frac{1}{5}$; A. $\frac{1}{15}\frac{1}{10}$.

Teeth, 2 or 3 rows in either jaw, 10 outer enlarged ones above, and the outer row below enlarged and subhorizontal. Dorsal spines weak, with filiform ends. Dorsals equal in height and but little apart. Colour greenish, with 8 or 10 darkish cross-bars. A band from the snout through the eye to the end of the soft dorsal, black anteriorly, then yellow, and a second from the mouth across the opercles to the tail, black anteriorly, then golden. A superior dark spot at base of the caudal. Anal dark margined.

The Andamans.

G. PUNTANG, Bleeker.

B. v.; D. $6\frac{1}{10}$; P. 17; V. $\frac{1}{5}$; A. 10; C. 11.

Teeth in several villiform rows in both jaws, the outer rather enlarged. A pair of small canines below. Dorsal spines flexible, with filamentous tips, the first three the longest. Colour olive, spotted with rusty. Fin rays yellow, barred and dotted

with purplish red. Anal with a yellow margin, and sometimes with purplish red streaks.

The Andamans in brackish water.

B. *No lateral recurved canines in the mandible.*

G. TENTACULARIS, Cuv. et Val.

B. v.; D. 6 $\frac{1}{12}$; P. 20; V. $\frac{1}{3}$; A. $\frac{1}{12}$; C. 15.

The lower jaw the longer. Teeth in one row in the premaxillaries, and in two or three in the mandible. Dorsal spines flexible, extending far beyond the web. A simple tentacle above the posterior third of the eye. Colour shell green, with some reddish spots. First dorsal with 4 to 6 bands of horizontal spots, and 6 to 8 along the second dorsal. Caudal grey. Anal grey, with a basal white band.

The Andamans.

G. ACUTIPINNIS, Cuv. et Val.

Mang-moo-goo-da-lah-dah. Andamans.

B. v.; D. 6 $\frac{1}{10}$ $\frac{1}{11}$; P. 19; V. $\frac{1}{3}$; A. $\frac{1}{11}$; C. 19.

A narrow row of warts across the cheeks. A large opening of mucous canals, below and behind the orbit. Villiform teeth in several rows in both jaws. Colour greyish brown above, dull white below. Several dull blotches bar the sides. A dark mark at base of caudal. A brown band from eye to gape. Four lines of spots down both dorsals. Fins grey, pale-edged. Pectorals, ventrals, and anal stained slaty.

The Andamans and seas of India.

G. PERSONATUS, Bleeker.

B. v.; D. 6 $\frac{1}{10}$; P. 16; V. $\frac{1}{3}$; A. $\frac{1}{10}$; C. 12.

No warts or tentacles on the head. Teeth in several fixed rows above, the outer teeth longer. In the mandible many villiform rows, the outer fine and slightly elongated. Dorsal spines weak, with filamentous ends, and equalling the last and longest dorsal rays. Caudal cut square. Colour light brown, darker above. A black opercular spot. Back and head vermiculated with black lines and spots. Dorsal with three or four rows of spots which form bars, and sometimes an exterior dark mark behind the fifth spine. Anal white-edged. Caudal barred or spotted.

The Andamans, in brackish water.

G. ORNATUS.

B. v.; D. 6 $\frac{1}{10}$; P. 21; V. $\frac{1}{3}$; A. $\frac{1}{10}$; C. 13.

Teeth in villiform rows. First dorsal lower than the second. Caudal rounded. Colour green, with numerous oblong brown spots. Some of the scales yellow-dotted. All the fins except the ventral black-dotted.

The Andamans.

G. ALBO-PUNCTATUS, Cuv. et Val.

B. v.; D. 6 $\frac{1}{3}$; P. 21; V. $\frac{1}{3}$; A. $\frac{1}{3}$; C. 13.

Teeth villiform in both jaws, the outer slightly enlarged. No glands, warts, or barbels on the head. First dorsal lower, or equal to the second. Caudal rounded. An anal papilla. Colour brownish, irregularly marbled. Sides of head and body studded with white spots. Dorsal and caudal greyish, black-dotted, forming 3 rows on the former. Other fins unspotted. Sometimes the fins are dark, with a row of white dots.

The Andamans.

G. GIURIS.

Ngā-tha-bōk. (Poo-dah, Andamans.)

B. iv.; D. 6 $\frac{1}{10}$; P. 20; V. $\frac{1}{3}$; A. $\frac{1}{10}$; C. 17.

Interorbital space slightly concave, with an open gland. Teeth in villiform rows in the upper jaw, the outer enlarged anteriorly, laterally the inner of two

rows sometimes the larger. In the mandible an anterior row of enlarged teeth; laterally two rows. Colour fawn colour, with cloudy markings on the head, and irregular bands and blotches on the back and side. Vertical fins spotted. Grows to $1\frac{1}{2}$ feet in fresh water, but less in the sea.

This species is very variable, and is largely used for stocking ponds, being highly esteemed for food, though rather earthy in flavour, according to European taste.

The Andamans. Eastern seas, and fresh waters of India and Burma.

G. SEMIDOLIATUS, Cuv. et Val.

B. v.; D. $6\frac{1}{2}$; P. 17; V. $\frac{1}{2}$; A. 8; C. 13.

Neither scales, warts nor barbels on the head. Teeth in villiform rows, the outer enlarged. In the mandible the last of the outer row is slightly recurved, and in large specimens is probably developed into a posteriorly placed canine-like tooth. Dorsal spines flexible, with filamentous ends. Caudal wedge-shaped. Colour chestnut, with three rather wide interorbital bands. Between the eye and the dorsal are three more bands, and below the dorsal four or five others. Three bands descend from the eye, another over the opercle, and another in front of the pectoral fin. Dorsals brown-spotted.

The Andamans.

G. SABANUNDIO, Ham. Buch.

B. v.; D. $6\frac{1}{2}$; P. 19; V. $\frac{1}{2}$; A. $\frac{1}{2}$; C. 15.

Teeth villiform in both jaws, outer ones in premaxillaries, enlarged. Caudal rounded. The second and third dorsal spines elongated, filamentous. Colour olive, with very large deep black, white-edged blotches over the body. First dorsal black with a white ring on its last three rays. Second dorsal with two basal rows of black spots and a median row of white ones. Ventral black, with orange edges. Anal dark olive, black-margined. Caudal with fine black dots.

The coast of Burma.

G. MELANOSOMA, Bleeker.

B. v.; D. $6\frac{1}{2}$; P. 21; V. $\frac{1}{2}$; A. 10; C. 15.

Anterior portion of head and jaws covered with warts and fine hairy barbels. Caudal rounded. Colour brownish, sometimes paler on the head. Dorsal, anal, and caudal very dark, ventrals nearly black, with a reddish edge. Caudal reddish.

The Andamans.

G. NUNUS, Ham. Buch.

B. v.; D. $5\frac{1}{2}$; P. 17; V. $\frac{1}{2}$; A. 9; C. 15.

External teeth in mandible, rather enlarged, the outer tooth rather recurved. First dorsal spines with filamentous ends. Caudal wedge-shaped. Colour reddish-brown, with seven black belts, the first through the eye, the next over the opercles, the last at the base of the caudal. These bands involve the vertical fins.

Maulmain in fresh water.

Gobiodon, Bleeker.

Scales none. Teeth conical and fixed. Two dorsals, basally united. Ventrals united.

G. QUINQUE-STRIATUS, Cuv. et Val.

D. $6\frac{1}{10}$ $\frac{1}{11}$; P. 19; V. $\frac{1}{2}$; A. $\frac{1}{8}$ $\frac{1}{9}$; C. 15.

Body elevated and strongly compressed. Two large canines above the mandibular symphysis. First dorsal half as high as second. Caudal rounded. Head with five vertical orange stripes, and two orange bands rather broken up along the body. Grows to $2\frac{1}{4}$ inches.

The Andamans and Nicobars.

G. ERYTHROSPILUS, Bleeker.

D. $6\frac{1}{10}$ $\frac{1}{11}$; P. 19; V. $\frac{1}{2}$; A. $\frac{1}{2}$; C. 15.

Symphysial lower canines. Dorsal fins usually equal in height. Colour brown, with small black spots. Fins blackish. Caudal wholly white or a white base only.

The Andamans and Nicobars.

G. CITRINUS, Rüpp.

D. 6 $\frac{1}{5}$; P. 20; V. $\frac{1}{2}$; A. $\frac{1}{8}$ $\frac{1}{5}$; C. 13.

Teeth in a single row above. A posterior enlarged row in the mandible, the external of which is a recurved canine-like one. Dorsals of equal height. Colour yellow. A blue-edged horizontal streak goes along the bases of the dorsal and anal fins. There are four similar vertical bands, two descending from the eye, one from the head to the opercles, and a fourth in front of the pectoral fins. A black spot on the opercle.

The Andamans and Nicobars.

SICYDIUM, *Cuvier et Valenciennes*.

Branchiostegals 4. Pseudobranchiæ, a slit behind the fourth gill. Upper jaw rather prominent, containing a single row of small teeth, implanted in the gums. Two dorsal fins. Ventrals united, forming a disk, more or less adherent to the belly. Air-vessel absent.

S. FASCIATUM.

B. iv.; D. 6 $\frac{1}{5}$; P. 17; V. 6; A. 11; C. 13.

Snout overhangs. No barbels. The inner teeth in the mandible large, recurved, distant, with two symphysial canines and a minute row of sharp teeth on the lower lip. Colour reddish-brown, with six dark vertical bands on the body, and some dark spots. Below dirty yellowish brown. Fins blackish, pale-edged. Grows to 2 $\frac{1}{4}$ inches.

Burma.

APOCRYPTIS, *Cuvier et Valenciennes*.

Branchiostegals 4. Pseudobranchiæ rudimentary. Teeth conical in a single fixed row in either jaw, and usually a pair of lower symphysial canines behind the fixed row. Ventrals united, forming a disk. Two dorsals.

A. BATOIDES, Day.

B. iv.; D. 6: 23; P. 21; V. $\frac{1}{2}$; A. 23; C. 13.

Eight or ten pointed *brown* teeth on either side of both jaws. Two moderate posterior canines in the mandible. Dorsals of equal height. Caudal lanceolate. Colour greyish above, whitish below. Fins without marks.

Maulmain.

This species differs from *A. bato* (which has notched teeth) by its sharp ones.

APOCRYPTICHTHYS, Day.

Branchiostegals 5. Symphysial canines in the upper jaw only.

A. CANTORIS, Day.

B. v.; D. 6·27; P. 19; V. $\frac{1}{2}$; A. 26; C. 17.

An angular pendulous flap of skin from the preorbital falls down below the teeth on the side of the upper jaw. No barbels. Thirteen elongated and curved teeth on either side of both jaws. The two upper central ones curving down beyond the lips. Head scaleless. Colour greyish olive; first dorsal dark and longitudinally banded. Caudal dark, superiorly spotted.

The Andamans.

PERIOPHTHALMUS, *Bl. Schn.*

Branchiostegals 5. Pseudobranchiæ rudimentary. Body elongated, subcylindrical in front. Profile above the eyes very steep. Eyes close together, prominent, with well-developed lids. Two dorsal fins. Ventrals partly united. Caudal obliquely truncated below. Air-vessel absent.

The *Periophthalmi* are capital climbers and walkers on the mud by means

of their muscular pectorals, and they are as much at home on the mud as in water, from which they make their escape as fast as they can, if washed in by the swell of a passing wave when basking on the banks. Day remarks of them, that they plant their pectoral fins "firmly as an organ of support, the same as one places one's elbows on a table, then they raise their heads and take a deliberate survey of surrounding objects."

P. KOELREUTERI, Pall.

Chood-mud-dah. Andamans.

B. v.; D. 10-15:12-13; P. 15; V. $\frac{1}{2}$; A. 11-14; C. 11.

Skin of the snout forms fleshy flaps. Teeth, about 24 conical pointed ones in each jaw. Body olive brown, with white or blue dots. Head sometimes blue-spotted. First dorsal bluish, with a dark edge and white top, sometimes basally white-spotted. Second dorsal with a white-edged black band down it, and white spots at its base.

The Andamans and Burmese coasts and tidal rivers.

P. SCHLOSSERI, Pall.

B. v.; D. 0-15:1-5; P. 9; V. $\frac{1}{2}$; A. $\frac{1}{12}$; C. 12.

Colour brownish, banded with emerald green spots. In some lights uniform bright green (*file* Day). First dorsal black, bluish above, edged with white, a scarlet band along its centre, with a white dot between each ray. Second dorsal similar, but lighter and spotted. Anal white-edged. The male has a black band cobalt above, and a scarlet edging along the first dorsal.

Coasts and tidal rivers of Burma.

BOLEOPHTHALMUS, *Cuvier et Valenciennes*.

Branchiostegals 5. Pseudobranchiae, a slit behind the fourth gill. Eyes very prominent, close together, with well-developed outer eyelids. Teeth in a single row in both jaws, and a pair of symphysial hinder canines in the lower. Two dorsals. Ventrals more or less united. Caudal obliquely truncated below.

B. GLAUCUS, Day.

B. v.; D. 5:27; P. 19; V. $\frac{1}{2}$; A. 25; C. 13.

A few tentacles along the mandibular rami, none below the symphysis. 13 canine-like teeth in front of the upper jaw, and laterally 13 more as large as those in the mandible. In the mandible 25 subhorizontal and pointed teeth all equal, and a pair of symphysial canines in the rear. Ventrals united along their whole extent. Scales minute, but visible posteriorly. Colour greenish, tinged with violet along the belly. Cloudy bands on head, and a few distant black spots on the cheeks and back. Second dorsal dark-lined. Anal yellowish. Caudal light below and dotted above, or covered with small ocelli.

The Andamans.

B. VIRIDIS, Ham. Buch.

B. v.; D. 5:26; P. 21; V. $\frac{1}{2}$; A. 26; C. 15.

A few tentacles along the mandibular rami, and a larger one beneath the symphysis. Colour greenish above, white below; distant black spots on head, body, and dorsals. Caudal angularly banded above, white below.

Akyab.

B. BODDAERTI, Pall.

B. v.; D. 5:24-25; P. 17; V. $\frac{1}{2}$; A. 24; C. 13.

The 6 central teeth in the premaxillaries canine like, laterally 30 smaller. In the mandible 30 horizontal truncated teeth in each ramus, with a pair of symphysial canines behind. Colours greenish-blue, with 7 or 8 vertical black bands. Body covered with opaque blue spots. Dorsal blue-spotted. Pectoral orange, black-edged, or dark with orange margin. Anal and caudal dark. Ventrals purplish.

Burma.

B. PECTINIROSTRIS, Gmel.

B. v. ; D. 5: 23·24 ; P. 18 ; V. $\frac{1}{3}$; A. 23·24 ; C. 14.

6 enlarged central teeth and 40 small ones on either side in the upper jaw. In the mandible 35 to 40 truncated and notched ones in either ramus, and a pair of symphyseal canines. Caudal pointed. The body covered with tubercles and verdigris spots. Dorsal blue-spotted.

Tenasserim.

B. Eleotrina.

Ventrals not united together.

BOSTRICHINIUS, Dumeril.

Branchiostegals 4 to 6. Pseudobranchiæ. Teeth in jaws and vomer, but no canines. Two dorsal fins. Ventrals proximate, but not joined.

B. SINENSIS, Lacép.

Lee-mee-jo-do-dah. Andamans.

B. v. ; D. 6 $\frac{1}{10}$ $\frac{1}{12}$; P. 15 ; V. $\frac{1}{3}$; A. $\frac{1}{3}$; C. 13.

Branchiostegals 5. Colour dark brown, marbled. A black, white-edged ocellus at the root of the tail. Three bands of spots along the dorsal, and caudal vertically banded by spots.

The Andamans.

ELECTRIS, *Gronovius*.

Branchiostegals 4 to 6. Pseudobranchiæ. Teeth small, none on the vomer or palatines. Two dorsals. Air-vessel large. Anal papilla distinct.

E. FELICEPS, Blyth.

B. v. ; D. 6 $\frac{1}{10}$; P. 15 ; V. $\frac{1}{3}$; A. 11 ; C. 13.

Eyes close together. Teeth villiform. Dorsal spines filiform. Central caudal rays longest. Colour brownish-white, spotted and blotched with darker. Bands from the orbit. Type 1 $\frac{1}{2}$ inches.

The Andamans.

E. MACRODON, Bleeker.

B. v. ; D. 6 $\frac{1}{10}$; P. 17 ; V. $\frac{1}{3}$; A. $\frac{1}{3}$; C. 13.

Head flat. Lower jaw longer. Anterior nostril tubular. A small barbel on either side of the upper jaw. Several rows of villiform teeth in either jaw, 8 or 10 enlarged ones on the premaxillaries, two of which are canine-like. In the mandible 4 to 6 canine-like teeth in front. Posterior half of caudal scaled. Colour brownish, second dorsal brown-spotted. A dark pale-edged ocellus at the base of caudal. Grows to 4 $\frac{1}{2}$ inches.

Estuaries and tidal rivers in Burma.

E. POROCEPHALUS, Cuv. et Val.

A-rig-dah and Mn-took-dah. Andamans.

B. v. ; D. 6 $\frac{1}{10}$ $\frac{1}{10}$; P. 15 ; V. $\frac{1}{3}$; A. $\frac{1}{3}$; C. 15.

Head obtuse, depressed. Lower jaw the longer, the anterior nostril tubular. The outer row of teeth on the mandible slightly the largest. Caudal rounded. Colour deep blackish brown, dark marbled. Second dorsal with three or four rows of spots. Anal dark-banded, sometimes the body light-spotted.

The Andamans.

E. SCINTILLANS, Blyth.

B. v. ; D. 6 $\frac{1}{8}$; P. 15 ; V. $\frac{1}{3}$; A. $\frac{1}{3}$; C. 13.

Lower jaw the longer. Anterior nostril in a short tube. No spine on the proopercle. Teeth villiform, the outer mandibular ones a little larger. Brownish marbled with darker, and the scales shot with light spots. Both dorsals with three

rows of spots. Caudal dark, with a white edge. A dark ocellus at the base of the caudal fin.

The Andamans. Closely allied to the last, of which it may be the young.

E. OPTIOCEPHALUS, Cuv. et Val.

A-rig-dah and Mu-took-dah. Andamans.

B. v.; D. $6\frac{1}{v}$; P. 17; V. $\frac{1}{3}$; A. $\frac{1}{7}$; C. 15.

The anterior nostril tubular. Teeth in numerous villiform rows, the outer rather enlarged and pointed. The last dorsal rays prolonged to the base of the caudal. Caudal rounded. Colour olive brown, irregularly blotched on the sides. Three black bands radiate from the eye. Sometimes a pectoral ocellus. Vertical fins pale-margined. A dark band along the second dorsal, anal, and ventral fins. Seasonably the soft dorsal and anal fins are yellow-spotted. Grows to $9\frac{1}{2}$ inches or more.

The Andamans.

E. CAVIFRONS, Blyth.

B. v.; D. $6\frac{1}{3}$; P. 13; V. $\frac{1}{3}$; A. $\frac{1}{3}$; C. 15.

Head depressed, a deep depression exists over the orbits. Lower jaw the longer. A well-marked downward spine at the angle of the preopercle. Anterior nostril somewhat tubular. Teeth villiform, the outer row of the premaxillaries rather enlarged, and the inner row on the mandible, and directed slightly inwards, and with 4 or 5 large canine-like teeth in front. Caudal obtusely rounded. Colour light brown; dark bands radiate from the orbits. A few dark spots on the body. Dorsal and caudal barred in spots. Grows to 4 inches.

The Andamans.

E. FUSCA, Bl. Schn.

E. Soaresi, Playfair.

B. vi.; D. $6\frac{1}{3}$; P. 18; V. $\frac{1}{3}$; A. $\frac{1}{3}$; C. 12.

Head depressed; lower jaw rather the longer. A short downward spine on the preopercle. Teeth in many villiform rows, the outer row wide apart and twice the size of the rest. In the mandible usually some enlarged ones. Caudal wedge-shaped. Colour leaden black, lighter on the belly, which is sometimes yellow-tinged. Dorsal horizontally barred, and caudal sometimes vertically. Markings and colour variable, sometimes stone colour above. Grows to 8 inches.

The coast of India (Burma).

E. LUTEA, Day.

B. vi.; D. $6\frac{1}{3}$; P. 15; V. $\frac{1}{3}$; A. $\frac{1}{3}$; C. 15.

Top of head and interorbital space flattened. Head scaleless. Lower jaw the longer. Anterior nostrils tubular. A downward spine on the preopercle. First dorsal spines with filamentous ends. Second dorsal highest anteriorly. Colour dirty grey, vertically banded. Head dark-spotted. Dorsals and anal black-spotted in bands. Caudal black, reticulated.

The Andamans.

E. LITORALIS, Day.

B. vi.; D. $6\frac{1}{3}$; P. 15; V. $\frac{1}{3}$; A. $\frac{1}{7}$; C. 13.

Top of head flat. Lower jaw the longest. Anterior nostrils tubular. Teeth in close villiform rows in both jaws, the inner slightly larger. First dorsal spines extend beyond the web. Caudal wedge-shaped. Colour brownish, dark-marked. Fins dark, minutely punctate. Three or four bars of spots on the dorsals. Caudal blackish. Anal with a central black band and white edge. Type 3 inches.

The Andamans.

E. CAPERATA, Cantor.

Oo-suf-foo. Arakan.

B. v.; D. $6\frac{1}{3}$; P. 21; V. $\frac{1}{3}$; A. $\frac{1}{3}$; C. 15.

A slight transverse depression behind the snout. Supraorbital margin serrated, and a serrated ridge along either side of the hind limb of the premaxillary. Teeth in villiform rows, the outer enlarged. Caudal rounded. Colour leaden brown, fins blackish. A deep black blotch edged with scarlet at the base of the pectoral. The second dorsal, caudal, and anal spotted.

The Andamans.

C. Amblyopina.

Vertical fins united, a single dorsal occupying the back.

Gobioides, *Lacépède.*

Branchiostegals 5. Gills 4. Pseudobranchiæ absent. Body elongate. Lower jaw prominent, so that the cleft of the mouth is directed upwards. Anterior teeth very strong. Eyes minute. Scales none, or rudimentary.

G. œcclus, Bl. Schn.

B. v.; D. 6:40:41; P. 15; V. $\frac{1}{2}$; A. 38:45; C. 13.

A few mandibular barbels. An outer row of curved teeth, 16 to 18 above, 10 to 13 below, with villiform ones inside. Caudal short and pointed. Scales none. Colour variable. Leaden above, lighter below. Vertical fins grey. Central caudal rays black, pectorals and ventrals reddish. Sometimes the fish is a general reddish-brown colour.

The Andamans.

This fish is very vicious (like its congeners), and if its tail is touched, will spring round and snap and grip like a bull-dog, with the utmost tenacity.

G. BUCHANANI, Day.

B. v.; D. 6:42; P. 19; V. $\frac{1}{2}$; A. 36; C. 17.

The posterior nostril opens just before the eye, and the anterior tubular one close to the front edge of the snout. A minute pair of symphyseal barbels on the mandible, and a still smaller pair behind them. Vertical fins continuous. Scales none, save a few rudimentary ones in crypts anteriorly. Colour brownish-olive above, reddish below. Pectoral and ventral fins yellow, with outer halves black. Vertical fins blackish.

Coast of Burma (Maulmain).

TRYPACHEN, *Cuvier et Valenciennes.*

Branchiostegals 4. Pseudobranchiæ. A blind cavity above the opercle, not communicating with the branchiæ. Body compressed and elongate. Eyes minute. Teeth in a band, no canines. Scales small.

T. VAGINA, Bl. Schn.

B. iv.; D. 6:40:49; P. 15; V. $\frac{1}{2}$; A. 40:46; C. 13.

Lower jaw the longer. Teeth distant, curved, longish, in both jaws, with one inner band above, and two below of fine ones. Caudal pointed, or rounded. Colour roseate white, seasonably brighter. Dorsal and anal grey-edged. Caudal, pectorals, and ventrals, white or yellowish. Grows to 9 inches, and is eaten by the poor.

Coasts of India and Burma.

Family Callionymidæ.

Branchiostegals 5 or 6. Pseudobranchiæ. The infraorbital ring of bones does not articulate with the preopercle. No palatine teeth. Two dorsal fins. Air-vessel none.

CALLIONYMUS, *Linnaeus.*

Gill opening narrow, sometimes merely a round hole at the upper edge of opercle. Body anteriorly depressed. Mouth narrow, upper jaw protractile. A strong spine at the angle of the preopercle. Teeth in jaws minute.

C. LONGICAUDATUS, Temm. et Schl.

B. 7.; D. 4:9; P. 20; V. 5; A. 9; C. 10.

Gill opening small, superior. Lateral line single. Numerous rows of warts on the head. Dorsal spines in the male filiform and extending beyond the web. Caudal lanceolate. Colour buff, with light rounded dots over the head and body, sometimes dark-edged. First dorsal and ventrals greyish; second with four rows of spots. Caudal banded with spots. Anal with a black, white-edged band externally. The Andamans.

Family Blennidæ.

Pseudobranchiæ. The infraorbital ring of bones does not articulate with the preopercle.

A. No molar teeth. Caudal distinct.

BLENNIUS, Artedi.

Gill opening wide. A single row of fixed teeth in the jaws. Scaleless.

PETROSCIRTES, Ruppell.

Gill opening small. A single row of fixed teeth in the jaws, with a large lateral canine. Scaleless.

P. VARIABILIS, Cantor.

B. vi.; D. 28:31; P. 13; V. 4; A. 17:21; C. 13.

A short simple tentacle at the postero-superior edge of the eye, and a very short one on either side of chin. Lower canines large, upper small. Caudal cut square and said to have its upper and lower rays sometimes produced. Colour pinkish with dark spots. A broad dark band from the eye to the tail, where it ends in a blotch. A second dark band is sometimes present. Two or three blue bands pass downwards from the eye. Head light-spotted. Dorsal and anal fins marbled and spotted in lines. Caudal yellow vertically banded in spots.

The Nicobars.

SALARIAS, Cuvier.

Gill opening wide. A single row of fixed teeth in the jaws. Scaleless. Dorsal single.

a. Dorsal fin not notched.

S. TRIDACTYLUS, Bloch. Sehn.

B. vi.; D. 12:13:19:22; P. 13; V. $\frac{1}{2}$; A. 25:26; C. 11.

Snout overhanging. Head crested; a small single tentacle over the postero-superior angle of the eye, but none on the neck or the nostril. Teeth in jaws small. Plumbeous, with vertical bands, fine black spots on the head and forepart of body and some light spots on the body as well. Dorsal fin obliquely black and white streaked, with a white outer edge. Caudal yellow, with the rays black.

The Andamans.

b. Dorsal fin distinctly notched.

S. QUADRICORNIS, Cuv. et Val.

B. vi.; D. 13:20:22; P. 14; V. 2; A. 22:24; C. 13.

Male crested. A simple tentacle above the eye, a fringed one at the nostril, and a small one on the nape. No canines. Anal lower than the dorsal and its web deeply cleft. Colour very variable. Brownish, with 8 or more vertical bands. Dorsal and anal fins with horizontal white bands.

The Andamans.

S. HASSEETHI, Blecker.

B. vi.; D. 12:23; P. 14; V. 3; A. 21:25; C. 14.

A line of open glands along the hind and lower edge of the preopercle. Male crested (?). A short fringed supraorbital tentacle, another at the nostril, none on the nape. No canines. Dorsal deeply notched. Colour, stone colour, with six darker vertical bands and several lighter longitudinal stripes. Dorsal brownish, oblique, striped at its base with 5 or 6 narrow bands, above blue-brown and yellow. Anal dark-edged.

The Andamans.

S. ANDAMANENSIS, Day.

B. vi.; D. 12:22; D. 15; V. 4; A. 22·24; C. 11.

Profile vertical. Head crested (male's?). A supraorbital tentacle. A pair of posterior mandibular canines. Caudal with central rays longest. Colour brownish with 10 brown bars along the centre of the body. A row of pearly oblong spots, with dark margins above the centre of the body posteriorly, and another below it. Dorsal dark-margined, and edged with white, and posteriorly spotted. Anal black-edged. Caudal barred. Pectoral and ventral fins white.

The Andamans.

S. DUSSUMERI, Chev. et Val.

B. vi.; D. 12:20·21; P. 14; V. 3; A. 22; C. 11.

Males crested. A supraorbital fringed tentacle, and a short one in front of the nostril; none on the nape. No canines. Dorsal rounded, central rays longest. Colour brownish, vertically banded. Three or four horizontal bands or rows of spots along the first dorsal, and numerous oblique ones on the second. Upper half of caudal banded in spots. Anal grey, black-edged.

The Andamans.

S. PERIOPHTHALMUS, Chev. et Val.

B. vi.; D. 12:20; P. 15; V. 2; A. 21; C. 15.

Profile vertical. A simple tentacle above the orbit, and a fringed one at the nostril. A crest sometimes present. Posterior canines in the mandible. Colour rose, with violet cross-bands. An oblique blue band under the eye, a small spot on the cheek, and a large one on the opercle. Along the sides two rows of blue spots margined above and below with black. Caudal yellow, red-spotted.

The Andamans.

S. STRIOLATUS, Day.

B. vi.; D. 12:20·21; P. 14; V. 2; A. 20·21; C. 13.

Profile vertical. A simple supraorbital tentacle, and another nasal one; none on the nape. Small posterior canines in the mandible. Caudal rounded. Greyish, indistinctly cross-banded. A blue spot below the eye. Five or six horizontal black lines between the pectoral and tail, ending in spots. Dorsal fins with two rows of spots, more distinct behind. Anal with a basal row of blue spots, and grey-edged. Caudal sinuously banded.

The Andamans.

S. BILTONENSIS, Bleeker.

B. vi.; D. 12:20; P. 13; V. 2; A. 20·21; C. 15.

Profile prominent. A large rounded crest on the head. A simple tentacle over the orbit, and a fringed one at the nostril; none on the nape. A pair of small canines on the mandible. Greenish stone colour, with some bluish spots about the eyes, and 8 pairs of vertical streaks on the body, and sometimes 8 or 10 longitudinal ones. Dorsal marked with brown, and oblique brown marks on lower half of second dorsal. Anal dark-edged. Caudal dark, with 6 or 7 vertical bands.

The Andamans.

S. ALBOGUTTATUS, Day.

B. vi.; D. 12:18; P. 15; V. $\frac{1}{2}$; A. 19·20; C. 13.

A low crest on the head. A fringed tentacle over the orbit, and a similar one at the nostril, but none at the nape. A small posterior canine in the mandible. Light brown, with 8 pairs of vertical bands, as broad as the interspaces. An oval blue spot behind the eye. Many small dark-edged round ones on the head. Two large brown ones at the base of the brown pectoral fin. Two or three rows of white spots on the lower and posterior half of the body. First dorsal brown, second white, both obliquely banded. Caudal banded with spots, and with a dark spot at its base.

The Andamans.

S. VERMICULATUS, Cuv. et Val.

V. vi.; D. 12·13:15; P. 14; V. 2; A. 18·19; C. 11.

No crest. A longish fringed tentacle over the orbit, and a smaller one over the anterior nostril, also a fine occipital one. Upper lip fringed. Large canines in the mandible. Caudal cut square. Brownish superiorly, bluish-white below, with 9 brown bars descending from the lateral line. The head, body, and fins irregularly reticulated.

The Andamans.

ANDAMIA, *Blyth*.

Gill opening wide. A single row of movable teeth. A symphysial sucker beneath the mandible. No canines.

A. LXPANSA, *Blyth*.

Salarias heteropterus, Bleeker.

B. vi.; D. 16:18; P. 14·15; V. 3; A. 25·26; C. 14.

Lips thick, continuous, and expanded below into a sucker. Colour olive, dark-banded. Head spotted.

The Andamans and Nicobars.

The sucker in this '*blenny*' recalls the sucker of the 'cyprinoid' *Homaloptera*.

Family Rhynchobdellidæ.

Branchiostegals 6. Pseudobranchiæ absent. Gills 4. Gill opening a slit on the side of the head. Body eel-shaped. Lower jaw long. A long dorsal fin, anteriorly consisting of free spines. Ventrals none. Air-vessel present.

RHYNCHOBDELLA, *Bloch-Schneider*.

A long fleshy snout, concave and transversely striated below. Teeth minute on jaws and vomer. Scales small.

R. ACULEATA, Bloch.

Ngā-myuwe-do.

B. vi.; D. 16·20:44·54; P. 23; A. 2·3:44·52; C. 15.

Brownish or greenish mottled superiorly, and yellowish below. A light band just above the lateral line. A series of 3 to 9 large black ocelli, white or buff-edged, along the base of the dorsal. Caudal with 6 to 8 vertical brown bars. Other fins greyish, pectoral sometimes yellow. Sometimes the ocelli are wanting, or the body (in Burmese specimens) white spotted, and the fins reddish.

These "spined eels" are excellent eating, and are widely distributed. In addition to respiration through their gills, they require to respire air directly, and die drowned if kept under water and access to air denied.

MASTACEMBALUS, *Cuvier et Valenciennes*.

A long fleshy appendage to the snout, which is not transversely striated below. Teeth minute. Scales small.

a. *Vertical fins distinct from the Caudal.*

M. UNICOLOR, Cuv. et Val.

B. vi.; D. 33·34:81·94; P. 27; A. 3:75·98; C. 25.

Of a uniform brown colour, or covered with large yellow blotches.
Burma (Rangoon).

M. ZIBRINUS, Blyth.

Ngā-myuwe-do-wet-toung. Ngā-yeng-bho (Tavoy).

B. vi.; D. 28-29:50-52; P. 19; A. 3:51-56; C. 19.

Yellow, with vertical blue stripes. Fins striped or spotted.
Burma and the Upper Irrawaddy Valley.

b. *Fertical fins confluent with the Caudal.*

M. ARMATUS, Lacép.

Ngā-myuwe-do.

B. vi.; D. 32-39:74-90; P. 23; A. 3:75-88.

Greenish, marbled and spotted, with or without undulating lines, or rich brown, lighter below; in some a dark undulating band through the eye along the side superiorly, and above it sometimes a row of black spots. Fins usually spotted. Grows to 2 feet, and is excellent eating.

Burma, in fresh and brackish waters.

The colours of the *Mastacembali* vary considerably with age and locality. They are all excellent eating.

Family **Mugilidæ.**

Branchiostegals 4 to 6. Pseudobranchiæ. Gills 4. Gill openings wide. Body compressed posteriorly and often depressed anteriorly. Teeth very fine, sometimes absent. Two dorsal fins.

MUGIL, *Arcti.*

A. *Adipose eyelids well developed.*

None of this section are quoted by Day from any Burma locality, though no doubt many species occur on the coast, as he enumerates 12 from the "seas of India."

B. *No adipose eyelids.*

M. CORSULA, Ham. Buch.

Ngā-zyn.

B. vi.; D. 4 $\frac{1}{8}$; P. 15; V. $\frac{1}{8}$; A. $\frac{3}{8}$; C. 15.

Dorsal profile nearly horizontal. Eyes elevated. Snout overhanging. A single row of fine teeth in either jaw. Dull brown above, lighter below. Dorsal and caudal fins tinged grey. Eyes golden. Peritoneum black. These fish swim with their goggle eyes just above the water. When alarmed, they slip their heads below the surface, and after some vigorous shoots reappear some distance in advance, swimming usually not far beneath the surface. They grow to 1½ feet or more, and are excellent eating, as are most of the species.

Rivers in Burma (and India) far above the tideway.

M. HAMILTONII, Day.

B. vi.; D. 4 $\frac{1}{8}$; P. 13; V. $\frac{1}{8}$; A. $\frac{3}{8}$; C. 15.

Interorbital region more convex than in *M. corsula*. Teeth none. Silvery shot with gold, and plumbeous along the back. Grows to 4½ inches.

Rivers of Burma.

M. CRENILABRIS, Forsk.

B. vi.; D. 4 $\frac{1}{8}$; P. 17; V. $\frac{1}{8}$; A. $\frac{3}{8}$; C. 16.

Upper lip very thick, forming the end of the snout, and with five rows of soft tubercles along its lower fourth, the lower of which are branched. Lower lip thick,

reflected, thickly studded with tubercles. Teeth none. Greenish brown along the back; dull white below. A black spot above the base of the pectoral fin.

The Andamans and Nicobars.

M. CERULEO-MACULATUS, Lacép.

B. vi.; D. $4\frac{1}{8}$; P. 17; V. $\frac{1}{2}$; A. $\frac{3}{8}$; C. 14.

Upper lip thick, placed obliquely, so as not to form part of the end of the snout. Teeth minute. Silvery, lighter below. A black spot above the base of the pectoral fin. Grows to $1\frac{1}{2}$ foot or more.

The Andamans.

The '*mugilis*,'¹ which Juvenal alludes to as sometimes subscribing the vengeance of an injured husband, probably applies to a fish of a very different family, and to one well provided with spines.

Family **Aulostomateidæ.**

The anterior bones of the skull produced, forming a long tube, and having a small mouth in front.

FISTULARIA, *Linnaeus*.

No scales. Caudal forked, with one or two of its central rays excessively elongated and filiform.

F. SERRATA, *Chu*.

B. vii.; D. 13-15; P. 13; V. $\frac{1}{2}$; A. 14-15; C. 10-1-10.

A serrated ridge from the eye to the nostril. The caudal filament nearly a third the length of the head and body.

The Andamans, where Day says it affects muddy localities.

Family **Ophiocephalidæ.**

Branchiostegals 5. Pseudobranchiæ absent. Gills 4. Body elongated. Head depressed, with somewhat plate-like scales. A cavity exists above and accessory to the true gill chamber. A single long, spineless, dorsal, and a similar but shorter anal. Teeth in jaws, vomer, and palatines. Air-vessel present.

The Ophiocephali or Snake-heads are remarkable for their longevity out of water, a privilege doubtless due to their amphibious mode of respiration, as, in addition to the gills which they possess in common with other fishes, they have a cavity for the reception of air, communicating with the bronchial chamber. Day remarks, "Judging from their habits in an aquarium, some of the *Ophiocephali* prefer dirty to clean water, perhaps for the purpose of concealment. When they have stirred up all the sediment and exuded a quantity of mucus, they appear to be delighted, their colours become much more vivid and they ascend to their favorite resort amongst the vegetation just beneath the surface of the water. As soon as clean water is given them, they become excited, as if they imagined the time had arrived when they should change their abode." They are all of them useful as food. Dr. Mason remarks, "Two or three species of *Ophiocephalus* are very common. They are fresh-water fish, appropriately named, for the head is very much like a snake's head, and they are remarkable for the power of making their way from one pool to another on land. One species, it is said, usually lives in hollow logs and holes, never in streams, and often a long time in the jungle without water. It appears to be either the same species, or a nearly related one to the *burachang* of Boutan, which the natives believe falls from heaven, from the circumstance of its being found after rain far from the water. Some of the Karens regard these with a superstitious awe, and abstain from eating them. They have a legend that they were formerly men, changed into fish

¹ "Necat hic ferro; secat ille eruentis
Verberibus; quosdam macchos et *mugilis* intrat."—SAT. VI. 316.

for their sins; and the Pwo Karens at Tavoy say: 'If people eat them, they will be transformed to lions.' The fame of this fish had reached Greece more than two thousand years ago, for it is mentioned as a remarkable Indian fish by Theophrastus."

OPHIOCEPHALUS, Bloch.

Characters of the Family.

O. MARULIUS, Ham. Buch.

Ngā-yan-daing.

B. v.; D. 45-55; P. 18; v. 6; A. 28-36; C. 14.

Teeth in numerous villiform bands, with a posterior row of 12 large conical teeth in the mandible. Colour variable with age and locality. Back greyish-green, the immature with a brilliant orange band from the eye to the middle of the caudal fin, but in the more mature 5 or 6 cloudy bands descend below the lateral line. Belly orange, the scales darkest at the base. On the posterior third of body and on the dorsal, anal and caudal fins are pearly white spots, and generally a black ocellus near the tail. Caudal grey. Ventrals orange. Grows to 4 feet, and defends its young with vigour.

Fresh waters in Burma and India.

O. STRIATUS, Bloch.

Ngā-yan-young-to.

B. v.; D. 37-45; P. 17; V. 6; A. 23-26; C. 13.

An inner row of conical teeth in the mandible, and cardiform ones on the palatines. Dark greyish or blackish above, whitish or yellowish white below. Checks and lower surface of the mouth streaked and spotted with grey. Band of grey over the belly. Ventral and anal fins greyish, with some white lines and spots on the latter. In the young usually a dark caudal ocellus. Grows to 3 feet.

Fresh waters in Burma and India, especially swamps and grassy tanks.

O. GACHUA, Ham. Buch.

Ngā-yan-pa-naw.

B. v.; D. 32-37; P. 15; V. 6; A. 21-23; C. 12.

An inner row of distant conical teeth in the mandible. Colours variable, usually greenish, paler below. Dorsal, caudal and anal slaty, with an orange margin. Pectoral with a black base, and a slight reddish or orange edge. In the young there is often a large ocellus on the last five dorsal rays. Occasionally the body is spotted with white, or even orange. Grows to 13 inches or more.

Burma. The Andamans.

O. PUNCTATUS, Bloch.

Ngā-yan-theng-ōng. (Ngā-ain, Arakan.)

B. v.; D. 29-32; P. 17; V. 6; A. 21-23; C. 12.

A posterior row of 4 or 5 conical teeth in the mandible. Colours variable. Greenish above, yellowish on sides and belly. A dark stripe along the side of the head, several dorsal cross-bands. Fins spotted. The caudal and vertical fins narrowly light-edged. Ventrals whitish. In some there are scattered black spots. Grows to a foot or so.

Burma and India, in rivers and stagnant waters.

Family Labyrinthici.

Branchiostegals 4 to 6. Pseudobranchiæ rudimentary or absent. Gills 4. Gill opening rather narrow, the membranes united to the isthmus. Above the third or upper portion of the first branchial arch, is a cavity containing an elaborate arrangement of bony laminae, covered by a vascular mucous membrane, adapted for aerial respiration.

A. *Teeth on the palate.*

ANABAS, *Curier*.

Branchiostegals 6. Pseudobranchiæ none. Suprabranchial organ well developed. Dorsal single.

A. SCANDENS, Dadd.

Ngā-bye-mā.

B. vi.; D. $\frac{3}{8}$ - $1\frac{1}{8}$; P. 15; V. $\frac{1}{3}$; A. $\frac{9}{10}$ - $1\frac{1}{11}$; C. 17.

Lower jaw slightly the longer. Preorbital strongly denticulated. The hinder edge of opercle, sub-, and inter-opercles strongly spinate. Teeth villiform, the outer row slightly enlarged. Colour rifle-green, lighter on the belly. During life, four wide vertical body-bands, and a dark stripe from the gape to the preopercle. An orange variety is sometimes seen. Grows to $8\frac{1}{2}$ inches.

Estuaries and fresh waters in Burma and India.

These fishes, though rarely growing to more than 8 inches, are highly esteemed as nourishing food, whilst owing to their vitality, due partly to their mixed system of respiration, they can be carried long distances in the living state. They are voracious fishes; and travel about by night from pond to pond, realizing a Yankee's notion of a smart boat, which only requires a good dew to move in. They sometimes, says Day, cause dangerous accidents by slipping into the throat of the fishermen; who, when they catch a fish, are wont to sever the spine with the teeth, to disable it. In this predicament Dr. Day recommends the fish being cut away as far as possible, so that it may bleed to death, and then the remainder being left till softened by putrefaction, when it can be either removed or thrust into the stomach. No force should be used for its extraction, as dangerous laceration of the œsophagus may result.

B. *Fixed teeth in the jaws. Palate edentulous.*

TRICHOGASTER, *Bloch. Schneider*.

Branchiostegals 5. Branchial arches with toothed tubercles. A single dorsal fin. Ventral consisting of a single elongated filiform ray. Teeth small in the jaws. Vomer and palatines edentulous.

T. FASCIATUS, Bl. Schn.

Ngā-pyn-kaik-kouk or Ngā-phyn-thale.

B. v.; D. $\frac{1}{9}$ - $1\frac{1}{3}$; P. 10; V. 1; A. $\frac{1}{4}$ - $1\frac{8}{9}$; C. 15.

Colour above greenish, below dirty white. A green spot on either gill cover. Eyes red. Fourteen or more oblique orange bands from back to belly. Ventral fin edged with red and variegated with black, green, and white. Dorsal and caudal fins orange-spotted. Grows to 5 inches. India and Burma (and Upper Burma).

T. LABIOSUS, Day.

B. v.; D. $\frac{1}{9}$; P. 10; V. 1; A. $\frac{1}{18}$ - $1\frac{8}{9}$; C. 15.

Colour above greenish, below lighter. Eight to ten obliquely vertical bars on the sides. A light yellowish-red band, dark-edged behind, crosses the lower jaw, from the eye to behind the lip. Fins dark. Anal edged with yellowish red.

Burma; from Rangoon to Mandalay on the Irrawaddy.

Family **Glyphidontidæ.**

Branchiostegals 5 to 7. Pseudobranchiæ. Gills $3\frac{1}{2}$. Teeth in jaws feeble, palate edentulous. A single dorsal. An air-vessel.

AMPHIPRION, *Bloch. Schneider*.

Branchiostegals 5. All the opercles and preorbital denticulated. Teeth in a single row, conical and small. Dorsal spines 9 to 11.

The *Amphiprions* are generally very vividly coloured, and are among the fish which, for some reason or other not known, resort for shelter to the 'Actiniæ' or

floating 'jelly' fish, beneath whose umbrella they habitually reside. This fact was first witnessed by myself in Mergui harbour, where, having transfixed a jelly fish floating past the boat with a small splinter of bamboo, I found to my surprise I had at the same time harpooned and landed a small fish. That these fish resort to the shelter of the disk of the *Acaleph* voluntarily is certain, emerging as they do from its shelter, and reseeking it, but the particular benefit they derive is not known. *A. porcula* is known to the Andamanese, says Day, by the name of '*Turtle's stomach fish*,' the Actiniae in which it shelters being so called.

A. EPHIPIUM, Bloch.

B. v.; D. $\frac{19}{17}$ — $\frac{11}{15}$; P. 19; V. $\frac{1}{3}$; A. $\frac{14}{14}$ — $\frac{2}{15}$; C. 15.

Dark yellow, a dark blotch on the side. Ventral brown-edged.
The Andamans.

A. FRENATUS, Brevoort.

B. v.; D. $\frac{10}{18}$ — $\frac{11}{17}$; P. 19; V. $\frac{1}{3}$; A. $\frac{13}{13}$ — $\frac{2}{13}$; C. 15.

Brownish orange, lighter below. A blackish blotch descends from the last five dorsal spines and first rays to the middle of the sides. A pearl-coloured or bluish band crosses the opercles from the nape. Ventrals externally blackish.

The Andamans, perhaps a variety of the last.

A. SEBÆ, Bleeker.

B. v.; D. $\frac{10}{14}$ — $\frac{11}{15}$; P. 20; V. $\frac{1}{3}$; A. $\frac{12}{12}$ — $\frac{2}{13}$; C. 15.

Brownish black, with two milk-white cross-bands, the first from the nape to the subopercle, over the orbit, and the second from the last 3 dorsal spines and first 4 rays to a little in front of the vent.

The Andamans.

A. PERCULA, Lacép.

Ea-ole-jo-do-dahi. Andamans.

B. v.; D. $\frac{10}{14}$ — $\frac{11}{15}$; P. 17; V. $\frac{1}{3}$; A. $\frac{11}{11}$ — $\frac{2}{12}$; C. 15.

Bright yellow, with 3 broad milk-white bands black-edged. The first is anteriorly concave (I follow the figure lxxx. f. 4, but Day's description says *convex*); the second from the middle of the dorsal to the vent; and the last over the free portion of the tail.

The Andamans.

A. BIFASCIATUS, Bloch.

B. v.; D. $\frac{11}{13}$ — $\frac{11}{15}$; P. 15; V. $\frac{1}{3}$; A. $\frac{12}{12}$ — $\frac{2}{13}$; C. 17.

Brownish black, with 2 milk-white cross-bands; the anterior passes from the nape, over the opercles, just touching the hind edge of orbit; the second, from the last 3 dorsal spines and first rays, to the centre of the body, and backward to the summit of all the dorsal rays. Caudal black, edged with white.

The Andamans.

A. AKALLOPISUS, Bleeker.

B. v.; D. $\frac{20}{20}$ — $\frac{10}{15}$; P. 19; V. $\frac{1}{3}$; A. $\frac{13}{13}$ — $\frac{2}{13}$; C. 15.

Orange, brightest on the head, chest, and base of tail. A blue band from between the orbits to the dorsal fin, where it bifurcates on either side of that fin. Scales on body light-spotted.

The Andamans.

TETRADRACHMUM, Cantor.

Teeth villiform, in a narrow band. Air-vessel large.

T. MARGINATUM, Rüpp.

B. v.; D. $\frac{11}{11}$ — $\frac{2}{15}$; P. 17; V. $\frac{1}{3}$; A. $\frac{12}{12}$ — $\frac{2}{13}$; C. 17.

Bluish. A dark band below and in front of the first 2 dorsal spines, through the

base of the pectoral, to the ventral. Snout dark. Every scale on the head, chest, and lower two-thirds of body with a black-edged bright blue spot. Soft dorsal and caudal yellow. Spinous dorsal, ventral and anal fins black.

The Andamans.

T. ARUANUM, Bloch.

B. v.; D. $\frac{12}{12}$ - $\frac{13}{11}$; P. 17; V. $\frac{1}{3}$; A. $\frac{11}{11}$ - $\frac{12}{12}$; C. 15.

Pearl-white, with three vertical black bands; the anterior, from the first three dorsal spines through the eye to below the mandible; the second from the sixth to the ninth dorsal spines, to the ventral fins, which are black; the third, from the base of the soft dorsal to the anal. Caudal dark, paler behind.

Burma, the Andamans, and Nicobars.

POMACENTRUS, *Cuvier*.

Teeth small, compressed, the crowns smooth or emarginate. Scales rather large.

P. TRILINEATUS, Cuv. et Val.

B. v.; D. $\frac{13}{13}$; P. 17; V. $\frac{1}{3}$; A. $\frac{12}{12}$; C. 17.

Olivaceous, caudal yellow. One or two blue spots on each scale. Three to five blue lines on the forehead, the outer being continued sometimes along the base of the dorsal. A black round spot on the opercle. A black spot edged with blue across the free portion of the tail.

The Andamans and Nicobars.

P. TRIMACCLATUS, Cuv. et Val.

B. v.; D. $\frac{13}{11}$ - $\frac{14}{15}$; P. 17; V. $\frac{1}{3}$; A. $\frac{12}{12}$ - $\frac{13}{14}$; C. 17.

Greenish yellow, with three black blotches over the back. Two narrow blue bands between the orbits, dividing the anterior blotch into three parts. A light blue line along the interorbital bones and spots on the cheeks and the bases of the dorsal and anal fins. Dorsal and caudal with a narrow dark edge, and with a broad dark outer margin, with one or two narrow blue lines at its base.

The Andamans.

P. BIFASCIATUS, Bleeker.

B. v.; D. $\frac{13}{14}$; P. 17; V. $\frac{1}{3}$; A. $\frac{12}{12}$ - $\frac{13}{14}$; C. 17.

Yellow, with a curved blue line on the preorbital, a black band from the nape over the opercles, and a second from the last dorsal spines to below the lateral line. Fins yellow.

The Andamans.

P. BANKANENSIS, Bleeker.

B. v.; D. $\frac{13}{14}$; P. 16; V. $\frac{1}{3}$; A. $\frac{12}{12}$ - $\frac{13}{16}$; C. 17.

Brownish; two narrow blue lines on the forehead, converging on the snout, and behind carried on to the back. Two more through the eye to the maxilla. A dark blue mark on the opercle. A line of blue spots along the cheeks. Each scale blue-spotted. A white-edged black ocellus below the dorsal, and sometimes a second near the tail.

The Andamans.

P. LITTORALIS, Cuv. et Val.

B. v.; D. $\frac{13}{14}$; P. 18; V. $\frac{1}{3}$; A. $\frac{12}{14}$; C. 15.

Olive, with vertical or round bluish spots on the scales. A black spot at the beginning of the lateral line, another at the base of the pectoral, and a third at the base of the tail.

The Andamans.

P. ALBOFASCIATUS, Schl.

B. v.; D. $\frac{12}{13}$ - $\frac{13}{13}$; P. 17; V. $\frac{1}{3}$; A. $\frac{12}{12}$ - $\frac{13}{14}$; C. 17.

Dark olive, with bluish spots on the cheeks. A curved blue line below the eye and a broad yellow vertical band below the last dorsal spines. Sometimes a black spot below the last dorsal spines, and a round white-edged one at the base of the pectoral.

The Nicobars.

P. PUNCTATUS, Quoy and Gaim.

B. v.; D. $\frac{1^2}{15}$ — $\frac{1^1}{14}$; P. 16; V. $\frac{1}{5}$; A. $\frac{2}{13}$ — $\frac{2}{14}$; C. 15.

Greyish brown, head with irregular bluish white dots, and one on each scale of the body. A black spot, margined anteriorly and superiorly with white, across the last six dorsal rays and is usually continued to the tail. Sometimes a dark spot on the axilla.

The Andamans and Nicobars.

P. LABIATUS, Day.

B. v.; D. $\frac{1^1}{12}$ — $\frac{1^3}{13}$; P. 17; V. $\frac{1}{5}$; A. $\frac{2}{13}$ — $\frac{2}{14}$; C. 17.

Lips very large, thick, covered with papillae and reflected all round the mouth. Brown, lighter on chest. Fins black. Blue spots on some scales of the head, and usually on the scales of the body above the lateral line.

The Andamans and Nicobars.

GLYPHIDODON, *Cuvier*.

Body short, compressed. Mouth small. Opercles entire. Teeth compressed.

G. SORDIDUS, Forsk.

Chak-mnd-dah. Andamans.

B. v.; D. $\frac{1^2}{14}$ — $\frac{1^3}{15}$; P. 17; V. $\frac{1}{5}$; A. $\frac{2}{12}$ — $\frac{2}{13}$; C. 15.

Yellowish olive, the fins darker. Five bands broader than the interspaces descend from the dorsal fin to the sides, and a sixth, nearly black, crosses the root of the tail. A black spot at the base of the pectoral and a row of black spots across the nape.

The Andamans.

G. LEUCOPLEURA, Day.

B. v.; D. $\frac{1^1}{13}$; P. 17; V. $\frac{1}{5}$; A. $\frac{2}{14}$; C. 15.

Colour brownish, with a dark band from the dorsal to the ventral. Several narrow white vertical bands from the back to belly. A black spot edged with white at the base of the caudal, extending up to the dorsal. Caudal yellowish, dark-edged.

The Andamans.

G. COCHINENSIS, Day.

B. v.; D. $\frac{1^1}{12}$ — $\frac{1^3}{13}$; P. 15; V. $\frac{1}{5}$; A. $\frac{2}{10}$ — $\frac{2}{11}$; C. 15.

Purplish black, lighter below. Pectoral fins paler than the others.

G. NOTATUS, Day.

B. v.; D. $\frac{1^1}{13}$ — $\frac{1^3}{14}$; P. 19; V. $\frac{1}{5}$; A. $\frac{2}{13}$ — $\frac{2}{14}$; C. 17.

Olive brown, paler below. Five narrow white bands from the back to the sides. A black spot at the base of the pectoral. Caudal yellowish.

G. BENGALENSIS, Bloch.

B. v.; D. $\frac{1^2}{12}$ — $\frac{1^3}{13}$; P. 17; V. $\frac{1}{5}$; A. $\frac{2}{11}$ — $\frac{2}{12}$; C. 15.

Dull greenish olive, with seven vertical dark bands from the back. A dark edge to spinous dorsal. A dark spot at base of pectoral, and two dark bands along the anal.

The Andamans.

G. ANTIJERIUS, Cuv. et Val.

B. v.; D. $\frac{1^1}{12}$ — $\frac{1^3}{13}$; P. 17; V. $\frac{1}{5}$; A. $\frac{2}{12}$ — $\frac{2}{13}$; C. 17.

Colour very variable, sometimes the markings absent. Cerulean blue above the lateral line. Dorsal with or without black blotches. A blue line on the eye, which joins its fellow across the snout. A median blue line along the occiput. Two blue bands along the eye, and another from the eye to gape. Cheeks and suborbital bones blue-lined.

The Andamans.

P. LEUCOGASTER, Bleeker.

B. v.; D. $12^1 3_{13}$; P. 17; V. $\frac{1}{2}$; A. $12^2 13$; C. 17.

Olive brown, paler on the sides and yellowish on the belly. Upper edge of dorsal and outer two-thirds of anal black, the rest and the ventrals yellow. Outer margin of caudal dark. A black spot at the base of caudal.

The Nicobars.

G. MODESTUS, Schl.

B. v.; D. 12^3 ; P. 18; V. $\frac{1}{2}$; A. 12^2 ; C. 15.

Yellowish olive, paler below. The outer third of dorsal and anal fins greyish. A brownish dot superiorly at the base of pectoral.

The Andamans.

HELIASTES.

Opercles entire. Teeth conical, in a narrow and irregular row.

H. LEPIDURUS, Cuv. et Val.

Glyphidion anabatoides, Day.

B. v.; D. $13^1 17$; P. 15; V. $\frac{1}{2}$; A. 12^2 ; C. 17.

Olive, each scale with a blue dot. A blue line from the eye across the preorbital. A blue spot at the beginning of the lateral line. Dorsal black-edged and blue-dotted. Anal dark-edged and yellow-dotted. A brownish band along either caudal lobe. A dark axillary spot on the pectoral. Ventrals green.

The Andamans.

Family Labridæ.

Branchiostegals 5 or 6. Pseudobranchiæ. Gills $3\frac{1}{2}$. Teeth in jaws. Palate edentulous. Lower pharyngeal bones ankylosed along the median line, with no median suture. A single dorsal. Body oblong, compressed (save in *Cheilio*).

The individuals of this family are brightly-coloured, strong-toothed fishes, which frequent coral reefs.

a. *Inferior pharyngeal teeth not confluent or pavement-like.*

CLEROPS, Rüppell.

Snout obtuse. The 4 anterior teeth conical and free, the lateral ones confluent into a bony ridge. Scales large. Cheeks high, covered with small scales.

C. ANCHORAGO, Bloch.

B. vi.; D. 17^3 ; P. 15; V. $\frac{1}{2}$; A. $\frac{3}{2}$; C. 14.

Cheeks brownish, shot with yellow and scarlet-spotted. Back brown, with a white vertical band between the dorsal and pectoral. A light band at the base of the tail. Dorsal fin with two dark bands and a third which descends to the back. It is edged with yellow behind and orange above. Other fins yellowish. Grows to a large size.

The Andamans.

LABROIDES, Bleeker.

Snout pointed. A notch anteriorly in one of the lips. A band of small teeth on the jaws, which each have a pair of canines, the upper fitting between the lower. A posterior canine tooth.

L. DIMIDIATUS, Cuv. et Val.

B. v. ; D. $\frac{9}{10}$ $\frac{9}{12}$; P. 13; V. $\frac{1}{5}$; A. $\frac{3}{10}$; C. 14.

White, with a black band to the caudal, with a bend just before that fin. A black band from the anal to caudal, joining the last. Dorsal dark-banded.

The Andamans.

CHELINS, Cuvier.

Teeth in one row. A pair of canines in both jaws, but no posterior canine.

C. CHLORURUS, Bloch.

B. v. ; D. $\frac{10}{9}$; P. 11; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 12.

Olive brown, with round yellow spots on the cheeks, and a yellow streak from the eye to the gape. Body sparingly yellow-dotted. A yellow mark on the soft dorsal. Spinous dorsal olive, with red edges. Soft dorsal reddish. Anal, ventral, and caudal yellow-dotted.

The Andamans.

C. TRILOBATUS, Lacép.

B. v. ; D. $\frac{9}{10}$; P. 12; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 13.

Greyish brown, with red spots, and narrow stripes on the head. Vertical fins green, the dorsal and anal with red margins. A dark spot at the base of the middle dorsal rays. Grows to 3 feet.

The Andamans.

EPIBULUS, Cuvier.

Mouth very protractile. Teeth as in *Cheilinus*.

E. STRIATUS, Day.

B. v. ; D. $\frac{9}{10}$; P. 11; V. $\frac{1}{5}$; A. $\frac{3}{8}$; C. 13.

Greenish brown, with five narrow milk-white vertical bands. A white line between the orbits, another joining them, and a third from the eye to the snout. Fins dark, save the soft dorsal and the anal terminally, which are white.

The Andamans.

ANAMPSES, Cuvier.

Teeth in one row, the anterior pair above, and below projecting forwards and compressed with cutting edges. No posterior canine.

A. CÆRULEO-PUNCTATUS. Rüpp.

B. vi. ; D. $\frac{9}{12}$; P. 12; V. $\frac{1}{5}$; A. $\frac{3}{12}$; C. 13.

Reddish brown, several bluish *vertical* (sic) lines radiate from the orbit. Each scale on the body with a blue spot darkly annulated, fins reddish, the dorsal with three rows of blue spots, the anal and caudal likewise blue-spotted.

The Andamans.

HEMIGYMNUS, Günther.

Lips very fleshy, the lower notched, the lateral segments pendant. Teeth much as in *Labroides*. Scales large, but a strip of very small ones on the cheek.

II. MELAPTERUS, Bloch.

Labrichthys bicolor, Day.

B. vi. ; D. $\frac{9}{11}$; P. 13; V. $\frac{1}{5}$; A. $\frac{3}{10}$; C. 15.

A posterior canine usually concealed by the skin. Bluish, above brown, yellowish below. A dark mark behind the orbit. Scales blue-dotted. Caudal dark.

The Andamans.

STETHOJULIS, Günther.

A posterior canine, but no anterior ones.

S. STRIGIVENTER, Bennett.

B. vi.; D. $\frac{9}{11}$; P. 15; V. $\frac{1}{3}$; A. $\frac{2}{11}$; C. 14.

Light brown, yellowish on the belly. A brown band, edged below with white from the snout below the eye to the opercle. Several longitudinal yellow lines and black dots along the sides. A black spot on the last dorsal ray, and another at the base of the tail.

The Andamans and Nicobars.

PLATYGLOSSUS, *Gunther*.

Anterior teeth conical, erect. A posterior canine. Head scaleless.

P. NOTOPIS, Bleeker.

B. vi.; D. $\frac{9}{13}$; P. 13; V. $\frac{1}{3}$; A. $\frac{3}{12}$; C. 14.

Purplish brown, with 4 or 5 red longitudinal bands. Two black ocelli on the dorsal fin, encircled by a light ocellus, and followed by two rows of light spots. Caudal with a yellow band at its base, and yellow edges.

The Andamans.

P. HYRILLI, Bleeker.

B. vi.; D. $\frac{9}{13}$; P. 14; V. $\frac{1}{3}$; A. $\frac{3}{12}$; C. 14.

Olive above, white below. Two brownish-black longitudinal bands, the upper ones united over the snout, the lower commences at the snout and ends at the tail in a black spot. It is interrupted on the opercle by a bright red spot. Two rows (or three posteriorly) of spots along the dorsal fin. Pectoral with a dark spot superiorly at its base.

The Andamans.

P. MARGINATUS, Rüpp.

B. vi.; D. $\frac{9}{13}$; P. 13; V. $\frac{1}{3}$; A. $\frac{3}{11}$; C. 15.

Blackish green. Head and anterior part of body with undulating grass-green streaks, edged with blue. The vertical fins blue-edged, and with numerous blue-edged streaks and spots. A large vertical green crescentic mark, light-spotted, on the middle of the caudal. Basal half of pectoral black.

The Andamans.

P. LEPARENSIS, Bleeker.

B. vi.; D. $\frac{9}{12}$; P. 14; V. $\frac{1}{3}$; A. $\frac{3}{12}$; C. 15.

Body vertically banded. A silvery line from the eye to tail, and below it 4 or 5 more. Many scales brown-spotted. Dorsal with 1 or 2 rows of light round spots, and 2 black ocelli, with sometimes a third caudal one. Caudal yellowish-red.

The Andamans.

P. HORTULANUS, Lacép.

B. vi.; D. $\frac{9}{12}$; P. 15; V. $\frac{1}{3}$; A. $\frac{3}{11}$; C. 15.

Yellowish-brown. Broad bluish oblique bands on the head and fore parts, and bluish spots. A yellow spot or two below the fourth dorsal spine, and sometimes a black spot behind. Dorsal obliquely brown streaked. A black spot in the axilla, another on the tail, which may be brown-spotted or banded.

The Andamans.

P. KAWARIN, Bleeker.

B. vi.; D. $\frac{9}{11}$; P. 14; V. $\frac{1}{3}$; A. $\frac{3}{11}$; C. 14.

A bluish band from eye to snout, another from the gape to the top of the head, and a third from the interopercle. A blue blotch on the opercle, and a wide blue band above. Top of head blue-spotted. Below the lateral line blue, each scale with a central rosy spot forming seven longitudinal bands. Dorsal and anal fins blue, with three rows of reddish spots, and a median black spot. Caudal yellowish, dark-edged.

The Andamans.

P. SCAPULARIS, Bennett.

B. vi.; D. $\frac{6}{1-1}$; P. 15; V. $\frac{1}{2}$; A. $\frac{3}{1-1}$; C. 15.

A broad red, blue-edged band from the snout to the eye. A second irregular one goes from the eye, obliquely upwards to the lateral band, which is a brownish violet, and goes from the shoulder to the tail. A red streak from the axilla to belly. Many of the body scales blue-spotted. Dorsal and anal margined with a green blue-edged band. Caudal transversely barred with reddish-violet.

The Andamans.

JULIS, Cuvier et Valenciennes.

Anterior teeth conical, no posterior canine. Scales large, head scaleless.

J. LUNARIS, L.

B. vi.; D. $\frac{8}{1-3}$; P. 14; V. $\frac{1}{2}$; A. $\frac{2}{1-1}$; C. 14.

Head violet, with several oblique reddish bands. Body green, each scale with a vertical red streak, forming bands. An oblong reddish-violet spot on the pectoral. Dorsal red, with a blue and yellow margin. Anal violet with a yellow edge. Caudal yellow, its base and lobes green.

The Andamans.

J. HEBRAICUS, Lacép.

B. vi.; D. $\frac{8}{1-3}$; P. 14; V. $\frac{1}{2}$; A. $\frac{2}{1-1}$; C. 15.

Greenish, each scale with a dark vertical mark. A violet dark-edged band from the eye downwards, a second to the base of the pectoral and a third up to the occiput. A dark spot on the pectoral. In the young there is a dark-edged buff band from the first two dorsal spines to behind the ventral, and a dorsal ocellus.

The Andamans.

J. PURPUREA, Forsk.

B. vi.; D. $\frac{8}{1-3}$; P. 16; V. $\frac{1}{2}$; A. $\frac{3}{1-1}$; C. 14.

Green or blue, with or without pink or red bands radiating from the eye. A red or pink band from the opercle to the tail. Another of a brownish-violet along the back to the upper margin of the caudal. A third along the belly to its lower margin, and sometimes a fourth from the chest to the anal fin. Caudal rays green, its web red and violet. Dorsal green or yellow, with a blue-edged pink band along its middle, and sometimes a black spot anteriorly. Anal green, with a dark basal band.

The Andamans.

J. JANSENI, Bleeker.

B. vi.; D. $\frac{8}{1-3}$; P. 15; V. $\frac{1}{2}$; A. $\frac{2}{1-1}$; C. 14.

Yellowish, with 3 to 5 wide black vertical bands down the sides, often wider than the interspaces. A violet streak from the opercle, to the base of the pectoral fin. Pectoral, ventral, and anal fins yellowish, the last with a black spot at the extremity of its last two rays.

The Andamans.

GOMPHOSUS, Lacépède.

Snout produced, tubiform. Anterior teeth conical. No posterior canine. Gill membranes attached to the isthmus. Scales large, head scaleless.

G. PECTORALIS, Quoy and Gaim.

B. vi.; D. $\frac{8}{1-3}$; P. 15; V. $\frac{1}{2}$; A. $\frac{2-3}{1-1}$; C. 14.

Reddish-brown, lighter on the belly; each scale darkest at its base. Cheeks pinkish. A dark band from the snout, through the eye. Pectorals yellow. Vertical fins dark, edged lighter. Ventrals whitish, the outer ray brown. A row of round transparent spots along the base of the anal fin.

The Andamans.

b. *Teeth in the pharyngeals confluent and pavement-like.*

PSEUDODAX, *Bleeker*.

One pair of upper and two pairs of lower incisors, broad, and with cutting lateral edges. An enlarged row of scales at the base of the caudal fin.

P. MOLECCANUS, *Cuv. et Val.*

B. vi.; D. $\frac{11}{12}$; P. 15; V. $\frac{1}{2}$; A. $\frac{3}{11}$; C. 14.

Teeth green, each outer lower incisor recurved. Colour brownish-red, paler on the belly, most of the body scales with a dark spot. Dorsal and anal basally yellow, the former with black reticulated lines and a blue margin. Anal with 2 to 4 dark undulating bands, and a dark blue-margined outer edge. Caudal brown, with a blue posterior edge, and dark banded vertically.

The Nicobars.

CALLYODON, *Cuvier et Valenciennes*.

Teeth in both jaws anteriorly compressed and imbricated in 1 row above, and 2 below, and laterally soldered into one deep-cutting lamina. Anterior nostril with a barbel-like prolongation. Scales large.

C. VIRIDESCENS, *Rüpp.*

B. vi.; D. $\frac{10}{15}$; P. 13; V. $\frac{1}{2}$; A. $\frac{2}{8}$; C. 13.

Colour variable. Brown, marbled and spotted with darker, or green, with dots on the sides, and red streaks on the snout. A black base to the pectoral, and a black spot between the first and second dorsal spines seem pretty constant. In some the colour is olive above, and white below, and most of the scales with a brick-red centre, and white spots. Head and middle of body with red spots, dark, with dark centres. Some red lines on the head, and a pale lateral line to the root of the tail. Dorsal and caudal with reddish-yellow spots. Anal with a black edge, and 2 inosculating red bands inclosing white spots. Ventrals white. Pectorals yellow.

The Andamans.

PSEUDOSCARUS, *Bleeker*.

The upper lip projecting, and double for its whole length. The anterior teeth soldered together, and ranged quincuncially. Scales large. Enlarged scales at the base of the caudal fin.

P. ÆRUGINOSUS, *Cuv. et Val.*

B. v.; D. $\frac{10}{15}$; P. 14; V. $\frac{1}{2}$; A. $\frac{3}{8}$; C. 13.

Olivaceous, with 3 longitudinal silver bands along the belly, below the pectoral fin.

The Andamans.

P. RIVULATUS, *Cuv. et Val.*

B. v.; D. $\frac{10}{15}$; P. 14-15; V. $\frac{1}{2}$; A. $\frac{3}{8}$; C. 13.

Green, each scale with a reddish base. Snout and cheeks with undulating green lines on a reddish ground. A narrow green band along the base of the dorsal, with an intermediate row of spots. Anal green, edged with darker. Caudal with green spots.

The Andamans.

P. ERYTHRODON, *Cuv. et Val.*

B. v.; D. $\frac{10}{15}$; P. 15; V. $\frac{1}{2}$; A. $\frac{3}{8}$; C. 13.

Purplish brown, the scales darker at their margins. The enlarged caudal scales dull yellowish. A violet tint in the thoracic region. Snout greenish yellow. Vertical fins brown. The dorsal black-margined. Pectoral transparent.

The Andamans.

Order ANACANTHINI.

Family Gadidæ.

Pseudobranchiæ none, or glandular and rudimentary.

BREGMACEROS, *Thompson*.

Branchiostegals 7. Teeth in jaws minute and movable, also on vomer, none on palate. Two dorsal fins, the anterior one consisting of a single elongated ray rising from the occiput, the second and anal having each a central dwarfed portion, almost forming a distinct fin.

B. ATRIPINNIS, *Tickell*.

B. vii.; D. 1: 20 + xv. + 22; V. 6; A. 22 + 10 + 26; C. 17.

Lower jaw rather the longer. The single dorsal ray reaches from the summit of the head to the extremity of the pectoral. Colour rich brown, lighter below. Ventrals dirty brown, the other fins black.

Coast of Burma and the Andamans.

Family Pleuronectidæ.

Pseudobranchiæ well developed. Body flattened, with one of its sides only coloured. Both eyes placed on the coloured side, except in the very young. A single long dorsal and anal fin. Air-vessel none.

In the very young of the '*Pleuronectidæ*' or 'flat fish' the eyes are symmetrical as in all other vertebrata; but the horizontal fins being too weak to sustain the body vertically, it is forced to rest on the ground. The inferior eye under these conditions undergoes displacement, carrying with it the surrounding cartilaginous framework of the skull. The terms '*right*' and '*left*' (*dextral* and *sinistral*) applied to these fishes refer to the coloured side, the fish being placed with its tail towards the observer, the dorsal fin upwards, and the anal downwards. As food these fish occupy the highest rank for wholesome and fine flavour. Reversed individuals occasionally occur.

PSEUDORHOMBUS, *Bleeker*.

Branchiostegals 6. Eyes to the left, without a free orbital edge. Interorbital space not concave. Jaws and dentition nearly symmetrical. Teeth in both jaws of unequal size, and in a single row. Vomer, palate and tongue edentulous. Lateral line strongly curved anteriorly.

P. ARSIUS, *Ham. Buch*.

B. vii.; D. 71-79; P. 11-12; V. 6; A. 54-61; C. 17.

Reddish brown, usually covered with variously-sized rings, and often two dark ocelli, on the straight portion of the lateral line. Grows to a foot.

The Andamans.

PLATOPHYRYS, *Swainson*.

Branchiostegals 6. Eyes to the left. Interorbital space concave. Jaws and dentition nearly symmetrical. Teeth minute. Lateral line strongly curved anteriorly.

P. PANTHERINUS, *Rüpp*.

B. vi.; D. 85-91; P. 10; V. 6; A. 65-70; C. 18.

Purplish-brown, with 3 dark spots along the middle of the body, besides scattered ones elsewhere, also some dark rings. Vertical fins, with brown spots, and white dots.

The Andamans.

SOLEA, *Klein*.

Eyes to the right, the upper in advance of the lower. Dentition most developed on the blind side, where the teeth are in villiform rows. Vomer and palate edentulous.

a. *Nostrils on blind side not dilated. Pectorals developed.*

S. HETERORHINA, Bleeker.

B. vi. ; D. 87·94 ; P. 8 ; V. 4 ; A. 78·82 ; C. 16.

Rich brownish-olive, with irregular vertical bands, blotches, and spots edged with black.

ACHIRUS, *Cuvier*.

Branchiostegals 6. Eyes to the right, the upper in advance of the lower. Teeth minute, and only on the blind side. Pectorals none.

A. PAVONINUS, Lacép.

B. vi. ; D. 64·70 ; P. 2·4 ; V. 5 ; A. 50·56 ; C. 15.

Greyish-brown, covered with milk-white spots of various shapes and sizes, edged with black, and some with a black central dot.

The Andamans.

This is probably the '*Tenasserim sole*,' of which Mason records that the natives consider that they swim in pairs, "with their flat uncoloured sides united."

SYNAPTURA, *Cantor*.

Branchiostegals 6. Eyes to the right, the upper in advance of the lower. Teeth minute, on the left side only. Palate edentulous.

a. *The right pectoral the longest.*

S. ORIENTALIS, Swainson.

B. vi. ; D. 62·65 ; P. 7 ; V. 5 ; A. 47·50 ; C. 16.

Nasal tube simple. The right pectoral longer than the left. No enlarged scales over the nape. Bluish slate, with short narrow black vertical bands crossing the lateral line ; occasionally some white marks. Vertical fins dark : outer half of pectoral black.

S. PAN, Ham. Buch.

B. vi. ; D. 57·60 ; P. 7 ; V. 6 ; A. 43·45 ; C. 14.

A patent nostril in front of lower eye, and a tubular one anterior to it. Nostril on blind side concealed. Scales on the nape enlarged. Dull red, or muddy brown or grey with irregular vertical black blotches or bands. Right pectoral black.

Coast of Burma.

CYNOGLOSSUS, *Hamilton Buchanan*.

Branchiostegals 6. Eye to the left. Snout prolonged and curved downwards and backwards. Mouth narrow and unsymmetrical. Teeth minute, on the right side only. Lateral line on the coloured side, double or triple. Pectorals none.

C. BRACHYRHYNCHUS, Bleeker.

B. vi. ; D. 106 ; V. 4 ; A. 78 ; C. 12.

Two nostrils, a patent one between the eyes, and a tubular one in front of the lower eye. No right ventral. Two lateral lines on the coloured side separated by 17 or 18 rows of scales. A single one on the blind side.

Maulmain, in brackish water.

C. BENGALENSIS, Bleeker. (Var. ?)

B. vi. ; D. 105 ; V. 4 ; A. 68 ; C. 15.

Eyes small, contiguous. Two lateral lines on the coloured side, divided by 14 rows of scales, 1 on the blind side. Brown, vertical fins spotted and edged with black.

The Sittoung River.

C. LIDA, Bleeker.

B. vi. ; D. 99·104 ; V. 4 ; A. 75·83 ; C. 12.

Nostrils as in *Brachyrhynchus*. Two lateral lines on the coloured side, separated by 13 rows of scales where most distant. A single one on the other. Brownish, with a dark mark on the opercle.

Burma.

Order PHYSOSTOMI.

Family Siluridæ.

Subopercle absent. Margin of upper jaw formed by the premaxillaries. Skin covered with scales, or bony plates or tubercles.

The *Siluridæ* or 'cat fishes' (so-called from their whiskers, or barbels) are fond of muddy water, and from disuse, the eyes in many species, which inhabit muddy water, seem to suffer from a sort of atrophy, and cease growing in the usual ratio. Some of the fishes of this family (*Clarias* and *Saccobranchus*) are amphibious breathers, like the *Ophiocephali*, and require access to the atmospheric air, else they become drowned if unable to rise to the surface. The air-vessels of some marine species yield a coarse isinglass. The spines inflict severe wounds and are much dreaded, as they are regarded as poisonous. Wounds caused by the spines are undoubtedly painful and angry.

A. *Air-vessel not inclosed in bone.*

a. *A posterior adipose dorsal fin.*

MACRONES, *Dumeril*.

Mouth terminal, transverse. Eyes with free circular lids. Barbels 8 (2 nasal, 2 maxillary, 4 mandibular). A distinct and separate interneural shield on the nape, closely connected to the basal bone of the dorsal fin. In some species wanting. Villiform teeth in jaws and palate. Dorsal fin with 1 spine and 7 rays. Pectoral with a strong serrated spine. Ova small.

M. AOR, Ham. Buch.

Ngā-gyoung. Burma.

B. xii.; D. $\frac{1}{2}$ ·0; P. $\frac{1}{9}$ · $\frac{1}{10}$; V. 6; A. 12·13; C. 17.

Upper jaw the longer. The maxillary barbels extend to beyond the base of the caudal, the nasal half-way to the orbit, the outer mandibular one to the pectoral, and the inner two-thirds as far. Dorsal spine as long as the head, finely serrated behind. Colour plumbeous above, whitish below. Fins yellowish, externally stained dark. A black spot, the size of the eye, on the dorsal. Grows to 3 feet.

Burma.

M. BLYTHII, Day.

D. $\frac{1}{2}$ ·0; P. $\frac{1}{2}$; V. 6; A. 12; C. 17.

Snout projecting. The maxillary barbels, which are the longest, only reach the anterior margin of the orbit. A dark spot on the shoulder, and another at the base of the adipose dorsal. Body indistinctly banded.

The Tenasserim provinces.

M. GULIO, Ham. Buch.

B. ix.; D. $\frac{1}{2}$ ·0; P. $\frac{1}{8}$ · $\frac{1}{9}$; V. 6; A. 12·15; C. 17.

Top of head granulated. The nasal barbels shorter than the head. The maxillary reach to nearly the end of the ventral fin. The outer maxillary barbels longer than the head, or the inner ones. Dorsal spine half as long as the head, serrated behind and with one or two teeth before. Lurid bluish brown above, dull white below. Fins usually black.

Burma.

M. MICROPHthalmus, Day.

Ngā-aik.

B. x.; D. $\frac{1}{2}$ ·0; P. $\frac{1}{9}$; V. 6; A. 12; C. 17.

Snout spatulate. Top of head smooth. Dorsal spine very slender, only osseous at its base. Upper caudal lobe with a filamentous prolongation. Light brown, shot with purple. Fins darkest externally.

The Irrawaddy River.

M. CAVASICS, Ham. Buch.

Ngā-zyn-zēng.

B. vi.; D. $\frac{2}{3}$ ·0; P. $\frac{1}{8}$; V. 6; A. 11·13; C. 16.

Snout obtuse. The nasal barbels nearly as long as the head. The maxillary extend to beyond the base of the caudal fin. The external mandibular to almost the base of the ventral, the internal as long as the head. Dorsal spine weak, entire. Pectoral internally denticulated. Colour plumbeous above, yellowish on the belly and cheeks. Dorsal and caudal dusky, the other fins dull white. Grows to $1\frac{1}{2}$ feet.

Burma.

M. VITTATUS, Bloch.

Ngā-zyn-yaing.

B. x.; D. $\frac{1}{2}$ ·0; P. $\frac{1}{8}$; V. 6; A. 9·12; C. 17.

Top of head roughened. The maxillary barbel reaches the ventral fin; the nasal, the opercle; the outer mandibular, to the first third of the pectoral spine, whilst the inner is shorter. Dorsal spine half as long as the head, finely serrated behind. Pectoral spine strong, with 16 coarse denticulations. Colour variable. Silvery or golden. Aged specimens (in Madras) have a light bluish lateral band with a paler one above and below. A dark shoulder spot, and another sometimes at the base of the caudal fin. Sometimes the fish appears dark with 5 longitudinal silvery bands. Tops of fins dark. Grows to 8 inches.

Burma.

M. LEUCOPHYSIS, Blyth.

Ngā-pet-lek and Ngā-nouk-thwā.

B. xi.; D. $\frac{1}{2}$ ·0; P. $\frac{1}{8}$ · $\frac{1}{10}$; V. 6; A. 11·12; C. 17.

Snout rounded. Top of head rather rugose. The nasal barbels just reach to the middle of the eye; the maxillary to the anal fin; the outer mandibular to the middle of the pectoral fin, and the inner to the gill openings. The dorsal spine finely serrated behind in its upper fourth. Purplish-black, with some white dots on the body. Grows to a foot or more.

Tenasserim.

M. BLEEKERI, Day.

B. x.; D. $\frac{1}{2}$ ·0; P. $\frac{1}{9}$ · $\frac{1}{10}$; V. 6; A. 9·10; C. 17.

Snout obtuse. Top of head, opercle, occipital bone and humeral process granulated. The nasal barbels reach the hind edge of eye; the maxillary ones, the anal fin; the outer mandibular, to the base of the pectoral; the inner ones a little less. Dorsal spine entire. Pectoral spine longer than dorsal and denticulated. Brownish grey, with two light longitudinal bands below the lateral line. Sometimes a dark shoulder spot, and a dark median band on the anal fin.

Burma.

ERETHISTES, *Muller et Troschell*.

Head osseous superiorly, somewhat depressed. Mouth small, terminal, or sub-inferior. Eyes small, sub-cutaneous, without a free orbital margin. Nostrils close together, separated by a barbel. Barbels 8, the maxillary ones with broad bases. Villiform teeth in jaws, palate edentulous.

E. NARA, Ham. Buch.

Ngā-kyonk-hpā. Burma.

D. $\frac{1}{4}$ ·0; P. $\frac{1}{8}$; V. 6; A. 10·11; C. 15.

Blunt spinate ossicles in skin. The pectoral spine denticulated internally, and serrated externally; each alternate tooth directed anteriorly or posteriorly. Caudal rays not elongated. Yellowish-brown, banded or blotched with darker. Fins black-banded. Barbels annulated with black. Grows to $5\frac{1}{2}$ inches.

Burma.

E. contra, Ham. Buch.

Ngā-they-tō and Ngā-kyonk-thwā.

Skin tuberculated. The pectoral spine denticulated internally, and backwardly serrated externally. Upper caudal ray elongated. Coloured as *E. hara*, save the mandibular barbels are not annulated.

Burma, as far south as Tenasserim.

RITA, Bleeker.

Branchiostegals 8. The mouth transverse, upper jaw the longer. The nostrils on either side contiguous to each other, but widely separated from those on the other. Eyes subcutaneous, and without free circular margins. Barbels 6, a minute pair at the posterior nostrils, a maxillary and a mandibular pair. Teeth villiform in both jaws, and molariform teeth in the mandible as well, and on the palate. Ova larger than in *Mucrones*.

R. SACERDOTUM, Anderson.

Upper half of body brownish olive, more or less suffusing the ventral surface, behind the ventral fins. Fins brown on both aspects. Eye a transverse ellipse margined with golden, the scleritic being brownish golden. Grows to 5 feet, and inhabits the Irrawaddy River, about Thingadaw pagoda, where the fish readily assemble at the call of "tit-tit," and are so tame as to allow themselves to be freely handled, according to Dr. Anderson, and even allow the hand to be introduced into their mouths.

R. BUCHANANI, Bleeker.

Ngā-lhwē.

B. viii.; D. $\frac{1}{6}$ ·0; P. $\frac{1}{16}$; V. 8; A. 12·13; C. 19.

Top of head covered with skin, except a strip anterior to the base of the occipital process. Teeth villiform above, and the outer and anterior ones in the mandible. Two or three rows of inner mandibular teeth rounded and larger posteriorly. The maxillary barbels nearly reach the end of the head, the mandibular are a little shorter. Dorsal spine very strong and slightly serrated behind in its upper portion. Air-vessel large, thick, quadrangular, posteriorly bicurved, and bipartite. Colour lurid green, paler below. Grows to 4 feet.

The Irrawaddy River.

ARIS, Cuvier.

Head above osseous, or covered with very thin skin. Eyes mostly with free orbital margins. Anterior and posterior nostrils placed close together, the latter valvular. Barbels 6, 1 maxillary, and 2 mandibular pairs. Villiform teeth on jaws, villiform or globular on palate and sometimes the vomer. Eggs larger than in *Rita*.

Fish of this genus are inferior as food, but are largely salted and afford a coarse isinglass. Day describes the remarkable habit possessed by the males of this genus of hatching the ova in their mouths. "I found many males, also of *Osteogeniosus*, with 15 to 20 of them in their mouths. Some of the eggs were in an early stage of development, others nearly ready to be hatched, while in the mouth of one specimen was a hatched fry, having the yolk-bag still adherent. The eggs filled the cavity of the mouth, and extended far back to the branchiæ. Whether the male carries about these eggs in his mouth till hatched, or only removes them when danger is imminent from some spot where he is guarding them, is questionable; but in none of the specimens which I examined, did I find a trace of food in the intestines of the males, which had been engaged in this interesting occupation."

a. *Villiform teeth on the palate.*

A. BERMANICUS, Day.

Ngā young. Burma.

B. vi. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{15}$; V. 6 ; A. 19·20 ; C. 15.

Eyes without free orbital edges. Snout spatulate. The maxillary barbels do not quite reach the base of the pectoral fin. The outer mandibular are nearly as long. Dorsal spine strong, serrated on both edges. Pectoral spine like the dorsal, but stronger. Purplish, dashed with copper. Dull white below. Dorsal fins stained black externally. Grows to a foot at least, and strongly resembles *Macrones aor*.

Tidal rivers in Burma (Maulmain and Bassein).

A. CCELATUS, Cuv. et Val.

A. aquibarbis, Cuv. et Val.

B. vi. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{5}$; V. 6 ; A. 19 ; C. 15.

The maxillary barbels reach the middle of the pectoral fin, the outer mandibular ones are a fifth shorter. Dorsal spine very strong, granulated laterally and anteriorly. Serrated behind, its whole length, and superiorly in front. Bluish along the back and sides, white on the belly. Adipose dorsal black. End of dorsal, ventral, and pectoral fins black. (Grows to a large size.)

Burma (Maulmain).

A. ACUTIROSTRIS, Day.

B. v. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{15}$; V. 6 ; A. 19 ; C. 17.

Snout fleshy and elongate, mouth inferior. Barbels short, the maxillary reach beyond the hind edge of the eye. Dorsal spine strong, serrated on both sides. Upper portion of dorsals black, the other fins grey. Grows to a foot or more.

The Salween River.

A. SUMATRANUS, Bennett.

D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{15}$; V. 6 ; A. 18·19 ; C. 17.

Scattered granulations on the top of head. The maxillary barbels reach the end of the head ; the outer mandibular ones as far as the base of the pectoral fin. Dorsal spine serrated on both edges. Bluish green above, paler below. Edges of fins stained grey. Very little black on adipose dorsal.

The Andamans.

A. VENOSTES, Cuv. et Val.

B. vi. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{15}$; V. 6 ; A. 18·19 ; C. 17.

Scattered granulations on the top of head. The maxillary barbels extend to the base of the pectoral fin, the outer mandibular ones are shorter. The dorsal spine is serrated posteriorly, and for its anterior upper half, the lower half being granulated.

Burma.

This species has a much shorter head than *A. sumatranus*.

A. THALASSINUS, Rüpp.

B. vi. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{12}$; V. 6 ; A. 15·17 ; C. 17.

Top of the head granulated. The maxillary barbel reaches to the end of the pectoral ; the outer mandibular are a little shorter. Dorsal spine granulated in front, serrated behind. Pectoral spine shorter than the dorsal, rough externally, fully serrated internally. Silvery, darkest above, the upper half of the adipose dorsal black. Sometimes the colour is a rich brown, the granules on the head tipped with gold.

The Andamans.

b. *Globular teeth on the palate.*

A. BUCHANANI, Day.

B. vi. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{15}$; V. 6 ; A. 22 ; C. 17.

Top of the head lined in roughened lines. The maxillary barbels reach to the first third of the pectoral fin, the outer mandibular ones almost to its base. Palatal teeth with large globular heads. Silvery above, lighter below. Pectoral and dorsal edged with blackish behind. A black spot on the adipose dorsal.

The Irrawaddy River.

A. GAGORA, Ham. Buch.

B. vi. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{10}$; V. 6 ; A. 18 ; C. 17.

Upper jaw the longer. Most of the occiput and the whole of the occipital process granulated. Median groove on the head narrow and deep. The maxillary barbels less than the head; the outer mandibular ones reach to the gill opening. Palatal teeth globular, in large semi-ovate patches. Purplish above, whitish below. Air-vessel five-chambered. Grows to $1\frac{1}{2}$ feet or more (3 feet, *vide* II. B.).

Burma.

A. JATIUS, Ham. Buch.

Ngā-yong or Ngā-yeh.

B. vi. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{10}$; V. 6 ; A. 18 ; C. 17.

Summit of head sparingly granulated behind. The maxillary barbels shorter than the head; the outer mandibular ones just reach the gill-opening. Palatal teeth on a small patch, which may be absent. Dorsal spine strong, serrated on both sides. Dark bluish above, paler below. Fins yellowish. Upper edge of dorsal deep black. A deep black spot on the upper half of the adipose dorsal. Caudal black-edged. Anal with a dark marginal spot. Grows to a foot or more.

Burma, ascending tidal rivers.

BATRACHOCEPHALUS, *Bleeker*.

Lower jaw the longer. Eyelids with a free circular margin. Nostrils approximate, the posterior valvular. Barbels two, rudimentary on the chin. Teeth obtusely conical in two distant rows in either jaw, and a longitudinal band on the palate. None on the vomer. An axillary pore.

B. MINO, Ham. Buch.

B. v. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{2}$; V. 6 ; A. 20 ; C. 15.

Colour silvery, darkest along the back and upper lobe of caudal fin.

The Irrawaddy River.

This fish is not common and is held in no esteem for food.

KETENGUS, *Bleeker*.

Head bony above. Eyelids with a free circular margin. Upper jaw longest. Barbels 6, small, no nasal ones. Nostrils approximate, the posterior valvular. A single row of compressed teeth, palate edentulous. An axillary pore.

K. TYPUS, *Bleeker*.

B. v. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{7}$; V. 6 ; A. 19·20 ; C. 15.

Colour silvery.

The Andamans.

OSTEOGENIOSUS, *Bleeker*.

A thin skin over the head. Upper jaw the longer. Nostrils approximate, the posterior valvular. A single pair of semi-osseous maxillary ones. Teeth on the jaws villiform, on the palate obtusely conical. An axillary pore.

O. MILITARIS, L.

B. v. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{10}$; V. 6 ; A. 19·22 ; C. 17.

Barbels rather longer than the head. Silvery, darker above. Fins tinged with red. Grows to 14 inches or more.

Burma, entering rivers.

O. STHENOCEPHALUS, Day.

B. v. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{6}$; V. 6 ; A. 20 ; C. 17.

Barbels as long as the head. Silvery, darkest above. Maulmain.

PANGASIUS, *Cuvier et Valenciennes*.

Upper jaw the longer. Eye with a free orbital margin. Nostrils apart ; both patent, the anterior situated on the upper edge of the snout. Barbels 4, one pair maxillary and one pair behind the chin. Villiform and conical teeth mixed in the jaws. One or more axillary pores.

P. BUCHANANI, Day.

B. ix.·x. ; D. $\frac{1}{2}$ ·0 ; P. $\frac{1}{12}$; V. 6 ; A. 31·34 ; C. 19.

The maxillary barbels reach the base of the pectoral fin ; the mandibular ones are half as long as the head. Silvery, darker on the back, and glossed with purple on the sides. Checks and under surface of the head shot with gold. Grows to 4 feet.

Burma, in tidal rivers.

PSEUDEUTROPIUS, *Bleeker*.

Head covered with a soft skin. Nostrils patent, equidistant. Barbels 8, one nasal, one maxillary, and two mandibular pairs, these last commencing in a transverse line close to the hind edges of the lower lip. Teeth villiform in jaws and palate. A very small adipose dorsal. An axillary pore generally present.

P. GOONGWAREE, Sykes.

B. vi. ; D. $\frac{1}{2}$ ·10 ; P. $\frac{1}{15}$; V. 6 ; A. 54 ; C. 17.

The nasal barbels reach to the dorsal, the maxillary to the anal, and the mandibular ones are about as long as the head. Dorsal spine slender, very finely serrated behind. Pectoral fins stronger, longer, and strongly denticulated inside. Silvery, darkest above. Grows to about a foot.

Burma.

P. ACUTIROSTRIS, Day.

B. vi. ; D. $\frac{1}{6}$ ·0 ; P. $\frac{1}{2}$; V. 6 ; A. 42·46 ; C. 17.

Eyes without adipose lids behind the gape. Top of head flat and rugose. Upper jaw elongated and projecting. The nasal barbels longer than the head, the mandibular as long, the maxillary reach to the base of the anal fin. The whole of the under surface of the snout toothed, the premaxillaries being entirely in advance of the lower jaw. Silvery, a black spot on the occiput and a black blotch at the base of the dorsal fin. The elongated snout appears not to be constant or even usual, as Day observes : "The common form has no elongation of the snout, although of the same size as the one having such an elongation, but otherwise the same."

The Irrawaddy and other large rivers of Burma.

In one specimen a long anal papilla was present. This species is the Burmese representative of *P. atherinoides* of India.

P. GURUA, Ham. Buch.

B. vi. ; D. $\frac{1}{2}$; P. $\frac{1}{17}$; V. 6 ; A. 29·36 ; C. 17.

Eye situated partly on the lower surface of the head, having a broad, circular, adipose lid. Upper jaw the longer. Nasal barbels half, or nearly so, as long as the head ; the maxillary extend to the middle or end of the ventral fin, while the two mandibular ones are as long as the head. Silvery, fins stained with grey. Grows to 2 feet or more.

The larger rivers of Burma.

OLYRA, *MacClelland*.

Body elongate and low, with horizontal dorsal profile. Head depressed. Nostrils remote from one another, the posterior provided with a barbel. Barbels 8. Eyes small. Villiform teeth in the jaws and palate. Skin smooth.

O. BERMANICA, Day.

D. 8·0; P. $\frac{1}{2}$; V. 7; A. 16; C. 17.

The maxillary barbels longest, extending nearly to the base of the ventral fin. No dorsal spine, its first ray the shortest. Colour dark brown. Streams in the Pegu Yoma.

b. *No second or adipose dorsal fin.*

CALLICHOUS, *Hamilton Buchanan.*

Head covered with skin. The lower jaw the longer. Eyes subcutaneous, behind the gape. Barbels 4, a maxillary pair, and a post-symphysial pair on the mandible, sometimes rudimentary or absent. Nostrils remote from one another. Teeth villiform on jaws and vomer, none on the palate. No axillary pore.

Fishes of this genus are excellent eating. They rarely exceed a foot in length and are called "butter fish" by Europeans, and "puffta" in Oerdoe.

a. *Anal and caudal fins united.*

b. *Anal fin distinct from the caudal.*

C. PABO, *Ham. Buch.*

B. xii; D. 5; P. $\frac{1}{4}$; V. 9·10; A. 66·71; C. 17.

The maxillary barbels reach the hinder edge of the eye, or a little further, the mandibular ones are fine and short. Pectoral spine feebly serrated, or entire in Burma. Silvery, with an indistinct shoulder spot.

Burma.

C. MACROPHthalmus, *Blyth.*

Ngā-nu-thān.

B. xv.; D. 4; P. $\frac{1}{12-15}$; V. 8; A. 69·73; C. 18.

The maxillary barbels reach to the eighth or tenth anal ray, the mandibular ones are half as long as the head. Caudal deeply forked. Silvery, a dark round shoulder spot over the middle of the pectoral spine.

Burma.

WALLAGO, *Bleeker.*

Head covered with soft skin. Snout produced, the lower jaw a little the longer. Eyes above the line of the gape. Nostrils apart, the posterior small and patent, the anterior slightly tubular. Barbels 4, one maxillary and one mandibular pair. Teeth numerous, cardiform in jaws and vomer, none on the palatines. Axillary pore minute, if present.

W. ATTU, *Bloch.*

Ngā-bāt, Burma.

B. xix·xxi; D. 5; P. $\frac{1}{13-15}$; V. 8·10; A. 86·93; C. 17.

Eyes with free lids. The maxillary barbels twice as long as the head, the mandibular ones as long as the snout. Colour uniform, fins sometimes finely punctate. It grows to at least 6 feet and is good eating.

Burma.

SILURUS, *Ardèi.*

Head covered with soft skin. Eyes above the line of the gape, subcutaneous. Nostrils remote from one another. Barbels 6, 1 pair maxillary, 2 mandibular. Teeth cardiform or villiform on jaws and vomer, none on the palatines. Anal and caudal fins approximate, but not continuous.

S. COCHINCHINENSIS, *Cuv. et Val.*

B. xiv·xv.; D. 4; P. $\frac{1}{17}$; V. 10; A. 62·64; C. 17.

Eyes minute. The maxillary barbels twice the length of the head, the mandibular shorter than it. Colour plumbeous, purplish below, and minutely black-punctate, sometimes an irregular finger mark on the shoulder. Caudal sometimes yellow.

Arakan. Tenasserim.

c. *Two rayed dorsals.*

CHACA, *Cuvier et Valenciennes.*

Head large, depressed. Gape very wide. Lower jaw prominent. Eyes minute, subcutaneous, and superior. One maxillary and two mandibular pairs of barbels; occasionally a nasal pair. Teeth villiform in both jaws, palate edentulous. Two dorsal fins, the second confluent with the caudal. Two anal fins, the second confluent with the caudal. No axillary pore.

C. LOPHIOIDES, Ham. Buch.

B. vi.; D. $\frac{1}{3} \frac{1}{4}$ 19·25; P. $\frac{1}{5}$; V. 6; A. 8·10:8·12; C. 11.

Brownish, darker marbled. Grows to 8 inches.

The larger rivers of India and Burma, and tanks near them.

Hamilton Buchanan says of this fish, "Of all the horrid animals of this tribe, the *Chaka* of this district is the most disagreeable to behold. It has the habit of the fishes called by Lacépède *Uranoscope* and *Cotté*, that is, it conceals itself among the mud, from which, by its lurid appearance, and a number of loose filamentous substances on its skin, it is scarcely distinguishable, and with an immense open mouth it is ready to seize any small prey that is passing along. In order that it may see what is approaching, the eyes are placed on the crown of the head. All persons turn away from it with loathing."

The "filamentous substances," to which Buchanan seems to have taken such exception, are doubtless the short tentacles over the head and body, round the eyes, and along the mandible, which are present in specimens from India, but which were wanting in a specimen taken by Day in the Irrawaddy.

PILOSUS, *Lacépède.*

Head depressed, covered with skin. Eyes with a free circular margin. Nostrils remote from one another, the hinder patent, the anterior tubular, and on the front edge of the snout. Barbels 8. Teeth conical in the upper, mixed in the lower jaw, molariform in the vomer. Dorsals 2, the last confluent with the caudal, as in the anal also. A dendritic post-anal apparatus.

P. CANES, Ham. Buch.

B. xi·xiii.; D. $\frac{1}{3}$ 2 D + C + A. 242·271; P. $\frac{1}{10} \frac{1}{11}$; V. 12.

Brown, the vertical fins edged with black. Grows to over 3 feet. Estuaries of Burma.

B. *Air-vessel more or less inclosed in bone.*

1. *No adipose dorsal fin.*

CLARIAS, *Gronovius.*

A dendritic accessory branchial apparatus, attached to the convex side of the second, third, and fourth branchial arches, is received into a recess above and behind the usual gill cavity. Eyes small, with a free circular margin. Barbels 8. Teeth villiform in the jaws and vomer. Dorsal long, and without a spine, extending from the neck to the caudal, with which it may be continuous. No adipose fin. Air-vessel small, transverse, lobed, and inclosed in bone.

Vertical fins not confluent with the caudal.

C. MAGUR, Ham. Buch.

Ngā-klm.

a. B. ix.; D. 62·76; P. $\frac{1}{8} \frac{1}{11}$; V. 6; A. 45·58; C. 15·17.

Head shagreened above, with fine granules. On the head are 2 depressions, the anterior oblong, falling partly between the eyes, the posterior oval between the anterior fossa and the occipital process. Dingy green, or brownish above, lighter below. The vertical fins usually with reddish margins. Grows to $1\frac{1}{2}$ feet.

Burma.

It lives long after being removed from water, and its flesh is esteemed highly nourishing.

SACCOBRANCHUS, *Cuvier et Valenciennes*.

Gill cavity with an accessory posterior sac, extending backwards on either side of the neural spines amongst the muscles of the abdominal and part of the caudal region. Head depressed. Eyes with a free circular margin. Barbels 8. Air-vessel placed transversely across the bodies of the anterior vertebra, where it is inclosed by bone; a duct passes up from either side of the air-vessel, unites and opens into the inferior surface of the pharynx. Dorsal short, spineless. Ventral short. Anal long.

S. FOSSILIS, Bloch.

Ngā-gyī.

D. 6·7; P. $\frac{1}{2}$; V. 6; A. 60·79; C. 19.

Anal and caudal separated by a notch. Colour plumbeous, with sometimes two longitudinal yellowish bands. The young sometimes reddish. Eggs pea-green. Grows to a foot or more.

Rivers and ponds in Burma.

Wounds from the pectoral spine of this fish are horribly dreaded by the fisherman, as they are supposed to be poisonous and to cause tetanus; the spines are therefore invariably broken off on capture. Its flesh is highly esteemed for its invigorating properties, and tanks are often stocked with this fish in consequence.

2. *An adipose dorsal fin.*

SILUNDIA, *Cuvier et Valenciennes*.

Body elongated and compressed. Eyes lateral, with narrow adipose lids. The nostrils on either side approximating, the anterior pair in front of the snout and a little external to the posterior pair. A pair of maxillary and sometimes a pair of mandibular barbels. Villiform teeth on the jaws and in an uninterrupted band on the palate. An axillary pore. Air-vessel reniform, convex before, lying across the body of an anterior vertebra, with the aorta between, and having its lateral margin protected by bone.

S. GANGETICA, *Cuv. et Val.*

D. $\frac{1}{2}$ ·0; P. $\frac{1}{12}$ — $\frac{1}{13}$; V. 6; A. 40·46; C. 17.

Barbels a single pair of minute maxillary ones.

Bluish above, silvery below. Fins stained with grey. Grows to 6 feet or more. The larger rivers of Burma and India.

EUTROPIENTHYS, *Bleeker*.

Body and head compressed. Head covered with a soft skin. Eyes with broad adipose lids. Gape deep, upper jaw slightly the longer. Nostrils wide and patent, the anterior outermost and lateral. Barbels 8. Teeth on jaws sharp, and also on the vomer and palatines. Air-vessel tubiform, lying across the body of an anterior vertebra, with the aorta intervening and protected by bone. No axillary pore.

E. VACHA, *Ham. Buch.*

Var. BURMANICUS, *Day*.

Kā-tha-boung and Ngā-myen-kōn-bān.

B. xi.; D. $\frac{1}{2}$ ·0; P. $\frac{1}{12}$ — $\frac{1}{13}$; V. 6; A. $\frac{3}{4}$ — $\frac{4}{7}$; C. 17.

The nasal barbels reach the hind edge of head or further. Maxillary ones as long as the head. The mandibular ones shorter. Ventral reaches half-way to the anal. Silvery, greyish along the back. Pectoral and caudal usually black-edged.

AMBLYCEPS, *Blyth.*

Head covered with soft skin. No thoracic adhesive disk. Eyes small, subcutaneous. Mouth anterior, gape wide. Nostrils close together, the posterior with a barbel. Villiform teeth in jaws, palate edentulous. Pectoral with a concealed spine. Air-vessel almost entirely inclosed in bone. No axillary pore.

A. MANGOIS, Ham. Buch.

B. xii.; D. $\frac{1}{2}$ ·0; P. $\frac{1}{2}$; V. 6; A. 9·12; C. 19.

Nasal and inner mandibular barbels as long as the head. The maxillary reach to the end of the pectoral spine, and the outer mandibular ones are not quite so long. Olive brown, lighter beneath. In some a dark line from opposite the opercle, divides, one band going to the caudal, the other to the base of the anal. Grows to 5 inches.

Hill streams from Afghanistan to Burma. (Maulmain.)

GAGATA, *Bleeker.*

Top of head with sharp longitudinal ridges covered with thin skin. Eyes subcutaneous. Snout overhanging the mouth. Nostrils close together, the anterior rounded, the posterior valvular. Barbels 8. Villiform teeth in jaws, palate edentulous. Air-vessel in two rounded portions, each of which is inclosed in an osseous cup.

G. CENIA, Ham. Buch.

Ngā-nan-joung.

B. v. vi.; D. $\frac{1}{4}$ ·0; P. $\frac{1}{2}$; V. 6; A. 14·16; C. 19.

Nasal barbels rudimentary, the maxillary reach to beyond the base of the pectoral spine. The two mandibular pairs rise on a transverse line across the chin, the outer ones half as long as the head. Dull grey. Caudal whitish. The outer two-thirds of the pectoral, and the outer halves of the other fins black. The young are yellowish bronze, silvery below. Blackish barred over the head and body, as low as the lateral line. Caudal and dorsal with black marks. Grows to a foot.

Burma.

BAGARIUS, *Bleeker.*

Head depressed, osseous above. Upper jaw the longer. Eyes with free margins. Nostrils approximating. Barbels 8. Teeth in jaws pointed, of unequal size, palate edentulous. Air-vessel small, its two rounded portions inclosed in bone. An axillary pore.

B. YARELLII, Sykes.

B. xii.; D. $\frac{1}{2}$ ·0; P. $\frac{1}{2}$; V. 6; A. 13·15; C. 17.

The maxillary barbels with broad bases, and longer than the head. The nasal pair short. Teeth sharp and unequal in the jaws, with an outer enlarged row in the mandible. Grey or yellowish, with irregular brown or black markings and cross-bands. A black base to all the fins. Grows to 6 feet or more.

This fish is sometimes called a fresh-water shark, as is the *Siluridia*. Mason specifies a large cat fish which may apply to either or both.

GLYPTOSTERNUM, *Mac Clelland.*

Head depressed, covered with soft skin. Eyes small, subcutaneous. Mouth inferior, upper jaw the longer. Nostrils close together, separated by a barbel. Barbels 8. Villiform teeth in jaws, palate edentulous. An adhesive apparatus of longitudinal plaits between the pectorals.

G. TRILINEATUM, *Blyth.*

D. $\frac{1}{2}$ ·0; P. $\frac{1}{2}$; V. 6; A. 13; C. 19.

The maxillary barbels reach to the end of the head, the nasal pair nearly to the orbit. The inter-mandibular barbels the longer, and reaching to the base of the pectoral fin. Colour chestnut-brown, with a light streak along the back, another along the lateral line and a third near the abdominal margin. Grows to a foot.

Burma, as far south as Tenasserim.

EXOSTOMA, Blyth.

No thoracic adhesive apparatus. Mouth inferior, lips reflected and tubercular. Nostrils close together, separated by a barbel. Teeth in several rows. Palate edentulous.

E. BERDMOREI, Blyth.

D. 3·0; P. 1¹/₆; V. 6; A. 6; C. 14.

The maxillary barbels reach the base of the pectoral fin. Dingy olive brown, with obscure dark broad bands, the fins usually darker.

Tenasserim.

Family Scopelidæ.

Pseudobranchiæ well developed. No barbels. Two dorsal fins, the posterior adipose. Ova inclosed in sacs in the ovaries and extruded by oviducts. Air-vessel small or absent.

HARPODON.

Premaxillaries from the margin of the upper jaw. Caudal trilobed. Thin and deciduous scales over the last three-fourths of the body.

H. NEHEREUS, Ham. Buch.

Bammaloh, or 'Bombay duck.'

B. xxiii·xxvi.; D. 12·13 : 0; P. 11·12; V. 9; A. 13·15; C. 19.

Body compressed. Snout short. Lower jaw the longer. Teeth recurved and erectile. In both jaws there are 3 rows of teeth, the outer minute, the inner the largest, and largest in the mandible. Teeth in 2 rows on the pharyngeals and palatines. Fine teeth on the tongue, hyoid bone and the upper margin of the branchial arches. The first dorsal is midway between the snout and tail. The point of the ventral reaches to the middle of the anal; a long thin elongated scale at its base. Head, back, and sides, semitransparent, like gelatine. Light greyish, with minute stellate black dots. Anterior part of the belly pale silvery bluish, the rest greyish-white. Fins transparent, like the body, but more closely dotted. Grows to 16 inches.

These fish when freshly caught and at once cooked are not unjustly esteemed the most delicate of any in the East. They are better known, however, in the dried state made up into bundles, and are then toasted brown with a little cayenne pepper on them, and handed round with curry, to which they impart a subempyreumatic flavour of dried fish, a strong liking for which is soon acquired. These 'Bombay ducks' as they are called are a standing dish at breakfast, on board the coasting steamers, and are very nice; but it is as well not to watch their being brought up from the store room by a naked 'lascar' afflicted perhaps with a cutaneous disease, and who, with a bundle of these delicacies under his naked arms, stops ever and anon for a quiet scratch!

Family Scombresocidæ.

Pseudobranchiæ concealed, glandular. Margin of the jaw formed mesially by the premaxillaries, laterally by the maxillaries. Lower pharyngeals united into a single bone.

B. STRONGYLURUS, v. Hasselt.

Thook-o-doo-noo-dah. Andamans.

B. xii.; D. 13·15; P. 11; V. 6; A. 16·18; C. 15.

A shallow median groove on the top of the head. Teeth on the jaws sharp, straight, not large, distant. Back and crown of head yellowish green, minutely brown-dotted, silvery on the sides, cheeks and opercles, white on the belly. A deep blue lateral band posteriorly, with a broader silvery one below it. Dorsal with a little orange

along its upper edge. Pectoral and ventral diaphanous, the latter with sometimes a black spot at the base. Caudal yellowish or greenish, minutely black-dotted and with a bluish-black spot at its base.

The Andamans.

BELONE, Cuvier.

Both jaws elongated into a beak. No finlets. Bones green.

B. CANCLA, Ham. Buch.

Ngā-lpoung-yo.

B. x.; D. 15·18; P. 11; V. 6; A. 16·18; C. 15.

A deep longitudinal groove along the top of the head. A row of large sharp distant teeth on both jaws, with an external row of fine ones, none on the vomer. Greenish grey above, whitish along the belly. A dark-margined silvery streak from the orbit to the tail. The upper two-thirds of the body closely marked with five black spots, with four or five larger blotches between the bases of the pectoral and anal fins. Dorsal and caudal fins tipped behind with darker. Eye golden.

Ta-goung.

HEMIRHAMPHUS, Cuvier.

The lower jaw only elongated into a beak.

H. UNIFASCIATUS, Ranzani.

B. x.; D. 15·16; P. 12; V. 6; A. 15·17; C. 16.

Teeth fine and numerous in both jaws. Bluish, with a narrow silvery band.

The Andamans.

H. LIMBATUS, Cuv. et Val.

B. x.; D. 13·14; P. 10; V. 6; A. 13·15; C. 14.

Teeth minute, in many rows in both jaws, tricuspidate. The lower caudal lobe the longer. A brilliant silvery lateral band posteriorly, as broad as one scale. Dorsal and top of tail sometimes blackish.

Burma, in tidal rivers.

H. BUFFONIS, Cuv. et Val.

Koo-door-rook-o-dah. Andamans.

B. xi.; D. 14; P. 10; V. 6; A. 10·12; C. 13.

A barbel at the posterior nostril. Teeth conical in both jaws. Lower rays of caudal slightly produced. A narrow silvery lateral streak, less than a scale broad, below the dorsal. Upper half of dorsal black.

The Andamans, and tidal rivers.

H. ECTUNCTIO, Ham. Buch.

Ngā-lpoung-yo.

B. x.; D. 13·14; P. 9; V. 6; A. 10·12; C. 15.

Upper jaw twice as long as its base is broad. Top of head flat. Teeth fine and conical. Anal rays thickened in the male. Caudal rounded. Scales on the upper jaw, none on the vertical fins. Dull greenish-brown, with an indistinct lateral band. End of upper jaw milk white.

Akyab and Burma.

H. DISPAR, Cuv. et Val.

B. x·xi.; D. 11·12; P. 10; V. 6; A. 11·12; C. 15.

Upper jaw as long as it is broad at the base. A nasal barbel. Caudal cut square, or slightly rounded. Scales on the upper jaw, none on the dorsal or anal fins.

The Andamans.

EXOCÆTUS, Artedi.

Pectorals elongated, so as to form an organ for flying. Air-vessel large.

E. EVOLANS, L.

D. 12-14; P. 14; V. 6; A. 13-15; C. 17.

Interorbital space flat. Caudal lobed, the lower much the longer. Six and a half rows of scales between the origin of the dorsal fin and the lateral line. Bluish along the back, lighter below. Pectoral grey or black, with a light edge. Grows to 9 inches. The Andamans.

Family Cyprinodontidæ.

Pseudobranchiæ absent. Barbels none. The margin of the upper jaw formed solely by the premaxillaries. Teeth in both jaws and on the pharyngeal bones.

HAFLOCHILUS, *MacClelland*.

Upper surface of nape and head broad and depressed. Mandibular rami united at the symphysis. Teeth villiform.

H. MELASTIGMA, *MacClelland*.

B. iv.; D. 6-7; P. 15; V. 6; A. 20-24; C. 15.

Lower jaw slightly the longer, the maxilla does not quite reach to the front edge of the eye. Teeth minute. Dull green above, dull white below. Outer portion of anal rays white-edged. A narrow dark line along the middle of the side, terminating in a dull spot at the base of the caudal. Grows to 6½ inches.

Burma.

H. PANCHAX, *Ham. Buch.*

Ngā-saki, Arakan. Choto-dah, Andamans.

B. v-vi.; D. 7-11; P. 15; V. 6; A. 15-17; C. 13.

Lower jaw rather the longer; the maxilla reaches to the first third of the eye. A row of enlarged teeth in the upper jaw, and a broad band on the vomer. A white occipital spot. Upper surface greenish, below dull white. Fins yellowish, the lower third of the dorsal covered by a large black spot. Dorsal, caudal, and anal, orange-margined. Ova very large.

Burma and the Andamans.

Family Cyprinidæ.

Branchiostegals 3. Margin of the upper jaw formed of the premaxillaries. Mouth toothless, but one to three rows of teeth in the inferior pharyngeal bones. Head scaleless (in Indian species).

*A. Belly rounded, not trenchant.**A. Dorsal fin commencing nearly opposite the ventrals. Anal short.*HOMALOPTERA, *v. Hasselt*.

Head and body anteriorly depressed, snout spatulate. Mouth small, inferior, with two pair of rostral and one of rictal barbels. Pharyngeal teeth small, 5 to 16 in one row.

H. BILINEATA, *Blyth*.

B. iii.; D. 10; P. 17; V. 9; A. 7; C. 19.

Snout pointed, upper lip fimbriated. Eyes small. Air-vessel none. Brownish, with a wide dark chestnut band from the snout to the tail.

Tenasserim.

DISCOGNATHUS, *Heckel*.

Body elongated, subcylindrical. Mouth transverse, semicircular and inferior. Upper and lower lips continuous. A suctorial disk on the chin formed on the lower lip. Upper lip fringed. Barbels 4, a rictal pair on each side. Air-vessel small.

D. LAMTA.

B. iii.; D. 11; P. 15; V. 9; A. 7; C. 17.

Snout very variable, smooth, or covered with pores, with sometimes a deep transverse depression, sometimes with a spinate gland on either side. Greenish, with a bluish-green band along the centre of the body, extending along the middle of the tail. Generally a dark spot behind the gill opening. Belly yellowish-green. Fins yellowish, tipped with black.

Tenasserim.

LABEO, *Cuvier*.

Body moderately elongated. Mouth generally semioval and inferior. Lips thick, continuous at the gape, and one or both with an inner transverse fold. A soft and movable horny covering with a sharp margin on the inner side of one or both lips. Snout rounded, projecting, tubercular, sometimes laterally lobed. Pharyngeal teeth in 3 rows.

L. NANDINA, Ham. Buch.

Ngā-ōng-dōng. Ngā-ni-pyā.

B. iii.; D. 24-26; P. 15; V. 9; A. 7; C. 19.

Snout slightly projecting with a few fine pores on it. Lips thick and fringed, and a distinct inner fold above and below. Barbels 4, short. Ventral inserted below the ninth dorsal ray. Caudal deeply forked. Dark greenish above, paler below. A few cloudy blotches on the side. Some of the scales with red centres.

Burma. (The Irrawaddy, Maulmain, etc.)

L. CALBASU, Ham. Buch.

Ngā-nek-pyā. Ngā-nu-thān. Ngā-ōng-dōng.

B. iii.; D. 16-18; P. 19; V. 9; A. 7; C. 19.

Snout obtuse and depressed, without lateral lobe, but with pores. Lips thick, fringed, and each with an inner fold. Barbels 4. Ventral commences below the fourth or fifth dorsal ray. Blackish. When caught in clear streams, many of the scales have a scarlet centre. Fins black, tip of caudal sometimes white above. Grows to 3 feet, and is good eating.

Burma.

L. STOLICZKE, Steindachner.

B. iii.; D. 15-16; P. 19; V. 9; A. 7; C. 19.

A deep groove across the chin, with a distinct labial fold. Upper lip very finely fringed. Pores on the snout. A very short pair of maxillary barbels concealed in the labial fold. Deep leaden-silvery above, white shot with gold below.

Irrawaddy River and Maulmain.

L. GONIVS, Ham. Buch.

Nga-dien, Nga-hoo (Ngā-pay, Tenasserim).

B. iii.; D. 16-18; P. 17; V. 9; A. 7; C. 19.

Snout with numerous pores. Lips thick, with a distinct inner fold for their entire circumference, both of which are fringed. A cartilaginous covering to inner side of both jaws. Barbels short, both maxillary and rostral. Ventral commences under the middle of the dorsal.¹ Caudal deeply forked. Greenish above, lighter below. Scales dark-edged and many with red crescentic spots. Grows to nearly 5 feet in length.

Burma.

L. KOMTA, Ham. Buch.

Ngā-myt-chyn, Nga-myt-tsan-nee.

B. iii.; D. 15-16; P. 17; V. 9; A. 7; C. 19.

¹ In the figure exxvii. f. 1, the ventral is a little in advance of this.

Snout scarcely swollen, but projecting beyond the jaws. Lips thick, fringed, and with a distinct inner fold above and below. A short and thin pair of maxillary barbels, and sometimes a rostral pair. Ventral inserted below the third or fourth dorsal ray. Caudal deeply forked. Bluish or brownish above, silvery on the sides and belly. Scales sometimes red-spotted. Fins sometimes black.

Grows to 3 feet, and is excellent eating.

Burma.

L. ANGRA, Ham. Buch.

Ngā-loo.

B. iii. ; D. 12·13 ; P. 16 ; V. 9 ; A. 7 ; C. 19.

Snout overhanging the jaws, with lateral lobes, and studded with pores. Lips continuous, fimbriated, and with a deep groove across the chin. A short pair of maxillary barbels, or in Burmese examples, in place thereof, is a fleshy flap inside the groove. Ventral inserted beneath the first third of the dorsal. Caudal deeply forked. Brownish above, with a black blotch at the base of the tail.

The Irrawaddy and Sittoung Rivers.

L. BOGA, Ham. Buch.

Kyook-nya-loo.

B. iii. ; D. 11·13 ; P. 16 ; V. 9 ; A. 7 ; C. 19.

Snout projecting, but no lateral lobes, sometimes covered with large pores. Lips rather thick, the lower being reflected from off the mandible and roughened inside, and with a thin layer of cartilage inside. Orange, with fins reddish, and sometimes a dark shoulder spot. Grows to a foot.

OSTEOCHILUS, *Günther*.

Mouth directed downwards. Lips thickened, continuous, the lower being reflected from off the mandible, leaving it uncovered, as a sharp and hard transverse prominence.

O. CHALYBEATUS, Cuv. et Val.

Ngā-leh.

B. iii. ; D. 20 ; P. 18 ; V. 9 ; A. 7 ; C. 19.

Snout overhanging, without lateral lobes. Barbels 4. The maxillary pair half as long as the orbit, the rostral ones shorter. Grey above, lighter below, with narrow dark lines along the body. Fins black.

The Irrawaddy and Salween Rivers.

O. NEILLI, Day.

B. iii. ; D. 17·18 ; P. 15 ; V. 9 ; A. 7 ; C. 19.

Snout rounded and smooth, scarcely overhangs. The rostral barbels do not reach the orbit, the maxillary extend to beneath its centre. Colour greyish-yellow, darker above, each scale darker at its base. A dull spot at the base of the tail and an ill-defined one near the commencement of the lateral line. Fins yellowish orange. Grows to 6 inches.

The Sittoung and Beeling Rivers.

O. CEPHALUS, Cuv. et Val.

B. iii. ; D. 16 ; P. 20 ; V. 9 ; A. 9 ; C. 19.

Snout swollen, projecting, and with many pores. The mandible has a transverse free edge, with thick lips, both the upper and lower fringed. One short pair of maxillary barbels. Greenish, the scales darker at their base. Grows to 1 foot.

Pegu.

DANGILA, *Cuvier et Valenciennes*.

Snout moderately depressed and obtusely rounded. Mouth transverse, inferior. Lower jaw sharp, covered with a thin lip and with a symphyseal tubercle. One maxillary and mandibular pair of small barbels.

D. BURMANICA, Day.

B. iii. ; D. 26·28 ; P. 16 ; V. 9 ; A. 7 ; C. 19.

Upper caudal lobe the longer. Silvery, some of the scales with dark spots at their base, forming horizontal bands. Fins orange. Grows to 10 inches.

Maulmain and Tavoy.

D. BERDMOREI, Blyth.

B. iii. ; D. 26 ; V. 9 ; A. 7.

Large pores on front of snout. Lower lip thick, not fringed. Colour (in spirit) uniform.

Tenasserim.

CIRRINA, *Cuvier et Valenciennes*.

Snout depressed, obtusely rounded, with soft covering extremely thin. Mouth broad, transverse. Upper lip not continuous with the lower. Lower jaw sharp, with a thin lip, or none, and a small tubercle over the symphysis.

C. MRIGALA, Ham. Buch.

Ngā-kyin and Ngā-gyein.

B. iii. ; D. 15·16 ; P. 15 ; V. 9 ; A. 8 ; C. 15.

Dorsal commences nearer to the snout than to the tail. Silvery, dark grey along the back, sometimes having a coppery tinge. Pectoral, ventral, and anal fins orange, stained with black. Grows to three feet, and is an excellent species for stocking tanks with.

Burma.

SEMILOTUS, *Bleeker*.

Snout thick and prominent. Mouth wide, transverse, inferior, with a knob at the symphysis. No barbels. Dorsal long, its last undivided ray strong.

S. MODESTUS, Day.

B. iii. ; D. 24 ; P. 15 ; V. 9 ; A. 9·10 ; C. 19.

Several open pores on either side of the snout. A thin cartilaginous covering to the mandible. The last undivided ray of the dorsal is serrated. Silvery, darkest above. Ventrals and anal tipped with orange.

Akyab in hill streams.

S. MACCLELLANDII, *Bleeker*.

B. iii. ; D. 27·28 ; P. 16 ; V. 10 ; A. 9 ; C. 19.

Snout thickened, with a line of 6 open pores crossing it towards the orbit. A horny covering to the mandible. Leadensilvery, darkest above, the pectoral, ventral and anal fins orange. Grows to 2 feet.

Burma.

CATLA, *Cuvier et Valenciennes*.

Head broad. Snout with very thin integuments. Lower lip thick, with a continuous and free posterior margin. Upper lip none. The mandible with a movable symphyisial articulation, but no tubercle. Barbels none.

C. BUCHANANI.

Ngā-thaing.

B. iii. ; D. 17·19 ; P. 21 ; V. 9 ; A. 8 ; C. 19.

Lower jaw prominent, in large fish some pores on the snout. Greyish on back. Silvery on the sides and belly. Fins dark. Grows to 6 feet.

Burma.

This fish is good for stocking tanks, and up to 2 feet its flesh is excellent, larger fish are rather coarse.

AMBLYPHARYNGODON, *Bleeker*.

Mouth wide. Lower jaw prominent. Upper lip none, and only a short labial fold along the mandible. No barbels. Pharyngeal teeth molariform. Scales small.

A. ATKINSONII, Blyth.

Ngā-pān-mā.

B. iii.; D. 9 10; P. 15; V. 9; A. 8; C. 19.

Dorsal and abdominal profile similar. Silvery, with a golden gloss over the head.

Burma and Upper Burma.

A. MOLA.

Ngā-leh-hpyoo and Ngā-zen-zāp.

B. iii.; D. 9; P. 15; V. 9; A. 7; C. 19.

The dorsal profile more convex than the abdominal. A silvery lateral band, and dark markings on the fins.

Burma.

BARBUS, *Cuvier et Valenciennes*.

Mouth arched. Jaws closely invested by the lips. Eyes without adipose lids. Pharyngeal teeth. Barbels present.

A. *Four barbels present.*

A. *Last undivided dorsal ray osseous and serrated.*

B. SARANA, Ham. Buch.

Ngā-khōn-mā-gyi and Ngā-chong.

B. iii.; D. 11; P. 15; V. 9; A. 8; C. 19.

Lower labial fold interrupted. No pores on the snout. The rostral barbels as long as the orbit, the maxillary pair longer. Silvery darkest above; opercles shot with gold. Upper row of scales sometimes horizontally banded. Fins white or yellowish, externally stained with grey. In Burma the caudal is sometimes black-edged. Grows to a foot.

Burma.

B. GONIOSOMA, *Bleeker*.

B. iii.; D. 11; P. 15; V. 8; A. 7; C. 19.

Rostral barbels extend to below the middle of the eye, the maxillary ones to opposite the posterior margin of the orbit. The lower caudal lobe the longer. Silvery, fins orange.

Mergui.

B. MARGARIANUS, *Anderson*.

B. iv.; D. 12; P. 18; V. 9; A. 7; C. 19.

Abdominal profile more convex. Some large open pores on the front and sides of snout. No transverse sulcus across the mandible. Four barbels, the rostral reaching to below the first third, and the maxillary pair to below the last third of the eye. Silvery blue along the back. Sides and belly white. Some of the scales basally dark marked. A black band down the middle of the dorsal fin. Caudal black-margined.

Namponng River, Kakhyen Hills.

B. *Last undivided dorsal ray osseous and entire.*

B. STRACHEYI, *Day*.

B. iii.; D. 11; P. 17; V. 9; C. 17.

Mouth without enlarged lips, lower labial fold interrupted. Upper jaw somewhat the longer. Crown of head flat. Barbels long, as in *goniosoma*. Osseous dorsal ray strong and smooth. Uniform silvery.

Akyab. Maulmain.

B. STEVENSONII, Day.

B. iii. ; D. 12 ; P. 17 ; V. 9 ; A. 8 ; C. 19.

Body elongated and compressed. Upper jaw the longer. Lower labial fold interrupted. The maxillary barbels extend to below the posterior extremity of the orbit; the rostrals are shorter. Osseous dorsal ray weak and smooth. Silvery, above darker, numerous black specks along the side, a black spot at the base of the tail, and a dark band along the dorsal fin.

Hills near Akyab.

B. BLYTHII, Day.

B. iii. ; D. 12 ; P. 15 ; V. 9 ; A. 8 ; C. 17.

Preorbital covered with pores. Barbels well developed. Caudal deeply forked. $2\frac{1}{2}$ rows of scales between the lateral line and the base of the ventral fin. Uniform silvery (in spirit). Perhaps this species is the young of *B. compressus*.

Tenasserim.

B. *Two barbels present.*

a. *With an osseous dorsal serrated ray.*

B. MACROLEPIDOTUS, Cuv. et Val.

B. iii. ; D. 12 ; P. 17 ; V. 9 ; A. 7 ; C. 19.

Snout pointed, upper jaw slightly the longer. Head compressed, flat above. The maxillary barbels as long as the orbit. Silvery, paler below. Fins orange, anterior edge of the dorsal and outer margins of the caudal black. A badly developed dark band from the dorsal to the ventral fin.

Tavoy.

b. *Osseous dorsal ray entire.*

B. CHOLA, Ham. Buch.

Ngã-không and Ngã-lowah.

B. iii. ; D. 11 ; P. 15 ; V. 9 ; A. 7 ; C. 19.

Jaws equal in front. Barbels short. Silvery, opercles shot with purple and gold. A dark blotch usually exists on the free portion of the tail. A dark mark on the base of the first dorsal rays, and a row of dark spots along its centre. Grows to 5 inches. The flesh is bitter.

Akyab to Mergui.

B. BURMANICUS, Day.

B. iii. ; D. 12 ; P. 15 ; V. 9 ; A. 7 ; C. 17.

Snout pointed, a considerable rise from the snout to the dorsal fin. Maxillary barbels very short. Labial fold interrupted. Silvery, paler below. A dull blotch before the base of the caudal fin. Fins silvery, with a dull band down the centre of the dorsal.

Burma.

C. *No barbels.*

a. *Last undivided ray osseous and serrated.*

B. APOGON, Cuv. et Val.

Ngã-ta-si and Ngã-lê-toung.

B. iii. ; D. 12 ; P. 17 ; V. 10 ; A. 8 ; C. 19.

Body strongly compressed, and rising abruptly from the nape to the base of the dorsal fin. Upper jaw overlaps. Silvery, each scale dark-spotted. Grows to 8 inches.

Mandalay to Tenasserim.

B. STOLICZKANUS, Day.

B. iii.; D. 10·11; P. 14; V. 9; A. 7; C. 19.

Mouth small. Silvery, an oblong black mark on the lateral line about the third scale, and a deep black mark above and behind the hinder extremity of the anal fin, on the eighteenth and nineteenth scales, reaching almost to the back, and edged in front with yellow. Fins orange. Grows to 4 inches.

Darjeeling to Maulmain.

B. PHTUNIO, Ham. Buch.

B. iii.; D. 10·11; P. 15; V. 9; A. 8; C. 19.

Mouth small. Reddish-brown, with a black band from the back to opposite the middle of the pectoral, and another to the end of the base of the anal fin. Two other light bands pass down from either end of the dorsal. A dark band down the centre of the dorsal, and another at the base of the tail. Grows to 3 inches.

Burma.

b. *Osseous dorsal ray entire.*

B. STIGMA, Ham. Buch.

Ngā-không-mā.

B. iii.; D. 11·12; P. 17; V. 9; A. 8; C. 19.

Upper jaw slightly the longer. Lower labial fold interrupted. Silvery, with a seasonal scarlet, lateral band, and a dark mark across the base of the middle dorsal rays. A round black blotch at the root of the tail. Grows to 5 inches. The flesh is bitter.

Burma.

B. PUNTIO, Ham. Buch.

B. iii.; D. 11; P. 15; V. 9; A. 7; C. 21.

Mouth small. Colour silvery. A wide black band encircles the free portion of the tail, and includes the tip of the anal fin. Dorsal orange, tipped with black. Grows to 3 inches.

Burma.

NERIA, *Cuvier et Valenciennes.*

Mouth narrow, directed obliquely, upwards. Barbels 4, the rostral shorter than the maxillary pair. Dorsal fin without osseous rays.

S DAURICA, Ham. Buch.

Ngā-zyn-byun.

B. iii.; D. 8; P. 15; V. 9; A. 8.

The maxillary barbels reach to the base of the tail, or a little less. A broad black lateral band (sometimes absent). Grows to 5 inches.

Burma. The Nicobars.

RASBORA, *Bleeker.*

Cleft of mouth oblique, lower jaw slightly prominent, having one central and on either side a lateral prominence fitting into emarginations in the upper jaw. Eyes with free lids. Dorsal fin without any osseous ray.

R. ELANGA, Ham. Buch.

B. iii.; D. 9; P. 15; V. 8·9; A. 7; C. 19.

Head pointed. One pair of short rostral barbels. Silvery, with sometimes a plumbeous band along the top of the side. Grows to 8 inches.

Burma.

R. DANICONTUS, Ham. Buch.

Ngā-doung-zi.

B. iii.; D. 9; P. 15; V. 9; A. 7; C. 19.

No barbels. A black band more or less distinct, from the eye to the tail, and sometimes a silvery band edged above with yellow runs along the sides. Grows to 8 inches.

Burma.

R. BUCHANANI, Bleeker.

B. iii.; D. 9; P. 15; V. 9; A. 7-8; C. 19.

Abdominal profile more convex than the dorsal. Silvery, with a faint side streak. Caudal tipped with black.

Burma.

ASPIDOPARIA, Bleeker.

Mouth small, inferior. The lower jaw with a sharp crescentic naked edge. Barbels none. Dorsal fin without osseous ray. Lateral line concave, and passing along the lower half of the base of the caudal fin.

A. MORAR, Ham. Buch.

Ngā-hpen-boo and Yen-boung-zā.

B. iii.; D. 9-10; P. 15; V. 8-10; C. 19.

Snout very obtuse. Upper jaw overlaps the lower. A broad suborbital ring of bones covers the cheek. Light brown above, divided from the silvery side by a burnished streak. Grows to 7 inches.

Burma.

ROUTE, Sykes.

Mouth anterior, lips thin. Dorsal fin with an osseous serrated spine and commencing midway between the ventral and anal fins. Scales small.

R. COTIO, Ham. Buch.

Ngā-lipān-mā.

B. iii.; D. 11-12; P. 13; V. 10; A. 29-36; C. 19.

Dorsal profile high. Upper jaw slightly the longer. Barbels none, or rudimentary. Silvery, darkest along the back, and with sometimes a silvery lateral band. Sometimes a black blotch before the tail and another on the nape. Grows to 6 inches.

Burma.

R. BELANGERI, Cuv. et Val.

Ngā-hpeh-oung and Ngā-nek-kyā.

B. iii.; D. 11-12; P. 17; V. 9; A. 20-21; C. 17.

Lower jaw a trifle the shorter. Dorsal profile elevated. Caudal deeply lobed, the lower slightly the longer. Silvery, greyish on the back. Sometimes a dark streak from the shoulder to the base of the pectoral fin. The very young have the tail black-banded. Grows to 15 inches in length.

Burma.

BARILIUS, *Hamilton Buchanan*.

Jaws compressed, the lower usually with a symphyseal knob fitting into the upper. Suborbital ring of bones usually broad, especially the third. Dorsal fin without osseous spine, and inserted posteriorly to the ventrals.

B. GUTTATUS, Day.

Ngā-la-wā.

B. iii.; D. 9; P. 15; V. 9; A. 14; C. 17.

Upper jaw the longer. Suborbitals broad, especially the hindermost, which almost covers the cheek. A rudimentary pair of rostral or maxillary barbels may be present. Caudal forked, the lower lobe slightly the longer. Silvery, shot with purple; one or two rows of blue spots along the side. Lower caudal lobe orange. Upper lobe dark-edged, and a dark submedian band. Grows to 7 inches.

The Irrawaddy River above Prome.

B. BOLA, Ham. Buch.

B. iii.; D. 10-11; P. 13; V. 9; A. 13; C. 19.

Head compressed, snout pointed. Suborbital ring of bones wide, especially the third. Barbels none. Silvery, with two or more rows of vertical bluish blotches along the sides. Caudal orange, stained with grey and black. Pectoral, ventral, and anal fins orange. Grows to a foot, and somewhat resembles a 'trout.' It is a very game fish, and takes a fly well.

Burma.

DANIO, *Hamilton Buchanan*.

Body compressed, belly rounded. Cleft of mouth shallow, directed obliquely upwards, the end of the lower jaw falling within the dorsal profile.

A. SPINOSUS, Day.

B. iii.; D. 15-16; P. 13; V. 7; A. 19-20; C. 19.

Orbit with an antero-superior spine and a blunter one on the preorbital. A pair of small rostral barbels. Caudal lunate. Silvery, with an ill-defined lateral band and some vertical yellow lines anteriorly. Dorsal and anal greyish, with front margins reddish. In the young a dark shoulder spot and a steel-blue side band posteriorly edged with scarlet. Grows to 4 inches.

Burma.

D. EQUIPINNATUS, MacClell.

B. iii.; D. 12-14; P. 17; V. 8; A. 14-16; C. 19.

The rostral barbel half as long as the orbit, the maxillary minute. Yellowish white, a broad bluish band from the eye to the tail, and along it several round silvery spots. Below it is another band and above it two paler ones, the intermediate space being yellow. Fins yellowish. Dorsal and anal fins each with an outer bluish band.

Tenasserim.

D. DANGILA, Ham. Buch.

B. iii.; D. 11-13; P. 12; V. 7; A. 17-18; C. 20.

Rostral barbels a little shorter than the head, the maxillary slightly longer. Back olive, belly silvery, sides with several narrow blue lines, anteriorly handsomely reticulated. A dark spot behind the gill covers. Anal fin with two or three blue stripes.

Hills about Akyab.

D. KAKHIENENSIS, Anderson.

D. 10; P. 13; A. 14.

Barbels two, equalling half the ocular interspace. Eleven longitudinal rows of scales between the dorsal and ventral margins. A dark lateral line with obscure dusky bands both above and below, the scales minutely punctulated with black, especially along the margins.

The Nampong River, Kakhyen Hills.

D. ALBOLINEATUS, Blyth.

B. iii.; D. 9; P. 13; V. 7; A. 13-15; C. 19.

The maxillary barbels reach beyond the base of the pectoral fins, the rostral ones to the back of the orbit. Greenish above. A scarlet band with a dark lower edge

from the base of the dorsal to the tail, narrowing anteriorly. Dorsal margined with red. Anal with a mesial yellow stripe. Grows to 2 inches.

Maulmain in tanks and streams.

D. NIGROFASCIATUS, Day.

B. iii.; D. 9; P. 15; V. 7; A. 13; C. 19.

The maxillary barbels reach to below the orbit. Rostral none. A dark band down the side, and a blue-dotted line below it. Dorsal and anal lineately black-spotted. Sometimes the body is intense blue. Grows to less than an inch in length.

Pegu and Maulmain.

B. *Belly trenchant, wholly, or in part.*

PERILAMPUS, *MacClelland*.

Body oblong, compressed, with a trenchant abdominal edge. Mouth directed obliquely upwards. Barbels none. Outer ventral ray elongated.

P. ATPAR, Ham. Buch.

Ngā-man-dor, or Ye-paw-ngā, or Ngā-hpyin-gyan.

B. iii.; D. 9; P. 10; V. 5-6; A. 22-24.

Body strongly compressed. Elongated ventral ray reaches to nearly the end of the anal fin. Silvery, with a burnished lateral band. Dorsal and caudal-fins yellow. Grows to 4 inches.

Burma.

P. LANBUCA, Ham. Buch.

Ngā-mi-loung.

B. iii.; D. 10-11; P. 13; V. 7; A. 19-23; C. 19.

Body strongly compressed. Ventral margin trenchant between the pectoral and anal fins. Silvery, with some golden vertical stripes during life. Fine dots over the body, and a black mark shot with green above the base of the pectoral, and another at the base of the caudal. The posterior third of the tail sometimes black. Tail spot sometimes wanting. Grows to 3½ inches.

Burma.

CHELA, *Hamilton Buchanan*.

Body elongate, compressed, with trenchant abdominal edge. Lower jaw prominent, with usually a symphysial knob. Barbels none. No ossaceous dorsal ray.

Bones of forearm do not support the edge of thorax.

C. SLADENI, Day.

B. iii.; D. 10; P. 11; V. 8; A. 20-21; C. 21.

Suborbital ring half as deep as the orbit. The serrated ventral margin commences opposite the base of the pectoral fin. The lower caudal lobe the longer. Silvery, caudal black-edged.

The Irrawaddy River.

C. SARDINELLA, Cuv. et Val.

Ngā-kwōn-hnyat.

B. iii.; D. 9; P. 13; V. 8; A. 21.

Suborbital ring broad, but does not touch the preopercular ridge. Caudal deeply forked, the lower lobe the longest. Silvery. Grows to 6 inches.

The Irrawaddy and Salween Rivers.

C. CLUPEOIDES, Bloch.

B. iii.; D. 9; P. 13; V. 9; A. 13-15.

Suborbital ring wide, four-fifths as wide as the uncovered cheek below. Silvery. Grows to 6 inches and is good eating.

Burma.

C. BACAÏLA, Ham. Buch.

B. iii.; D. 9; P. 13; V. 9; A. 13·15; C. 19.

Suborbital ring broad, nearly covering the cheek. Silvery. Grows to 7 inches. Maulmain (fide Günther).

Sub-family COBITIDINA.

Pseudobranchiæ none. Body elongated, oblong, compressed or cylindrical, but never depressed. Snout and lips fleshy. Mouth small, inferior, with 6 to 12 barbels. Scales small and much buried in mucus. Air-vessel wholly or partly inclosed in bone.

A. An erectile spine near the orbit.

BOTIA, Gray.

Eye with a free circular eyelid. Barbels 6 to 8. Four nasal and two maxillary (two mandibular). No scales on the head.

B. BERDMOREI, Blyth.

B. iii.; D. 13·15; P. 13; V. 8; A. 7; C. 17.

The suborbital spine reaches to below the middle of the eye. Barbels six. Buff, with 10 to 12 dark vertical bands from back to belly. Head banded, and a dark line from the eye to the snout. Numerous oblong blotches over the body. Dorsal fin with three or four rows of spots. Caudal and anal also spotted.

The Irrawaddy River and Tenasserim.

B. HISTRIONICA, Blyth.

B. iii.; D. 10; P. 15; V. 8; A. 7; C. 19.

Suborbital spine very strong, and reaching to the hinder edge of the orbit. Barbels eight. Olive, with five dark vertical bands over the body and ten over the head. All the fins with two broad brown bars.

Pegu.

ACANTHOISIS, v. Hasselt.

Body very elongated. Snout long and compressed. Barbels eight, two being mandibular. Orbital spine bifid.

A. CHOIRRHYNCHUS, Bleeker.

Ngā-tha-leh-tō. (Applied to many allied species.)

B. iii.; D. 11; P. 11; V. 7; A. 8; C. 11.

Nostrils nearer the end of the snout than to the orbit. Brownish, with 12 bands across the back, and as many blotches along the lateral line. Two rows of blotches along the dorsal, and three across the anal fins.

Burma.

LEPIDOCEPHALICHTHYS, Bleeker.

Barbels 6 to 12, 4 being mandibular. A skinny flap on either side of the mandible, ending in a barbel. Pectoral fin sometimes armed with a flat spine, adapted for digging in the mud, for the purpose of concealment.

L. BERDMOREI, Blyth.

Ngā-tha-lah-tō.

B. iii.; D. 8; P. 10; V. 8; A. 7·8; C. 17.

Barbels 4 rostral, 2 maxillary, and 4 to 6 short mandibular ones. Rich yellowish-brown, with a dark-spotted line along the body. The upper part of the body covered

with fine markings. A black spot at the base of the tail. Dorsal and caudal fins punctately lineated.

Maulmain.

ACANTHOPHTHALMUS, v. Hasselt.

Barbels 6, one rostral and two maxillary pairs. Suborbital spine bifid.

A. PANGIO, Ham. Buch.

B. iii.; D. 8; P. 10; V. 6-7; A. 7; C. 17.

Eyes minute. Caudal entire. Scales distinct. Light cinnamon.

Burma.

ARCA, Blyth.

Barbels 8. Two rostral, two maxillary, and four mandibular. Suborbital spine bifid. Ventral fins absent.

A. FUSCA, Blyth.

B. iii.; D. 8; P. 11; V. 0; A. 8; C. 16.

Brownish, with a dark longitudinal band. Grows to 2½ inches.

Pegu.

B. *No erectile orbital spine.*

NEMACHEILUS, v. Hasselt.

Dorsal profile nearly horizontal. Barbels 6 (8 in one Indian species). None on the mandible.

N. RUBIDIPINNIS, Blyth.

B. iii.; D. 15-16; P. 14; V. 8; A. 7; C. 19.

The premaxillary ends in a spine-like process projecting from the middle of the upper lip. The two rostral pairs of barbels reach to below the front edge of the eye. Caudal nearly entire. Scales distinct. Reddish brown, with from 12 to 16 dark irregular bands across the back, ending in dark spots below the lateral line. Dorsal obliquely banded. Caudal vertically banded, and a black ocellus at the upper half of its base.

Tenasserim.

N. ZONALTERNANS, Blyth.

B. iii.; D. 11; P. 11; V. 9; A. 7; C. 19.

Scales distinct. Ten or eleven bars across the belly and sides, with intermediate half bands superiorly. Dorsal and caudal fins.

N. CINCTICAUDA, Blyth.

B. iii.; D. 10; P. 11; V. 8; A. 7; C. 17.

Barbels well developed, the maxillary reaching to below the front edge of the orbit. Yellowish, with 10 regular brown zones encircling the body, a dark spot at the base of the tail, and a dark band between the eye and the snout. Dorsal black-spotted.

The Irrawaddy.

Family Clupeidæ.

Margin of the upper jaw formed mesially by the premaxillaries, laterally by the maxillaries. Barbels none. Stomach with a "cul de sac." Air-vessel simple.

ENGRAULIS, *Cuvier.*

Branchiostegals short and numerous. Body compressed, and serrated beneath. The upper jaw the longer. Maxillaries long, with a membranous attachment to the cheeks. Teeth small.

a. *Origin of dorsal fin in advance of that of the anal.*

E. BŒELAMA, Forsk.

B. xi.; D. 14·16; P. 13; V. 7; A. 29·32; C. 20.

Eyes subcutaneous. Snout compressed, projecting. Teeth equal in both jaws, a small patch on the vomer, and a single band on the palate. Bluish above, silvery on the sides and belly. Head glossed with gold.

The Andamans.

Cuvier and Valenciennes remark that the flesh of this species is poisonous, if dressed without removing the head and intestines.

b. *Dorsal fin partly or entirely above the anal.*

E. TELABA, Ham. Buch.

B. xii·xiii.; D. 1 + 14·15; P. 15; V. 7; A. 70·80; C. 19.

Eye subcutaneous. Abdominal profile more prominent than the dorsal. Snout slightly overhanging. Teeth fine in the jaws, larger in the palate. Lower caudal lobe the longer; the upper truncated. Seven spinate scales behind the ventral, and 15 to 16 anterior to it. Greenish along the back, silvery below, dashed with gold. Dorsal and caudal yellow, black-stained above. Pectorals in the adult blue-black, in the young yellowish, the elongated ray uncoloured. Grows to 16 inches.

Burma, ascending the Irrawaddy as high as Mandalay.

E. INDICUS, v. Hasselt.

Zoo-roo-cart-dah. Andamans.

B. xi·xiii.; D. 15·16; P. 15; V. 7; A. 19; C. 19.

Eye subcutaneous. Dorsal and abdominal profile slightly convex, equal. Snout pointed, projecting. Teeth small in jaws, tongue and palate. Scales very deciduous. Four scutes before the base of the ventral fin. Silvery, dashed with green along the back. Sometimes dark-spotted behind the occiput. A brilliant silvery side band.

The Andamans and coast, ascending tidal rivers.

COLIA, Gray.

Branchiostegals ix. to xi. Body compressed, tail pointed. Belly trenchant and serrated. Snout pointed and projecting.

B. x.; D. 1 + 14; P. 6 + 9 to 12; V. 7.; A. 77·95.

Teeth on the jaws, vomer, palatine and pterygoid bones and tongue. Golden, fins yellowish.

Burma; common in the Irrawaddy River.

CHATOESSUS, Cuvier et Valenciennes.

Eyes with adipose lids. Belly serrated. Upper jaw projecting. Branchiostegals four to six. Jaws edentulous. Air-vessel large, rounded in front, pointed behind.

C. CHACUNDA, Ham. Buch.

Korc paig-dah. Andamans.

B. vi.; D. 17·19; P. 15; V. 8; A. 19·20; C. 19.

Twenty-eight spines along the abdominal and thoracic edge, 16 or 17 of which are anterior to the ventral fin. Golden, shot with purple; lines formed of spots, along the rows of scales in the upper third of the body. A black shoulder spot. Grows to 8 inches.

Burma and the Andamans.

C. MODESTUS, Day.

B. vi.; D. 14·16; P. 16; V. 8; A. 27·28; C. 21.

Profile over the nape slightly concave, then a great rise to the base of the dorsal.

Abdominal profile equally convex. 17 or 18 serrations anterior to the ventral fin, and 11 to 12 posterior to it. Yellowish, shot with purple. Grows to 5½ inches.

The Bassein and Salween Rivers.

C. MAXMINNA, Ham. Buch.

B. vi.; D. 14-15; P. 15; V. 8; A. 22-24.

Abdominal profile usually the more convex. Snout prominent. Silvery, glossed with gold. Cheeks purplish, back tinged bluish-green. A shoulder spot usually present. Grows to 11 inches.

Burma, in estuaries and tanks.

CLUPEA, *Artedi*.

Eyes with free adipose lids. Upper jaw not projecting. Belly serrated. Teeth, when present, rudimentary.

A. *Teeth in lower jaw.*

C. ATRICAUDA, Günther.

B. vi.; D. 18; P. 17; V. 8; A. 17-19; C. 20.

Lower jaw projects beyond the upper. A few mandibular teeth in front, a band on the tongue, and some deciduous ones on the palatines and pterygoids, but none on the vomer. Deep steel-blue along the upper third of the body, separated from the silvery sides and belly by a yellowish line. Sides and belly glossed with blue and purple. Caudal black-tipped.

The Andamans.

C. KLUNZEL, Bleeker.

B. vi.; D. 17-18; P. 16; V. 8; A. 17-18; C. 20.

Lower jaw prominent. Teeth as in *C. atricauda*. Last two anal rays thickened, and slightly elongated. Scales in regular rows, with the edges crenulated. Thirty badly-developed scutes, of which about 13 are behind the ventral fin. Silvery white, bluish above, shot with purple, below.

The Andamans and Nicobars.

C. LONGIPES, Cuv. et Val.

The 'oil sardine.'

B. vi.; D. 16-17; P. 17; V. 9; A. 14-16; C. 17.

Lower jaw slightly projecting. Fine teeth on the tongue, very deciduous on the palatines, and rarely on the pterygoids, none on the vomer, and minute or absent in the mandible. Scales indistinctly crenulated. About 18 badly-developed scutes before the ventral fin, and 13 or 14 behind it. Bluish along the back, with golden reflexions. Belly silvery, shot with purple, and sometimes a golden lateral line. A large greenish spot on the upper margin of opercle and preopercle. Dorsal greenish, caudal stained with green. The other fins transparent.

The Andamans.

A large quantity of oil is made from this species in Malabar.

B. *No teeth in jaws.*

C. LILE, Cuv. et Val.

B. vi.; D. 14-15; P. 13; V. 8; A. 17-20; C. 21.

Snout obtuse, lower jaw slightly projecting. Teeth on tongue and pterygoids, but none on palatines or vomer. Edges of scales smooth. Scutes 11 to 12 posterior to the ventral and 16 to 18 anterior to it. Golden, shot with purple. A brilliant silvery band one scale broad along the side. Caudal dark-tipped, shot with blue. A brilliant bronze spot on the occiput. Grows to 4 inches.

Burma.

C. *No teeth inside mouth.*

C. VARIEGATA, Day.

B. vi.; D. 15-18; P. 17; V. 8; A. 24-29; C. 17.

Jaws equal. Ten serrated scales on either side of the ventral fin. Silvery, glossed with gold and bronze. A dark shoulder spot. Back barred with 18 bands. Dorsal fin black-banded posteriorly. Tail black-tipped. Grows to 7 inches.

The Irrawaddy and its branches.

C. ILISHA, Ham. Buch.

Ngā-tha-louk. Burma. "Sable fish" or "Hilsa" of Europeans.

B. vi.; D. 18-19; P. 15; V. 9; A. 19-22; C. 19.

Jaws equal. Caudal deeply forked. 16 to 17 scutes before, and 14 to 15 behind the ventral fin. Silvery, shot with gold and purple. In the young a row of spots along the upper third of the body. The young are bronzed along the back, and the caudal fin black-edged. The 'hilsa' ascends rivers to spawn, and when taken full of roe is excellent eating, though somewhat rich and heavy to digest. After spawning they become thin, and, according to Day, "positively unwholesome."

PELLONA, *Cuvier et Valenciennes.*

Branchiostegals 6. Body compressed. Belly serrated. Upper jaw generally shorter than the lower. Fine sharp teeth on the jaws, palatine and pterygoid bones and tongue, but none on vomer. Dorsal fin small, median.

P. SLADENI, Day.

B. vi.; D. 13; P. 11; V. 7; A. 44; C. 21.

Ridges on the occiput diverge slightly posteriorly. 23 spinate scales anterior to the ventral, and 10 posterior to that fin. Silvery. Opercles golden. Caudal black-edged. The Irrawaddy River at Mandalay.

DUSSEMERIA, *Cuvier et Valenciennes.*

Branchiostegals numerous. Belly rounded, not serrated. Snout pointed. Eyes with broad adipose lids. Small fixed teeth in the jaws, and villiform ones on the palatines, pterygoids and tongue, but none on the vomer.

D. ACUTA, *Cuv. et Val.*

O-pul-dah. Andamans.

B. XIV.XV.; D. 19-20; P. 14; V. 8; A. 14-17; C. 21.

Abdominal profile more convex than the dorsal. Scales very deciduous. Green, shot with blue. Upper margin of opercle and back light blue, with a bronzed line below, and below that again a silvery line, shot with pink. Caudal shot with blue, green and gold. Top of head emerald green. Pectoral, ventral, and anal fins white. Dorsal yellowish green. Eyes white. This fish grows to 7 inches, and is called a 'sardine,' and highly esteemed for food.

The Andamans.

MEGALOPS, *Commerson.*

Branchiostegals numerous. Lower jaws prominent. A narrow bony plate adherent to the mandibular symphysis, and covering the space between the rami.

M. CYPRINOIDES, Brouss.

Ngā-tan-youet.

B. XXIV.XXVI.; D. 19-21; P. 15-16; V. 10; A. 24-27; C. 19.

Eyes with narrow adipose lids. Villiform teeth in both jaws, and on the vomer, palatines, pterygoid and sphenoid. Caudal deeply lobed. Top of head dark olive, back bluish-green (paler in the immature). Belly silvery, with bluish reflexions. Scales silver-margined. Sides of head and lateral line silvery. The centre of the jaws black. Dorsal and caudal greyish, minutely black-dotted.

Pectoral, ventral and anal fins diaphanous, with some black dots. Eyes silvery, with dark orbital margins. Pupils oval.

Burma, in rivers and tanks.

Family **Notopteridæ.**

Body elongated, tail prolonged and tapering. A parieto-mastoid cavity on either side of the head, connected with the interior of the skull. Barbels none. Scales small. Abdominal edge serrated anteriorly to the ventral fins.

NOTOPTERUS, Lacépède.

Snout obtuse, convex. Teeth on jaws, vomer, palatines, sphenoid and tongue. Ventrals rudimentary. Air-vessel divided internally, with two horns anteriorly in connexion with the auditory organs. Posteriorly it ends in two branches, separated by the hæmal spines.

N. KAPIRAT, Lacép.

Ngā-hpoh.

B. viii.; D. 7·8; P. 17; V. 5·6; A. 100·110; C. 19.

Dorsal profile not so convex as that of the belly. Preorbital serrated, lower edge of preopercle with a double serrated margin. An external row of strongly curved teeth in either jaw, with an internal row of finer ones. About 28 serrations between the throat and the ventral. Silvery, darker above. Head yellow-glossed. Body with numerous fine greyish spots. Eyes golden. Grows to 2 feet.

Burma in fresh and brackish waters.

N. CHITALA, Ham. Buch.

B. viii.·ix.; D. 9·10; P. 16; V. 6; A. 110·125; C. 12·14.

Upper profile of head deeply concave, back arched. Snout prominent. Preorbital entire. Lower edge of preopercle very finely serrated. Villiform teeth in both jaws, with an outer enlarged row most developed in centre of upper jaw. About 51 serrations between the throat and the ventral fin. Coppery brown above, with 15 transverse silvery bars confluent over the back. Sides silvery. Fins with greyish spots, which are stellate on the caudal and in a row or two along the anal. Grows to 4 feet, and is rich and well-flavoured according to Ham. Buchanan.

Burma in fresh water.

Family **Symbranchidæ.**

Gill openings confluent into a single slit, situated on the abdominal surface. Body elongated. Vertical fins rudimentary, and no paired ones. Air-vessel none.

AMPHIPNOCUS, Muller.

Branchiostegals 6. A respiratory air sac, behind the head, communicating with the gill chamber. Palatine teeth in a single well-developed row. Scales present.

A. CUCHIA, Ham. Buch.

Ngā-shin-ni.

Greenish or chestnut brown, paler below. Grows to 2 feet.

Burma, in fresh and brackish water.

Taylor thus describes the respiratory system :

“The principal organs of respiration are two small bladders, which the animal has the power of filling with air, immediately derived from the atmosphere. They are placed behind the head, one on each side of the neck, above the superior, or vertebral extremities of the branchial arches, and are covered over by the common integument, presenting externally, when distended with air, two protuberances of a round shape . . . They present when separated from their surrounding attachments and inflated with air, thin transparent membranous parietes, resembling the posterior portions of the lungs of a serpent.” (Gleanings in Science, II. p. 173.)

MONOPTERUS, *Lacépède*.

Branchiostegals 5 or 6. No accessory respiratory sac. No scales.

M. JAVANENSIS, *Lacép*.

Tail narrow, tapering to a point. Teeth conical and in a band, tapering towards the angle of the mouth, with a similar band on the palate. Greenish, sometimes spotted, or else the body nearly black. This species is esteemed for food.

Burma, in fresh and brackish water.

Family *Murænidæ*.

Body elongated. The humeral arch not attached to the skull.

A. *Branchial openings in the pharynx, wide slits.*

ANQUILLA, *Cuvier*.

Upper jaw not projecting. Tongue free. Teeth small and in bands. Dorsal fin commences at some distance behind the nape. Scales small, imbedded.

A. BENGALENSIS, *Gray and Hardw.*

B. xii.; D. 250-305; P. 18; A. 220-250; C. 10-12.

Lower jaw prominent. Lips well developed. The mandibular teeth divided by a longitudinal groove. Brownish above, yellowish below. Sometimes the upper surface is covered with black spots and blotches. Anal with a dark marginal band and a light outer edging. Grows to over 4 feet.

Burma and the Andamans, where it is common.

Buchanan remarks: "It is an irritable creature, swelling its head whenever angered, and constantly, when it can, buries itself in putrescent carcases."

A. BICOLOR, *MacClelland*.

Jee-tah-dah. Andamans.

B. xii.; D. 220-245; P. 18; A. 200-220; C. 10-12.

Jaws nearly equal. Lips thick. Dark olive above, yellowish below.

The Andamans.

MURÆNESOX, *MacClelland*.

Gill openings wide, approximating to the belly. The upper jaw the longer. Two pair of nostrils, the posterior of which are opposite the upper part or centre of the orbit. Teeth fine, with some canines anteriorly. Scales none.

M. CINEREUS, *Forsk.*

Conger bagio, *Ham. Buch.*

B. xx.-xxii.; P. 14-16; D. 230-270; A. 190-220; C. 10.

Vomerine teeth large, with a basal lobe. The external mandibular row of teeth not directed outwards. Silvery. Beneath white. Fins yellowish, black-edged.

M. TELABON, *Cuv.*

B. xvii.-xix.; P. 15-16; D. 270-285; A. 195-210; C. 10.

Vomerine teeth large, without a basal lobe. Mandibular teeth smaller than the vomerine, and none directed outwards. Back and head olive, brown posteriorly. Belly white, silvery below. Grows to 10 feet.

The Burmese name, says Mason, signifies "the fish that comes on board the ship," as they are occasionally washed upon the deck.

MURÆNICHTHYS, *Bleeker*.

Eyes small. Nostrils on the edge of the upper jaw. Tongue not free. No scales.

M. SCHULTZEI, Bleeker.

Upper jaw somewhat the longer. Teeth in jaws, in three rows, pointed, the inner the larger. Palatine teeth in two rows, obtuse. Brownish above, yellowish green below.

The Andamans.

OPHICHTHYS, *All.*

Snout produced. Teeth in jaws and on vomer. Nostrils labial. Tongue not free. No scales.

O. COLUMBINUS, Bodd.

Eyes rather small, behind the gape. Snout pointed. Teeth in two rows, obtuse. 25 to 35 brown rings encircle the body, sometimes with a spot in the interspace between each ring.

The Andamans.

B. *Branchial openings in the pharynx, narrow slits.*

MURANA, *Artedi.*

Body elongated. Gill openings narrow. A tubular nostril on either side of the upper surface of the snout. The posterior nostril with or without a tube, and between or in front of the eyes. Pectoral fin absent.

a. *Teeth pointed. The posterior nostrils not tubular.*

M. RÜPPELLII, MacClelland.

Teeth in a single row. 20 to 23 in either ramus of mandible. Canines moderate. Yellowish, with 18 to 20 black rings round the head and body, narrower than the interspaces. The mouth can be completely closed.

The Andamans.

M. RETICULARIS, Bloch.

Teeth in a single row, some slightly serrated. About 13 in either mandibular ramus. Canines small. The mouth can be completely closed. Head and back spotted, and dotted with brown; about 16 cross bands on the body, wider than the interspaces, and most distinct below, and on the tail.

The Andamans.

M. UNDULATA, Lacép.

Teeth in a single row, occasionally two inner ones on the maxilla. Four pairs of canines in the mandible, and 18 or 20 in either ramus. Two canines in the maxilla. Light brownish, with irregular-sized blotches, and light reticulated lines over the body, most distinct behind. No black gill spot. No white edge to fins.

The Andamans.

b. *Teeth in jaws pointed; on the vomer, globular.*

M. THYRSOIDEA, Richards.

Teeth conical and in two rows on the maxilla, and 23 on either mandibular ramus. No large canines. The mouth cannot be completely closed. Light brown, covered with closely-set purplish spots, with reticulated light lines. No white edge to fins.

The Andamans.

c. *Teeth obtuse.*

M. NIGRA.

Teeth in two rows on the maxilla (the inner pointed), and in three rows of 20 in each ramus of the mandible. Uniform black.

The Andamans.

d. Teeth obtuse or molariform.

M. ZEBRA, Shaw.

Teeth consist of bands of obtuse molars. A rich dark brown, with from 30 to 100 narrow white or yellow rings, sometimes incomplete.

The Andamans.

GYMNOMURENA, Lacépède.

Two pair of nostrils on the upper surface of the snout. Teeth small, pointed, and numerous. Fins none, save a rudimentary one round the end of the tail. Scales none.

G. MARMORATA, Lacép.

Anterior nasal tubes short, the posterior nostrils with a raised edge. Teeth in a band in either jaw, the inner row the larger. On the vomer, in a single row, the anterior two enlarged and acicular. Brownish grey, marbled with arborescent dark lines. Sometimes the fins are yellow.

The Andamans.

G. TIGRINA, Lesson.

No distinct canines. The anterior teeth in two rows. Brownish, with many irregular black spots and blotches. Grows to 4 feet.

The Andamans.

The above are but a few of the 'eels' and 'congers' found in the Indian seas and undoubtedly ranging to Burma, as no fewer than 39 are enumerated in Day's work. There is some prejudice against them as food, else they would be of importance, as some of them attain to 10 or 12 feet in length, and are well adapted for salting, when the removal of fiscal obstructions shall have rendered the preparation of salt fish a possibility with the Indian fisherman, and the poorer classes thereby placed everywhere in possession of a hitherto unattainable article of diet. What is required on grounds of public welfare is not any farther lowering of the price of salt in general, or such a concession to fishermen alone as will both tempt and permit them to 'salt' their surplus stock.

Order LOPHOBRANCHII.

Fishes having a dermal segmented skeleton, with the opercular bones reduced to a single plate. Gills rounded tufts attached to the branchial arches. Snout produced. Mouth terminal and small. Teeth none.

Family Syngnathidæ.

Gill openings small, round, and situated at the postero superior angle of the gill cover. A single dorsal fin.

A. Tail not prehensile.

a. Humeral bones united. Male with egg-pouch on the tail. A caudal fin.

SYNGNATHUS, *Artedi*.

Body ridged. Dorsal and caudal edges not continuous. Eggs carried and hatched by the male, and covered by cutaneous folds. The eyes are capable of independent motion, as in Chamæleo, producing a most grotesque appearance.

S. SPIRIFER, Rüpp.

Ea-dec-dah, or Lek-atha-dah. Andamans. "Turtle's tail."

A bony ridge crosses the opercle. A ridge from the snout to the nape. Ventral edge very prominent. The dorsal is situated on the first 5 rings of the tail. Anal rays minute. Divisions between the rings little apparent. Light brownish,

a brown streak from the orbit to the gape, and a second over the opercle. A few black spots below the mandible. Body brown, barred below. Dorsal barred. Caudal blackish. Grows to 5 inches, and enters tidal rivers and fresh-water.

The Andamans.

The 'Pipe fishes' are curious creatures, and may be kept in an aquarium. Major Holland describes a British species (*S. ophidion*) as being, whilst under his observation over three months, "particularly remarkable for perpetually getting himself swallowed by the larger anemones. Whether his skin was too tough, or he didn't agree with them, we cannot say; but they invariably rejected him after a few minutes, and at last they ceased to pull him in, when his tail, which hung dangling down, dragged across their tentacles." (Science Gossip, September, 1870.)

B. Tail prehensile.

ACENTRONURA, Kaup.

Body compressed, covered with non-tubercular shields. Occiput compressed into a crest, without a coronet. Ova carried by the males in a sac situated below the tail, and opening near the vent.

A. GRACILLIMA, Temm. et Schl.

The dorsal fin stands on four rings, two of which belong to the tail. Brown, white-dotted, and with little brown markings. A band of dark spots along the dorsal. The male is darker, and of a bluish colour, with a milk-white spot on each body ring. 3 inches long.

The Andamans, where dredged in 35 to 40 fathoms.

HIPOCAMPUS, Leach.

Trunk compressed, with 10 to 12 rings, tubercular or spinate. Occiput coronetted posteriorly. Egg-sac as in *Acentronura*. Tail longer than the trunk.

H. TRIMACULATUS, Leach.

D. 19-20; P. 17; A. 4. Osseous rings 11+36.

Pale yellow ochre. Two rows of blackish spots along the dorsal fin. Sometimes a brown blotch on the first, fourth and seventh rings. Sometimes the body is black-dotted, in others banded.

Andamans. Tenasserim.

H. MYSTRIX, Kaup.

D. 17-18; P. 16. Osseous rings 11+36-37.

Coronet high, with 5 spines and a tubercle anteriorly, with another spine in front. Two spines below the orbit, and one behind it. All the tubercles (save the last caudal ones) in the form of slender black-tipped spines. Grey or yellowish white with brown, and white dots. 6 or 7 light patches on the tail, dark-spotted, and a few similar spots on the body. Snout with a light ring.

The Andamans, where dredged by Mr. Wood-Mason in 35 to 40 fathoms.

Order PLECTOGNATHI.

Teleostean fishes with an incompletely ossified skeleton, and a few vertebræ.

Family Sclerodermi.

Body compressed or angular. Distinct teeth in the jaws. Skin rough or spinate or mailed.

TRICANTHUS, Cuvier.

Body oblong, compressed. Teeth in two rows in both jaws, the outer incisor-like, the inner more molariform. First dorsal consisting of a long and strong spine, followed by smaller and weaker ones. Ventrals formed by a pair of strong spines. Scales minute and rough.

T. BREVIROSTRIS, Temm. and Schl.

Ko-tah-thoo-lay-po-dah. Andamans.

B. vi.; D. 5: 22·25; P. 14; V. 1; A. 16·20; C. 12.

Upper outer row of 8 compressed teeth, the inner row of 6, rounded. The mandibular outer row of 10, in the inner, 2, similar to, but smaller than the maxillary teeth. Silvery, with a black spot on the first dorsal fin.

The Andamans.

BALISTES, *Artedi*.

Two rows of teeth in the maxilla, 8 in the outer, 6 in the inner row. A single row of 8 similar teeth in the mandible. First dorsal consists of a strong spine, followed by two weak ones. Ventrals absent, or represented by a ventral process.

The flesh of these fishes is a virulent poison, causing gastric spasms and tetanic paroxysms, which end fatally. An immediate emetic, followed by oil and demulcents to allay irritation, is the appropriate treatment.

B. VIRIDESCENS, Bloch. Schn.

D. vi.; D. $\frac{3}{24}$ $\frac{3}{26}$; P. 14; A. 23·24; C. 12.

A groove in front of the eye. Teeth white, compressed, notched. Four and a half rows of recurved spines on the side of the tail. A light ring round the muzzle, joining one from below, and separating the black lip from a black band on the forehead. Body brownish olive, each scale darkest in the centre. A blackish band from the eye to the tail. Vertical fin yellowish, with dark margins and sinuous lines. Blue blotches on the first dorsal.

The Andamans.

B. FLAVOMARGINATUS, Rüpp.

B. vi.; D. $\frac{3}{26}$ $\frac{3}{27}$; P. 15; A. 23·24; C. 14.

A groove in front of the eye. Four to six rows of rather small recurved spines on the side of the tail. Bluish-olive, paler and buffish below. Chin and chest orange, fading to yellow. Vertical fins with a dark base, and band above it. Grows to 20 inches, the adults being of a uniform colour.

The Andamans.

B. UNDULATUS, Lacép.

B. vi.; D. $\frac{3}{26}$ $\frac{3}{26}$; P. 14; A. 22; C. 12.

No groove in front of the eye. Four to six strong spines on either side of the tail. Brownish, with numerous undulating yellow lines from the eye and back, to the anal and caudal fins, and three or four from the lips. A dark band along the base of the dorsal and anal fins.

The Andamans.

MONACANTHUS, *Cuvier*.

Two rows of incisor-like teeth in the maxilla, six in the outer row, and a row of six similar ones in the mandible. The first dorsal consists of a single spine. Ventral as in *Balistes*.

M. MONOCEROS, L.

B. vi.; D. $\frac{3}{26}$ $\frac{3}{28}$; P. 14; A. 48·53; C. 12.

Dorsal spine rough, but without barbs. Brownish or blackish. Fins yellow. The Andamans.

Family Gymnodontidæ.

Jaws armed with a cutting edge, or osseous beak. Fins spineless. Ventrals absent. Skin spinate.

Many of the species of this family are in the habit of inflating their bodies with air when caught, till they swell themselves out into tight little balls, uttering the

while a grating sound, whence the imitative name of one species in India (*Catcutia*). When thrown again into the water, the fish is unable to sink in spite of its efforts, till it has discharged the air with which its body is distended. Some species are considered to be highly poisonous, whilst others are eaten, but only by the poorest classes. The Burmese call them Ngā-bū-dyn, and they are not only a nuisance to the fisherman, from delighting to bite his line asunder, but torment the bather, if stationary for a moment, by nipping a piece out of his flesh with their parrot-like beaks.

XENOPTERUS, *Duméril*.

Nostrils funnel-shaped, with fringed margins. Jaws divided by a median suture. Dorsal and anal fins with many rays.

X. NARITUS, Richardson.

Ngā-bu-dyn.

B. v.; D. 32-38; P. 19; A. 28-32; C. 12.

Eyes small. Lips thick and fringed. Spines with 2 or 3 roots present between the eye and the pectoral fin, also below that fin, and backwards along the belly, nearly as far as the vent. Pale yellow, darker along the back.

Burma, in rivers and estuaries.

TETRODON, *Linnaeus*.

Jaws divided with a median suture. Dorsal and anal fins with few rays.

T. LUNARIS, Bloch. Schn.

Cha-mo-dah. Andamans.

B. v.; D. 12-14; P. 16-19; A. 11-12; C. 10.

Eye large. Back and belly covered with small spines. Snout, sides and tail spineless. Greenish olive above, sides and belly white, with a yellow line from the eye to the tail. Grows to a foot.

The Andamans, where it is eaten.

T. RETICULARIS, Bloch. Schn.

Ko-pud-dah. Andamans.

D. 10-11; P. 19; A. 10-11; C. 10-11.

Upper surface of the body deep grey or brown, white below, with from 8 to 10 longitudinal black stripes, anterior to the anal and pectoral fins. Body posteriorly spotted. Grows to 17 inches, and is deemed very poisonous.

The Andamans.

T. DIODON, *Cuvier*.

Body nearly globular. Jaws without median suture. Body covered with stiff erectile dorsal spines.

D. HYSTRIX, L.

The whole body, except the belly, of a light brown, covered with round blue or brown spots. Fins spotted like the body. Grows to 2½ feet.

The Andamans.

Sub-class CHONDROPTERYGII.

Skeleton cartilaginous. Caudal with an elongated upper lobe. Intestines with a spiral valve. Males furnished with prehensile organs. Ova large. Some species viviparous. Embryo with external deciduous gills. No air-vessel.

Order PLAGIOSTOMATA.

Five to seven gill openings. Jaws distinct from the skull.

a. *Gill openings lateral.*Family **Carchariidæ.**

A nictitating membrane to the eye. Mouth crescentic, inferior.

CHARCHARIUS, *Müller and Henle*

No spiracles. A pit before the root of the tail. Snout produced. Teeth with a sharp compressed cusp.

a. *Teeth with smooth edges and without swollen bases.*

C. LATICAUDUS, *Müll. and Henle.*

The groove at the gape scarcely extends on to the upper jaw. Nostrils very much nearer the mouth than the end of the snout. Uniform grey above, white beneath. Pectoral deep-grey, white-edged, as are the ventral and anal fins. Caudal dark-tipped. Grows to 2 feet.

b. *Teeth with smooth edges, oblique, and without swollen bases.*

C. WALBEEHMI, *Bleeker.*

Ei-dah. Andamans.

A well-marked groove at the gape, extending a short distance along both jaws. From snout to mouth equals the space between the outer margins of the nostrils. Light brown above, dull white below.

The Andamans.

c. *Some or all the teeth serrated on their base and cusps.*

C. GANGETICUS, *Müll. and Henle.*

A very slight groove at the gape. Nostrils in advance of midway between the snout and the mouth. Teeth 27 to 30 in either jaw. Pectorals falciform, and reaching to the middle of the first dorsal. Colour much as in *C. laticaudus*. Grows to 7 feet, and is reputed to be one of the most ferocious of Indian sharks.

C. MELANOPTERUS, *Quoy et Gaim.*

A very short groove at the gape. Snout rounded and very obtuse. Pectoral fin falciform, its outer edge three times as long as its inner and reaching to the middle (or more) of the base of the dorsal. Second dorsal opposite and similar to the anal. Scales large, lineated, and with entire edges. Brown or bluish grey above, white below. Teeth 24 to 25 in each jaw.

The Andamans.

Dr. Day does not give the size attained by this fish, but adds that the *liver* of one captured at Calicut weighed 270lbs. According to Dr. Buist (*Proc. Zool. Soc. Lond.*, 1850, p. 100), the shark fishers at Kurachi employed 13 boats each with a crew of 12 men. The 'Mhor' or 'Great basking shark' is said to grow to from 40 to 60 feet in length and to be taken by the harpoon when asleep on the surface. When exhausted by its struggles, the fish is hauled up and despatched or stunned by blows with clubs, and is then towed on shore, several boats uniting for the purpose when an unusually large fish is captured. They are also taken in nets with 6 inch meshes, six feet wide and often nearly a mile in length. These nets are buoyed vertically, and sunk some 80 to 150 feet below the surface. The smaller sharks are usually brought up dead, and the larger ones much exhausted. On being brought on shore the fins are cut off and dried in the sun (Dr. Buist says only the back fins, but elsewhere I believe all the fins are taken), the flesh cut off in strips and salted, and the liver carefully extracted for oil. In 1845, over 229 tons of sharks' fins were imported into Bonbay from various ports, and over 413 tons exported, chiefly to China, valued at £18,231.

C. TEMMINCKII, Müll. and Henle.

Nostrils nearer to the mouth than to the end of the snout. 38 erect teeth above, and 40 below. The upper rather narrow with a broad base, the lower entire and awl-shaped. The teeth near the outer angle of the jaws very small. Second dorsal opposite the anal, and as large as the first. Colour uniform.

GALEOCERDO, *Müller and Henle.*

Spiracles small. A nictitating membrane over the eye. A pit on the base of the tail, both above and below. Teeth oblique, serrated on either edge, and with a deep outer notch.

G. TIGRINUS, Müll. and Henle.

A labial fold along the edge of the upper jaw. Grey, paler beneath. Numerous dark grey or brown spots on the body.

ZYGÆNA, *Cuvier.*

The anterior portion of the head flattened, and laterally elongated, with the eyes at the lateral extremities, and the nostrils at its fore-border. Eyes with a nictitating membrane. Spiracles none.

Z. BLOCHII, Cuv.

The lateral expansion of the head twice or thrice as long as broad, with a deep groove along the fore edge. Nostril nearer the mouth than the eye. Deep grey, paler beneath. Fins darker. Grows to 4 feet or more.

The "hammer-headed" sharks are much dreaded, and are common in the Bay of Bengal.

Family Scyllidæ.

Spiracles present. Eye without a nictitating membrane.

STEGOSTOMA, *Müller and Henle.*

Spiracles about the size of the small eye, behind which they are situated. Nasal and buccal cavities confluent. Snout obtuse. Upper lip thick, with a cirrus on either side. A well-developed labial fold at the gape. Teeth small, sometimes trilobed, the dental plate being almost quadrangular. Caudal fin very elongate.

S. TIGRINUM, Gmel.

Colour of young black, with white or buff bands on the head and body, with spots between. The adults are tawny, with bands of rounded spots.

This is one of the species Mason says is common on the coast, and whose fins are collected for export to China.

It seems by no means improbable that Homer, in describing Scylla, may have had in view the jaws of some species of this family, perhaps the dried trophy of some stranded monster of the deep; and borrowed the idea of Scylla's twelve limbs from some mariner's yarn he may have heard of an octopus—

τῆς ἦτοι πόδες εἰσὶ δωδέκα πάντες ἄωροι,
 ἕξ δὲ τέ οἱ δειραὶ περιμήκεες, ἐν δὲ ἑκάστη
 σμερδαλέη κεφαλῆ, ἐν δὲ τρίστοιχοι ὀδόντες
 πυκνοὶ καὶ θαμέες, πλείοι μελανοὶ θανάτοιο.—*Odyssey* XII. 89.

Twelve feet deformed and foul, the fiend dispreads,
 Six horrid necks she rears and six terrific heads;
 Her jaws grin dreadful with three rows of teeth,
 Jaggy they stand, the gaping den of death.—*Pope.*

*b. Gill openings ventral.***Family Pristidæ.**

Snout produced and flattened into a 'saw,' with numerous so-called teeth along its edge.

PRISTIS, *Latham.*

Spiracle wide and behind the eye, which is devoid of a nictitating membrane. Nostrils inferior. Teeth (true) minute and obtuse.

Three species inhabit the Eastern seas: *P. cuspidatus*, with distinct lower caudal lobe, and 25 to 35 pairs of rostral 'teeth,' but none for the basal fourth of the snout; *P. Perrotteti*, with no distinct lower caudal lobe, and 17 to 20 pairs of rostral 'teeth' from its base, and the dorsal in advance of the ventrals; and *P. zysron*, which resembles the last, but has 25 to 32 pairs of rostral 'teeth,' and the dorsal fin posterior to the ventrals.

These fish are valuable for their fins, which, together with those of sharks, are dried and exported to China, and for the oil which is extracted from the liver. They attain a great size, a specimen of *P. zysron* caught on the coast of Sind measured over 16 feet, and a *P. cuspidatus*, captured at Calicut, afforded a liver which weighed 185 pounds. They ascend rivers far above tidal influence, and are eaten by low-caste natives only.

Family Rhinobatidæ.

Pectoral fins not continued to the snout. Trunk gradually passing into the tail. Two dorsal fins.

RHINOBATUS, *Bloch. and Schneider.*

Body depressed and elongated. Spiracles wide and behind the eyes. Snout elongated and connected by a membrane with the pectoral fin. Nostrils oblique and wide. Teeth obtuse ridged. No lower caudal lobe.

R. GRANULATUS, *Cuv.*

Ngā-man-haing.

$3\frac{1}{2}$ dental plates, with a central and lateral elevation in the mandibular ones, and a corresponding depression in the maxillary. 20 to 22 vertical rows of teeth above, and 13 in the mandible, opposite the symphysis. Scales tubercular, and a spined vertebral row. Reddish-grey above, white below. Grows to 7 feet.

The Andamans.

R. THOUNI, *Lacép.*

Teeth small, upwards of 100 rows in either jaw. Skin granulated with a row of compressed spines along the middle of the back, and smaller ones over the shoulders and about the eyes. Brown, yellowish-white beneath.

The Andamans.

Family Torpedinidæ.

Disk smooth. An electric organ situated between the pectoral fin and the head.

Mason says a 'Torpedo' is found on the coast. Day mentions two species: *Narcine timlei*, *Bloch.*, with two dorsal fins, and which grows to 18 inches; and *Astrape dipterygia*, *Bloch.*, with one dorsal fin, and which is somewhat smaller. A species of *Narcine* (?) is common in the Bassein River, at Ngā-pootau, if my memory serves me.

Family Trygonidæ.

Disk wide. Pectorals continued to the end of the snout, where they join.

TRYGON, *Adanson*.

Nasal valves coalescent, and forming a quadrangular flap. Teeth flattened, with a central point, or transverse ridge. Tail without a fin, and armed with one or two lanceolate serrated spines.

T. SEPIEN, *Forsk.*

Upper surface of head, body, and base of tail covered by thick, flat, or concave, many-sided tubercles. Young reddish-brown. Adults lead-coloured, with terminal two-thirds of tail black.

This species *Mason* says is common on the coast. It grows to a large size, 6 feet or more across the body, and the wounds it can inflict with its tail are much dreaded.

Family Myliobatidæ.

Body very broad from the large development of the pectoral fins. These fins are not present on the sides of the head, but reappear as a pair of detached fins at the end of the snout.

ÆTOBATUS, *Müller and Henle*.

Head distinct from disk. Snout with a soft prolongation, internally supported by fin rays. Teeth hexagonal, broad, flat, with the lower dental laminae projecting beyond the upper. Tail whip-like, dorsal fin present near its base, and with a serrated posterior spine.

Æ. NARINARI, *Cuv.*

Ra-ta-choru-dah. Andamans.

Tail three or four times as long as the body, triangular in section, as far as the spine, and compressed behind it. Body smooth. Greyish-olive sometimes, greenish-olive, or leaden grey, covered with black-edged, dirty-white, or bluish spots. Belly white. Tail black. Iris golden-green. Teeth greenish-yellow.

The Andamans.

HERPETOLOGY.

Class AMPHIBIA.

Cold-blooded vertebrata which breath by means of gills, mostly external in the early stage of life and deciduous, afterwards by lungs. Adults finless. A metamorphosis before reaching maturity. Two occipital condyles. Oviparous. External reproductive organs none. No species are poisonous.

Order OPHIOMORPHA.

Body worm-like, long, cylindrical and limbless. Skin smooth, with annular folds. Eyes rudimentary. The young do not pass through an aquatic career, but are provided with short gills, which soon disappear. In the adult one lung is only developed, the other remaining rudimentary as in most snakes.

Family Cæciliidæ.

EPICRITUM, *Wagler*.

A small groove in front and below the eye near the labial margin.

E. GLUTINOSUM.

The labial groove incloses a short, slender, exsertile tentacle. Upper jaw projecting. The eye distinctly seen beneath the transparent skin. From 280 to 320 transverse folds on the body and tail. Colour black, with a lateral yellow band on either side. Grows to 15 inches.

Inhabits South India, Java, Siam, Tenasserim and Arakan.

E. MONOCHROMUM, *Bleeker*.

This species differs from the last in wanting the yellow side band, and has been obtained in Singapore and may be found to range into Burma.

Order URODELA.

Tailed amphibia, with lizard-like bodies, and tails well developed. Feet two or four. Gills permanent or deciduous.

Family Salamandridæ.

TYLOTTRITON, *Anderson*.

Teeth in both jaws. Skull surrounded in both sexes by a prominent porous ridge. Paratoids large, auricular, flattened. A lateral line of porous glandular knobs. A broad porous vertebral ridge. A permanent gular fold from paratoid to paratoid. Tail long. Limbs well developed. Skin tubercular. Toes unwebbed, 4 to 5.

T. verrucosus, Anderson.

Sixteen glandular knobs along the side, the first behind and above the axilla, the last three behind the articulation of the femur. Colour blackish-brown, paler on the chin, throat, and under surface of limbs, all of which have a brownish-olive tinge. Under surface of the tail orange-yellow.

Males, body 4.00; tail 3.75=7.75 inches.

Females, body 3.00; tail 3.00=6.00 inches.

Common in the high country of Yunnan, and extending into Sikkim.

The vertebrae of the trunk are opisthocœlian, but the sixteenth and all posterior caudal vertebrae are proœlian.

This remarkable species having been discovered in Sikkim, by Col. G. B. Mainwaring, may possibly be detected in the damp forests of Arakan, which are quite as suitable to it as Sikkim.

Order BATRACHIA.¹

Tailless amphibia breathing by lungs in the adult stage. Legs well developed. Vertebrae proœlous. Oviparous. Respiration, owing to the rudimentary character of the ribs, is an act of swallowing.

Family Ranidæ.

a. Water frogs.

OXYGLOSSUS, *Tschudi*.

Fingers free. Toes webbed. Vomerine teeth none. Tongue not notched behind.

O. LEVIS, Günth.

Tympanum indistinct, smaller than the eye. Skin with a few scattered tubercles. Colour pale vinaceous, lighter on the limbs, and finely marbled. Below yellowish-white, marbled with dusky on the throat. A distinct tarsal fold, and a very thin one on the fifth toe.

Length, a little over an inch. Maulmain, where it ranges from the Philippines.

O. LIMA, Tsch.

Tympanum quite indistinct. Body above covered with small subequal tubercles, of which two rows on the chin and throat are conspicuous for their regularity. Colour greenish-brown, with a pale dorsal streak. Femur dark-banded. Below yellowish-white, with two brown bands from the middle of lower lip to the belly.

Grows to a little more than an inch.

Maulmain, in company with the last in swampy grounds.

For full descriptions, see Stoliczka, J.A.S.B. 1870, p. 273.

RANA, *Wagler*.

Fingers free. Toes webbed. Maxillary and vomerine teeth.

R. KUHLII, Dum. et. Bib.

Hpā (generic).

Tympanum hidden. Skin in adults smooth above and below, but in the young slightly tubercular on the sides. Colour greenish-brown, with a rufous tinge, marbled with darker, which marks become faint in large individuals. Sometimes a yellow dorsal line. The lower jaw has two large fang-like apophyses. Usual size 2 inches, but grows to double that size. Ranges from Yunnan to Tenasserim, Ceylon, China, Java and Borneo.

¹ As these pages were going through the press, the British Museum Catalogue of Batrachia Salientia, by Mr. Boulenger, came into my hands. I have been able to add little, therefore, from it here, but have given Mr. Boulenger's arrangement of the Burmese species in the Appendix.

R. TIGRINA, Daud.

Tympanum moderate, as large as the eye. Skin on the back with numerous short longitudinal folds. Above brown, with large blackish spots, and with or without a pale vertebral line. Lips whitish, black-spotted. Colour varies rather from admixture of greenish or yellowish. Mandibular apophyses distinct. Grows to 7 inches. Ranges over India and Burma.

Anderson describes the males during the breeding season as pale greenish-yellow, with dark spots, and a pale vertebral streak; and the larger females as greyish-olive, with dark spots. This is the common 'Bull frog' of the Europeans in India, and has a powerful voice; though when the animal is concealed, it is often difficult to make out where the voice emanates from, by the sound.

R. CYANOPHILICTIS, Schm.

Tympanum rather indistinct, as large as the eye. Mandible with two distinct but not prominent apophyses in front. No fold of skin across the occiput. Skin of the back finely tubercular or nearly smooth. Metatarsus with a single pointed tubercle. Vocal sacs large. Upper parts dark brownish-olive, with irregular brown spots. No pale vertebral streak. Below white. A white band behind the thighs from ham to ham. Grows to 2 to 5 inches.

Inhabits Pegu, the Malayan Peninsula and Bengal.

R. GRACILIS, Wieg.

Var. *Andamanensis* and *Nicobarensis*.

Tympanum moderate, smaller than the eye. The skin of the back with short longitudinal folds. Greyish-olive, dark-spotted, and limbs dark-barred. A pale vertebral line generally present. Mandibular apophyses inconspicuous. This is a small species. Stoliczka's largest Akyab specimen being 2.5 inches.

See Stoliczka, in J.A.S.B. 1870, p. 12.

Inhabits Burma, the Andamans, Nicobars, Siam and Hongkong.

R. FUSCA, Blyth.

Tympanum indistinct or hidden. Two fang-like apophyses on the mandible. Skin subgranulose above, smooth below. A pale vertebral streak sometimes present. Colour dark olive-grey above, white below; upper lip black, as also the fold from the eye over the tympanum. Limbs barred, and posterior surface of the thigh marbled. No vocal sacs. Length of head and body (nearly) 6.5, of hind limb 9 inches.

This species appears to be closely allied to *R. tigrina* in its vomerine ridges, and in the general form of its body; but approaches *R. Kuhlii* in its fang-like apophyses, almost hidden tympanum and metatarsal tubercle.

Inhabits Tenasserim. See Blyth, J.A.S.B. 1855, p. 719, and Anderson, P.Z.S.L. 1871, p. 198.

R. YUNNANENSIS, Anderson.

A glandular fold from the eye to the shoulder over the tympanum. A feeble fold along the metatarsus, and along the first toe, inclosing a small sharp-edged crescentic tubercle. A fold along the fifth toe. Upper surface densely covered with round warty tubercles, each surmounted by a black horny granule. Greenish olive-brown, with dark bands on the upper surface of the limbs. Beneath smooth, and brownish-yellow, reticulately spotted with brown. Length 2 inches. Habitat Hotha at 5,000.

LYMNODYTES, *Dumeril et Bibron*.

Skin smooth, with a glandular fold along each side of the back, and usually a second below the former. Fingers free. Toes webbed. Disks not much developed.

(*Lymnodytes* is preferable to *Hylorana* as less misleading, as it is an essentially water frog, and its dilated extremities do not (as has been supposed) indicate an arboreal or semiarboreal life.)

L. TYTLERI, Theobald.

Adult olive-green above, blackish on the sides anteriorly, and mottled with black posteriorly. The glandular folds are white. Below pale, mottled with black. Limbs barred with brown.

Head and body 2·0, hind limb 3·3 inches. Burma.

This is the representative in Bengal and Burma of *H. erythraea*, which it closely resembles, but has, says Blyth, "shorter and stouter limbs and short anterior digits." See Stoliczka, J.A.S.B. 1870, p. 148.

L. NIGROVITTATUS, Blyth.

Colour "above ruddy plumbeous, below albescens with a broad blackish band from the nostril to the base of the hind limbs," with a slightly palish upper margin in place of the broad white stripe of *L. erythraeus*. Limbs posteriorly dark-marbled. Head and body 2·0, hind limb 3·15 inches. Inhabits Tenasserim.

L. NICOBARIENSIS, Stoliczka.

Much like the last, but tympanum larger ("a little smaller than the eye"), and the disks more developed. Colour greenish-olive, almost black in some males. Sides and loreal region black. Below black-mottled; yellowish between the thighs.

Head and body of male 2·0, hind limb 3·25 inches. Inhabits the Nicobars.

L. GRANULOSA, Anderson.

Tympanum nearly as large as the eye. Two glands behind the mouth, but not prolonged along the side. Two well-developed metatarsal tubercles. Back granular, with a few scattered tubercles in the sacral region. Colour above olive-brown. A dark lateral band and a narrow white streak from the eye along the glandular fold behind the gape. Throat dusky. Below yellowish, reticulately spotted with brown. Legs barred. Grows to 2·2 inches. Inhabits Assam and Pegu.

L. MARGARIANA, Anderson.

Body slender. Tympanum nearly as large as the eye. Vomerine teeth very fully developed on two obscure ridges, widely separated. Limbs long and slender. The web reaches the disks on the toes except on the fourth. A small elongated tubercle at the base of the first toe. Disks on the fingers feebly developed, on the toes more so. Skin smooth. A glandular lateral fold. Above dark olive-brown, with a blackish band through the eye to the groin, and a narrow pale yellowish line from the eye to the shoulder. Limbs banded. Throat and chest almost black.

b. Ground frogs.

XENOPHYRUS, Günther.

Fingers and toes tapering, free. Tympanum small. No paratoids. Vomerine teeth present. Upper eyelid well developed, but without appendages.

X. MONTICOLA, Günth.

A linear fold from the orbit over the tympanum to the axilla. Tongue large, not notched behind. A fold on the nape, with the angle pointing backwards. Colour above brownish-olive. A dark spot on the crown. A brown spot below the eye, and a brown band below the supratympanal fold. Lower parts brown-marbled. Head and body 2·75; hind leg, 4·1 inches. See Anderson, in P.Z.S.L. 1871, p. 200.

Pegu and Sikkim.

CALOPHYRUS, Tschudi.

Berdmorea, Stoliczka. (Proc. As. Soc. Beng. 1872, p. 146.)

Habit bufonine, with proportionately short hind limbs. Head moderate, triangular. Fingers free, toes webbed; tips of both very slightly swollen, truncate; heel with two small tubercles. Skin granular. Tympanum distinct. Eustachian tubes rather large. Tongue entire. Maxillaries sharp, edentulous; intermaxillary not ossified. An interrupted fold of skin behind the choanae, and two others further on on the palate, both papillose, but the posterior much stronger than the anterior.

C. INTERLINEATA, Blyth.

The live animal is one of the most beautifully coloured frogs. The entire body is strongly tinged with vinaceous red, paling to golden yellowish on the lower belly. The two longitudinal dorsal bands are sometimes not very conspicuous on account of the entire upper surface being reticulated with narrow vinous brown bands; the large

round spots in front of the bases of the femora are deep purplish black, encircled with golden yellow. The sides are also purplish black near the edge of the back, but the colour shades into purplish towards the belly; lips, throat and breast rich vinaceous.

The fold across the occiput in the type specimen, re-described by Dr. Anderson, appears to be accidental, for another beautifully preserved one does not show a trace of it.

Length of body 1·8, hind limb measured from vent 2·1, fore limb 1·1 inch.

Both in the type and another specimen collected by Theobald in Pegu, the skin above is not only porose, but throughout distinctly granular. (Stol. l.c.)

Inhabits Pegu and Martaban, sheltering itself under stones, in damp forests.

MICRONYLA, *Tschudi*.

Head small. Teeth none in jaws or palate. Tongue entire behind. Tympanum hidden. Fingers free. Toes webbed. Tips of both more or less dilated.

M. (ENGYSTOMA) CARNATICA, Jerdon.

Disks small. Metatarsal tubercles two. Colour above isabelline or yellowish-brown, with a dark bottle-shaped mark from between the eyes; on the back a triangular black mark above the anus. Limbs brown-barred. A pale streak from the eye to the shoulder. Chin and throat dusky. Belly whitish. During life the sides have a faint rosy tinge, much as in *Callula pulchra*.

Head and body 1·0; anus to metatarsal tubercle 1·0 inch. Maulmain, under logs. See Stoliezka, J.A.S.B. 1870, p. 154.

M. (ENGYSTOMA) BERDMOREI, Blyth.

Callula natatrix, Cope.

Tympanum concealed. Head small. Fore limbs small. Hind limbs very large, and toes fully webbed. Colour above dusky. Throat dusky. The rest of the lower parts white. A dark bottle-shaped mark from between the eyes.

Head and body 1·50; hind limb 2·80 inches.

Pegu, abounding in hill-streams and the adjoining forests.

It is contrary to facts for Dr. Anderson (P.Z.S.L. 1871, p. 202) to state that I identified *D. pulchrum* with this species. In my Catalogue, cited by Dr. Anderson, it is distinctly shown that there were *no specimens* of *D. pulchrum* in the Museum, and *D. Berdmorei* follows beneath *Engystoma*, though, by a typographic error, the species is printed in italics. This is the sole ground for Dr. Anderson's absurd and mischievous allegation.

GLYPHOGLOSSUS, *Gunther*.

Tongue long, free, and notched behind and in front; divided into two lateral halves by a deep groove. Tympanum hidden. Openings of eustachian tubes small. Toes broadly webbed. Metatarsus with a large shovel-like prominence.

G. MOLOSSUS, Günth.

Snout very short. The lower jaw truncated in front into a fleshy semicircular disk. Body short, and thick. Limbs very short. Skin on the loins loose. Pupil vertical. Skin smooth. Colour above uniform brownish-olive, marbled with brown on the sides and limbs; below whitish.

Length 50 mill. Inhabits Eastern Pegu.

The type specimen only is known. It was taken by myself under the following circumstances:—I had halted one day within the tidal portion of the Irrawaddy Delta, to enable my boatmen to prepare their dinner. One of my servants having cooked his rice, poured out the hot-water as usual on the ground, and some of it went down a hole that happened to be near the spot. No sooner, however, had the hot-water disappeared, than out scrambled, in great haste, a fine *Glyphoglossus*, only, alas! to be transferred to a collecting jar. So true does it often prove

“Incidit in Scyllam qui vult vitare Charybdi!”

CALLULA, *Gray*.

Habit stout. Head and gape short. Teeth none. Tongue entire, free. Skin smooth. Tympanum hidden. Tips of fingers enlarged, of toes less so.

C. PULCHRA, Gray.*Hylodactylus bivittatus*, Cantor.

Eye rather small. Thigh enveloped in the skin of the side. Back and outside of limbs brownish olive, with some small black spots. Muzzle and side reddish grey, or rosy, the tint varying with season, the colour forming a side band edged with black and the two confluent across the snout. Below this reddish band a dark band concolorous with the back comes on behind the eye and hardly reaching to the loins. Chin dark. Belly marbled. Iris golden brown. Pupil transversely rhombic.

Grows to over 3 inches.

This fine species is very common in Pegu, and harbours under stones in damp spots like a toad. The enlarged finger-tips bear no relation to arboreal habits, and would seem to be merely simulative of the adhesive disk on the digits of tree frogs, and functionless unless of use in forming a bed in soft earth.

The following species has been separated by Stoliczka from *Callula*.

CALLUELLA, *Stoliczka*.

Habit stout. Head and gape short, maxillary and vomerine teeth present, choanae and openings of eustachian tubes small, two folds across the palate, lower jaw with two prominences. Tongue entire, free behind. Fingers free, toes webbed, both with truncated, but not swollen tip. Metatarsus with an inner shovel-like prominence. Processes of sacral vertebrae dilated. Tympanum hidden. Skin smooth.

C. GUTTULATA, Blyth.

Eye small. Colour variable, above pinkish-olive maculately marbled with black-bordered brown spots. A transverse black mark across the vent. The reniform marbling somewhat resembles the arrangement of water drops on an oily surface.

Length over 3 inches. Inhabits Pegu.

Stoliczka adds:—"Blyth, when originally describing the species as a *Megalophrys*, must have noticed the maxillary and vomerine teeth, and was, therefore, not very wrong in his determination, but his description is so insufficient, that I would have hardly ventured to identify the present species with it, had Dr. Günther not done so. *Calluella* appears to connect *Pyxicephalus* with *Megalophrys*, differing from the former by the entire tongue and from the latter by the absence of cutaneous prolongations on the eyelids. It evidently belongs to the family *Dicoglossidae*.

"Although this species externally most closely resembles the type of the genus *Callula*, *C. pulchra*,—except in having the tips of fingers and toes scarcely swollen, instead of dilated,—it essentially differs by having two very distinctly toothed ridges extending from behind the choanae towards the centre of the vomer and also by the toothed maxillaries and intermaxillaries. An adult specimen of about the same size as the one figured by Günther shows these characters very distinctly, but in young ones these denticulations are scarcely or very deficiently traceable. I have examined a large series of *Callula pulchra*, but as none of them show any teeth on the vomer or on the maxillaries, a generic separation of the present species appears to me justified."

LEPTOBRACHIUM, *Tschudi*.

Vomerine teeth none. Fingers free, toes webbed at the base.

L. HASSELTII, *Tschudi*.

Nireus pulcherrimus, Theobald. British Burma Gazetteer, Vol. I. p. 638.

A few specimens of this most lovely frog were captured by me in stream beds in the Arakan hills, but all were subsequently lost. The following brief note may serve to lead to the recognition of the species. Length about an inch. Mouth very broad, bufonine. Colour light pinkish silvery-grey. Back beautifully ornamented with velvet black reniform spots. Pupil of eye lozenge-shaped, vertical; the upper half bright orange, the lower black. Legs feeble.

Inhabits the Arakan Range or Western Yo-mā. This is a remarkable habitat for such an animal, as it was only previously known from Java.

c. *Tree frogs.*Family **Polypedatidæ.**

Fingers and toes more or less dilated at their tips into pneumatically prehensile disks, in accordance with their arboreal habits.

POLYPEDATES, *Dumeril et Bibron.*

Skin smooth. A fold from the eye to the tympanum, but none along the back. Tongue elongate and deeply notched behind. Fingers partly, toes broadly webbed. Disk well developed. Habits arboreal, crepuscular. Females larger than the males.

P. MACULATUS, Gray.

P. leucomystax, Dum. et Bib.

Eye large. Tympanum nearly as large. Skin smooth above. Disks large. Fingers slightly, toes broadly webbed. Colour variable, pale-brown or grey above. Limbs barred. Upper lip pale. A dark streak through the orbit and tympanum. Under parts dirty white.

Females grow to 3·5 inches. Males to 2·25 inches.

Ranges through India to Burma and China.

These animals are arboreal and crepuscular, and during the day remain in concealment under bushes in damp spots. As the shades of evening spread, their feeble piping note may be heard, and they may be seen if carefully looked for moving about among the branches, and not unfrequently assuming grotesque attitudes, holding on with out-stretched limbs to twigs, either arrested in these attitudes, by the approach of the observer, or on the outlook for insects. They also enter houses in pursuit of insects, and their presence is perhaps first announced by the heavy flop of their bodies falling from the walls or ceilings on the smooth surface of a table or the polished floor.

P. YUNNANENSIS, Anderson.

Tympanum more than half a diameter of the eye. Vomerine teeth in two oblique, convergent but separated ridges. Thumb much swollen in the male. Disks feebly developed. A few wart-like glands behind the gape and a series from the shoulder along the sides, in the position of the fold on *Hylarana*, with numerous wart-like glands below it. Belly minutely granular. A circular granular area on the chest. Above dark-greenish brown, with ragged dark-brown spots. Limbs and feet barred. Jaws spotted. Below yellow, sometimes faintly spotted. Length 2·73 inches.

Near Hotha at 4 to 500 feet.

It differs from its nearest ally *P. marmoratus*, by its smaller disks, and "more emarginate interdigital membrane."

In Boulenger's Catalogue of the Batrachia Salientia, this species is transferred to *Rana*, and renamed *R. Andersonii*, in conformity with the author's practice of disregarding the significance of the digital disks, and selecting as of more importance the absence or presence of an interdigital web. The natural genus *Polypedates* hence comes to be split up, those species with *web* between the fingers being referred to *Rhacophorus*, and those without, to *Rana*.

P. MARMORATUS, Blyth.

P. Afghana, Günther.

Tympanum very small, the size of one of the finger disks. Vomerine teeth in a straight line interrupted in the middle. Disks well developed. Skin smooth or sometimes finely granular above and more coarsely so on the sides. Above brown, very finely marbled or spotted with pale yellowish brown. Below yellowish, unspotted. Throat sometimes brown-spotted.

Ranges from Darjiling to Pegu and Yunnan.

This species, because its fingers are free, is transferred by Boulenger to *Rana*, in spite of its well-developed digital pads. As it is next to certain that the species did not come from Afghanistan, but from the Eastern Himalayas, Blyth's name seems entitled to retention.

P. QUADRILINEATUS, Wieg.

Closely resembles *P. marmoratus*, but the vomerine teeth are in two distinctly oblique convergent series. Colour above brownish-olive, with four dark and black-edged bands down the back. Grows to 3 inches. Inhabits Pegu and Tenasserim.

P. LIVIDUS, Blyth.

Skin smooth, and only granulose on the posterior part of the thighs. Colour above dull olive-green. Below whitish, and the membranes of the toes dusky.

Head and body 3.6; hind limb 6.5 inches. Inhabits Tenasserim.

IXALUS, *Dumeril et Bibron*.

Characters of *Polypedates*, but without vomerine teeth, and of a smaller size.

I. LATERALIS, Anderson.

Olive above, slightly tinged with green; below yellowish, marbled with brown. Sometimes a triangular patch, with its apex directed backwards, between the eyes. The web of the foot is prolonged as a fringe or border along the toes. Bhamo.

I. KAKHYENSIS, Anderson.

Tympanum less than half the size of the eye. Disks large, and blackish. Toes, except the fourth, fully webbed. The wrist nearly reaches the snout. The heel reaches a little beyond it. Above dark olive-black, paling on the limbs to brown, banded with blackish-brown. Throat, chest, and sides marbled with brown, and whitish. Belly yellowish, obscurely brown-spotted.

Length of body 0.93 inches; fore-limb 0.57; hind 1.62.

Inhabits fields in the Nampoung Valley at 1000 feet.

I. TUBERCULATUS, Anderson.

Eye rather large, with finely tubercular eyelids. The tympanum one-fourth as large as the eye. The wrist and heel both reach the tip of the snout. The disks of the fingers are larger than those of the toes, which are feebly webbed. Colour above uniform dark olive. The small tubercles white. Sometimes a yellowish interocular band. A black spot on the groin extending up the side, with two yellow spots. Legs banded. Elbow yellow. Sides of snout and upper lip marbled yellowish and olive, and lower lip and chin yellowish and brown. Chest and belly yellow, finely punctated with brown.

Length 0.80; hind limb 1.35 inches.

Marsly flats on the Nampoung River, in the Kakhyen Hills.

I. CINERASCENS, Stoliczka.

Body small, stoutish, moderately depressed, above with a few scattered tubercles; below on chin and throat smooth; on the belly, and the lower side of the femora, very densely and coarsely tuberculated, the tubercles being flattened and more or less distinctly polyhedral. Snout short, obtuse, shorter than eye, but equal to the length of the exposed pupil, or to the distance between the eyes, which are very prominent; nostrils rounded, very slightly swollen and somewhat laterally placed below the indistinct canthus rostralis; tympanum quite indistinct; a fold runs from the upper eyelid posteriorly to the shoulder. Fingers quite free, elongated with well-developed swollen discs, which are only slightly smaller than those on the toes, the latter being barely half-webbed; metatarsus with a small inner tubercle and a very indistinct one at the base of the fourth toe; no fold on the tarsus. Tongue broadly oval, distinctly notched behind; eustachian openings small and very wide apart.

Colour above olive ashy, very minutely freckled with dark, paling at the sides; a broadish somewhat indistinct band between the eyes, one irregular band on each side of the back, legs and arms 3-banded, the middle band being in each case broadest and most distinct; a spot on the knee, a few small spots on the tarsi and toes, and a large spot round the anus are dark ashy, often encircled with a more conspicuous enlarged black line; shoulder fold, a few small spots on the lips, one spot on the side of the posterior belly, followed, and partially encircled, by a silvery yellow tinge, the inner basal half of the femora, and, to a great extent, also their hinder side, and the

toes internally are blackish. Below pale brownish white, somewhat purer on chin and throat, and all over finely speckled and punctated with dark.

The specimens examined appear to be quite full grown; the largest measures only $\frac{3}{4}$ of an inch. Inhabits Maulmain.

HYLA, Dumeril et Bibron.

Differs from *Polypedates* in the tongue being entire, or but feebly notched behind. Males with vocal sacs.

II. *CNIXENSIS*, Günther.

Tympanum one-third as large as the eye. Fingers partly, toes fully webbed. A distinct fold across the chest. Vomerine teeth in two small groups between the hinder part of the choanæ. Above uniform green, below white. Some black spots on the sides, loins, and thighs. A dark band from the snout to the tympanum.

Length 1·8 inches. Inhabits Momiin in Yunan.

Toads.

Family **Bufonidæ.**

BUFO, Laurenti.

Skin warty. Parotoids swollen. Tongue free, entire. Fingers free. Toes partially webbed. Teeth none.

B. MELANOSTICTUS, Schn.

The common toad of India attains a large size in Barma, one specimen from Maulmain measuring 6·5 inches (Stoliczka, J.A.S.B. 1870, p. 157). It is also found in the Nicobar and Andaman Islands.

B. ASPER, Schn.

Tympanum distinct, but very small. A conspicuous groove along the vertebral line. A cutaneous fold along the inner side of the tarsus. The physiognomy of this species, says Günther, is "very peculiar, in consequence of the prominent eyes and of the short snout, with angular canthus rostralis and perfectly vertical loreal regions." Grows to 5·5 inches or more.

Ranges from Borneo as far north as Mergui.

Toads are useful animals, especially in gardens, where they destroy slugs and insects. They would seem to be capable of appreciating the kindness and protection of man, or in other words of being easily tamed. In Maulmain a very large toad used to come up every night into the verandah of the house in search of insects, and was frequently taken up in the hand and inspected, but evidently felt himself quite at ease, and at home as it were. He was once seized by a large snake, but his lusty croaking brought him speedy succour, and he escaped for the time with a good fright. He eventually disappeared after a visit paid me by a friend who was making a 'collection,' and who I fear was tempted by my poor toad's size and beauty to slip him into one of his store jars.

"En iterum crudelia retro

Fata vocant, conditque *nutantia* lumina somnus."—Georgic IV. 495.

Class REPTILIA.

Cold-blooded vertebrata, which breathe by means of lungs throughout life, and undergo no metamorphosis. The body covered with plates or scales. One occipital condyle.

Order OPHIDIA.

Body slender, cylindrical, covered with horny scales, no external limbs. No eyelids. Mouth dilatable. Tongue bifid. All the bones composing the upper and lower jaws are movable, and united by ligaments or muscles, and not by cartilage. This peculiar structure enables the mouth to be enormously dilated (Pascoc). Reproduction oviparous or viviparous. Vent linear, transverse. Tongue and reproductive organs bifid.

HARMLESS SNAKES.

“Innocuous serpents (writes Dr. Mason) are very numerous from the diminutive blind worm, that hides itself in its burrow, to the gigantic python that displays its coat of many colours on the tree tops, ready to dart upon any animal that seeks the shade. The Burmans have marvellous myths concerning the ‘blind snake’ and the short-tailed earth snakes. They say that each snake has a head at each end, and runs at pleasure either backwards or forwards. Cut one in two and immediately one half runs off in one direction and the other in an opposite direction. More than this, I had a Burman before me who by some misadventure killed one of these snakes, and immediately, he knew not how, two others appeared by the side of the dead one. Others say this snake has a head and tail, but that they change places every six months. It can throw itself six feet at a jump against an elephant, and as soon as it strikes, the elephant reels from one side to the other, and immediately falls down dead. Hence one of the common names is ‘The snake that shoots the elephant.’ On account of its power of self-multiplication it is called ‘Father of the birth of many.’”

It is not quite clear to which of the two snakes mentioned above (*Typhlops* and *Cylindrophis*) the above legends apply. Doubtless they are applied loosely to more snakes than one, just as in India the name ‘two-headed snake’ is applied to *Eryx*, though in Burma, where *Eryx* is not known, the name with its nexus of myths is bestowed on *Typhlops* or *Cylindrophis*.

Of reptiles as food, Dr. Mason writes: “The reptiles form a much more important branch of Zoology in a tropical country like Burma than they do in a temperate land like England. Both their number and variety are vastly increased. Their utility for food is very considerable to the natives of this country. All the tortoises and turtles are eaten, and the crocodiles, saurians, snakes and frogs are not wanting in a Karen’s bill of fare. Still, if man’s olfactory nerves were given to aid him to select his food, as they seem to have been, there is little of the flesh of reptiles that can fairly pass muster.” The above verdict of Dr. Mason is, I think, too sweeping, though raw snakes have a repulsive odour. As I have probably consumed more reptilian flesh than Dr. Mason, I may perhaps be allowed to observe that most tortoises and turtles are good eating, and their flesh, and that of lizards, is not more offensive when raw, than fish, and incomparably less offensive than the odour evolved from the fresh and reeking flesh of either mau or monkey.

Family Typhlopidae.

TYPHLOPS, *Dumeril et Bibron.*

T. HORSFIELDII, Gray.

Fronto-nasal in contact with the second labial. Nasal and fronto-nasal united. Colour dark blackish-olive above, passing to dull yellowish on the belly. Grows to 17 inches.

Ranges from Assam to Tenasserim.

T. BOTHRIORHYNCHUS, Günther.

Fronto-nasal in contact with the second labial. A round groove larger than the nostril in the suture between the nasal and fronto-nasal. A smaller groove on the suture between the rostral and nasal. Colour uniform brown. Grows to 11 inches. Has been taken at Hurdwar, Assam and Pinang.

T. ANDAMANENSIS, Stol.

Fronto-nasal in contact with the second labial. Nasal and fronto-nasal separated by a suture above and below. Fronto-nasals do not meet behind. Colour brownish-black above, sides vinaceous. Below paler, white-mottled.

Inhabits the Andamans.

T. BURMANUS, Stoliczka.

Fronto-nasal in contact with the second labial. Fronto-nasals just touch each other in a point behind the rostral. Nasal separated from the fronto-nasal by an extremely fine short suture. Colour vinaceous black above, paler on the sides, yellow below. The snout in front pale yellow.

Inhabits Maulmain.

T. BRAMINUS, Daud.

The fronto-nasal separated from the labials by the nasal and præocular shields. Nasal separated from the fronto-nasals, but in contact with the præocular. Colour uniform brown, paler below. Grows to 8 inches.

Inhabits India and Burma.

These snakes are rather difficult to distinguish from each other, especially if much injured, as their specific characters are mainly minute differences in the arrangement of the head shields. In all species the scales are smooth and imbricate, the eyes rudimentary and covered by the head shields, the upper labials four, and the cleft of the mouth inferior and very small. In spite of this helpless organization, they are regarded generally with much awe in India no less than in Burma.

Family Tortricidæ.

CYLINDROPHIS, *Wagler.*

C. RUFUS, Laur.

Nostril in a single nasal. Nasals united behind the rostral. Eye surrounded by a supraorbital, a postocular, two labials and a frontal. Colour brown. Belly with white cross-bands (perhaps red seasonably). A red collar and red below the tail. Scales 19 to 21 rows. Grows to 30 inches.

Inhabits Pegu and Tenasserim.

“Under certain circumstances” (writes Dr. Mason) “the Burmans say the bite of this serpent is fatal. These are five: *gnan-soung*, *loo-soung*, *young-soung*, *lan-soung*, *ne-soung*, ‘Snake oblique, man oblique, turban oblique, road oblique, and sun oblique.’ That is, if the snake approaches a man with its head askance, as this snake is always said to do, and the man look at it askance, and if his turban be put askance, and he be moving on the road askance, and the sun be askance descending in the heavens; when these five circumstances meet, if the snake bite, which by the way is always very improbable, death will certainly ensue!”

Family Xenopeltidæ.

Scales in 15 rows, polished. Eye small. A mental fold.

XENOPELTIS, *Reinwardt*.

X. UNICOLOR, *Rein.*

Scales in 15 rows, large and polished. Præocular large, replacing the absent loreal. Five occipital shields. Colour uniform steel blue splendidly iridescent, below whitish. Young specimens have a white head. Grows to 50 inches. Inhabits Pegu and Tenasserim. This is a thick-set, repulsive and venomous-looking snake. It is one of those harmless snakes which have no *loreal* shield.

Family Calamaridæ.

CALAMARIA, *Boie*.

C. SIAMENSIS, *Günther*.

Scales smooth, in 13 rows. Upper labials 4. One pair of frontals. Loreal absent. Colour olive, or fleshy grey, with eleven narrow black lines down the back, the vertebral and alternate lines thicker than the rest. A yellow collar behind the head, and another black-edged yellow collar below it. Grows to 9 inches.

Inhabits Pegu.

Family Oligodontidæ.

SIMOTES, *Dumeril et Bibron*.

Scales smooth, in 17 to 19 rows. Two nasals. Head symmetrically ornamented.

S. CRUENTATUS, *Theobald*.

Scales smooth, in 17 rows. Loreal small. Seven upper labials. Anal bifid. Colour above uniform umber brown; beneath yellowish-white, with numerous square black blotches. Tail beneath bright red, black-mottled. Grows to 15 inches.

Inhabits Pegu.

S. THEOBALDI, *Günther*.

Scales smooth, in 17 rows. Loreal elongate. Eight upper labials. Anal bifid. Colour brown, with a pale vertebral streak, and a pair of light lines down the back along the fifth outer row of scales. The back marked by reticulated black streaks.

Inhabits Pegu.

S. BEATENATUS, *Günther*.

Scales smooth, in 19 rows. Two præoculars. Anal entire. Colour variable, brown, pale brownish-salmon, or uniform brick-red. A pale vertebral line, and a second below it on the side. Scuta with dark marginal dots. Grows to 31 inches.

Inhabits Pegu and Tenasserim.

S. AMABILIS, *Günther*.

Scales smooth, in 19 rows. One præocular. Anal entire. Back barred with over forty narrow black-edged yellow cross-bars. Below white, with an irregular series of blackish spots along either side of belly. Young only known.

Inhabits the Arakan Hills.

Family Colubridæ.

Head distinct. Eye moderate or large. Pupil round. Subcaudals divided. A mental groove.

ABLABES, *Günther*.

Scales smooth, in 13 to 17 rows. Anal bifid. Teeth numerous, equal.

A. SCRIPTUS, Blyth.

Scales smooth, in 13 rows. Colour above brown, with a few black dots on either side of the spine anteriorly. A white collar on the nape. Beneath white.

Inhabits Martaban.

A. BISTRIGATUS, Günther.

Scales smooth, in 17 rows. Præocular 1. Postoculars 2. Upper labials 10. Fourth, fifth, and sixth enter the orbit. Head black, emitting on either side a distinct black band continued to the end of the tail. A yellow dot on each occipital and two on the nape. A chain of black spots on the neck, continued as dots to the tip of the tail. Back ruddy brown, paling behind. Sides grey. Belly yellow. Anal divided.

Body 7·8; tail 3·0 inches.

Prome.

A. COLLARIS, Gray.

Scales smooth, in 17 rows. Præocular 1. Postoculars 2. Labials as in the last. Loreal longer than high. The occipital does not reach to the lower postocular. Colour brown above, white below. A vertebral series of black spots, anteriorly. Two black bands across the head. A yellow-margined black collar on the nape. Ventrals with a black splash at either end, and anteriorly a pair of median dots. Grows to 32 inches.

Inhabits the Arakan Hills and Upper Burma.

A. NICOBARIENSIS, Stol.

Scales smooth, in 17 rows. Light brown, with two white longitudinal bands commencing from a broad black collar and fading posteriorly. Each band is broken up by a series of quadrangular equidistant black spots. Lips yellow. A black band from the eye to the gape. Belly white, each ventral with a black side dot.

The Nicobars, where it seems to be the local representative of *A. melanocephalus*.

COLUBER, *Linnaeus*.*C. NUTHALLI*, Theobald.

Scales smooth, in 23 rows. Colour reddish grey, with four rows of elongate rhomboidal black spots, each inclosing a pale centre. These spots disappear posteriorly and are replaced by four deep brown bands. An oval black spot between the eye and gape.

Inhabits Pegu.

ELAPHS, *Dumeril et Bibron*.

Scales keeled. Ventral shields over 200. Nasals two. Pupil round. Maxillary teeth equal.

E. YUNNANENSIS, Anderson.

Scales on the body in 23 rows. Ventral scutes from 252 to 258. Colour bright olive yellow, darker on the upper surface of the head. A narrow black line from behind the eye of the neck. A series of irregular elongated black spots down each side of the vertebral line, anteriorly connected by a narrow black area, and sometimes forming yellow-centred ocelli. Posteriorly a broad yellow vertebral band to the end of the tail. Behind the twenty-fifth ventral come in some 12 or 14 yellow-centred black rings, replaced posteriorly by dark brown oblong spots, which become confluent on the tail. Some of the ventrals laterally dark marbled.

Body 48·17; tail 11·0=59·17 inches.

Momien.

COMPSOSOMA, *Dumeril et Bibron*.*C. MELANURUM*, Schl.

Scales keeled, in 19 rows. Colour anteriorly brown, posteriorly black. Belly yellow before, black behind. A yellow vertebral band, broadly edged with black, behind the neck. Grows to 65 inches.

Inhabits the Malayan Archipelago and the Andamans.

C. RADIATUM, Schl.

Scales keeled, in 19 rows. Colour pale but rich red brown. Behind the head four black stripes commence abruptly and taper off to about the middle of the body. Sides of the body dark slaty, extending to the belly. Beneath tail, yellowish. Grows to 76 inches.

Inhabits Assam, Pegu, Tenasserim, etc.

This is the 'rat snake' of Europeans in Burma. Mason remarks "The Karens call it the 'striped squirrel snake,' because they say its markings resemble those of the striped squirrel. One that dropped from the roof of my house into the dining room, on being attacked by a cat, defended itself furiously and came off victorious. I have seen them in the act of swallowing rats twice the circumference of their own bodies." When one of these snakes has got into the roof of a house, the fact is often made known by the uneasiness of the rats, who may be seen hurrying backwards and forwards along the beams, often with their young in their mouths, transplanting them from one end of the house to the other, and not unfrequently dropping a callow rat, in their haste and fright, on to the table at which one may be writing or taking tea.

PITYAS, Fitzinger.*P. HEXAGONORUS*, Cantor.

Scales smooth, in 17 rows. The vertebral row enlarged. Loreal one. Colour brown above, yellowish below. Grows to 62 inches.

Inhabits Arakan and the Malayan Peninsula.

P. MUCOSUS, L.

Scales in 17 rows, some 7 of which are keeled, and the vertebrals rather enlarged. Three loreals. Colour brownish olive, the scales dark-edged, especially behind, where the body and tail have in consequence a reticulated appearance. Grows to 91 inches.

Inhabits all India and Ceylon, the whole of Burma and its islands, and the Malayan countries.

P. KORROS, Rein.

Scales smooth, in 15 rows. Vertebrals not enlarged. Scales faintly keeled posteriorly. Two loreals. Colour the same as the last. Grows to 86 inches.

Inhabits Assam, Arakan, Pegu, Tenasserim and the Malayan countries.

TROPIDONOTUS, Kuhl.*T. PUNCTULATUS*, Günther.

Scales smooth, in 15 rows. Colour very variable. Adult males above dark amber, below white, the two colours sharply separated. Upper labials white. Adult females light brown, much mottled with yellow, which sometimes predominates.

Inhabits Pegu.

T. ZEBRINUS, Blyth.

Scales smooth, in 15 rows. Nape black-banded. Colour plumbeous, black-spotted. Sides barred with black bars, and a white spot above. Young only known.

Inhabits Mergui.

T. ANGUSTICEPS, Blyth.

Scales keeled, in 17 rows. 8 upper labials. Præoculars 2, 3 or 4. Postoculars 4 or 5. Colour above plumbeous, uniformly spotted with black. Grows to 41 inches.

Inhabits Assam and Arakan.

T. MACROPS, Blyth.

Scales keeled, in 17 rows. 8 upper labials. 1 præocular. Colour uniform brown, or with a dorsal series of reddish-brown spots. Neck with an indistinct arrowmark. Belly marked anteriorly with large quadrangular brown spots, posteriorly blended with brown. Neck sometimes greenish, and body with black and yellow reticulations. Grows to 39 inches.

Inhabits Sikkim, the Khasi Hills, and the Pegu Range west of Toung-ngoo.

T. nigrocinctus, Blyth.

Scales keeled, in 17 rows. 8 upper labials, the penultimate and antepenultimate upper labial very large. Colour reddish brown, passing into greenish on the neck and head. Some 50 narrow black bars across the back. Grows to 27 inches.

Inhabits Pegu and Tenasserim.

T. quincunciatus, Sehl.

Scales keeled, in 19 rows. 9 upper labials, the fourth and fifth enter the orbit. Nostrils valvular. Colour variable. Above grey, brown or greenish olive, with from three to seven rows of black spots down the body in quincuncial order. Sometimes red spots are present, and in the young dark bars. Sometimes in place of the black spots there are dark lines and yellow spots. Grows to 51 inches.

Inhabits all India and Burma, and the Malayan countries, the Andamans, etc.

T. junceus, Cantor.

Scales keeled, in 19 rows. Nine upper labials, the fourth, fifth, and sixth entering the orbit. Colour greyish-olive, with a row of whitish spots on each side of the back. Grows to 27 inches.

Inhabits Assam and Pinang (and no doubt Burma).

T. bellulus, Stoliczka.

Scales keeled, in 19 rows. Nine upper labials, the fourth, fifth, and sixth entering the orbit. Colour olive brown, with two series of black dots along the back. Præocular and postoculars bright yellow. Ventrals and subcaudals black-edged.

Inhabits the Pegu Range west of Toung-ngoo.

T. modestus, Günther.

Scales in 19 rows. Nine upper labials, the fourth, fifth, and sixth entering the orbit. Ventrals 154 to 168. Subcaudals 82 to 122. Uniform olive brown. Below yellow. Each ventral black dotted at its angle, the spots confluent posteriorly. A narrow pale olive-yellow lateral band anteriorly. In one male from Yunnan the subcaudals were entire.

Ranges from the Khasi Hills to Western Yunnan.

T. subminiatus, Rein.

Scales keeled, in 19 rows. Eight upper labials, the third, fourth, and fifth entering the orbit. Colour olive-brown, passing into yellowish-green on the neck and head. Body anteriorly handsomely reticulated with black and yellow. In the young a black collar on neck. Grows to 42 inches.

Inhabits Assam, Pegu, Tenasserim and Bengal.

T. stolatus, L.

Scales keeled, in 19 rows. Eight upper labials, the third, fourth and fifth entering the orbit. Colour brownish-olive, with numerous reticulated cross-bars, intersected by two pale buff or stone colour dorsal bands. Seasonably, the colours are brightened with red and yellow. Grows to 24 inches.

Inhabits all India and Burma.

A. atretium, Cope.*A. schistosum*, Dand.

Scales keeled, in 19 rows. A single triangular prefrontal. Colour above dark blackish olive, below yellowish. Grows to 25 inches (or more).

Inhabits the Malayan Peninsula, India, and probably Burma.

Family Homalopsidæ.

Nasals large. Nostrils valvular. Head shields often modified and irregular. Posterior maxillary fang grooved.

*GERARDA, Gray.**G. BICOLOR, Gray.*

Scales smooth, in 17 rows. A single præfrontal. Eye over the fourth labial. Colour above muddy. Belly pale. Grows to 11 inches.

Inhabits Pegu.

*CANTORIA, Gerard.**C. DAYANA, Stoliczka.*

Scales smooth, in 19 rows. A single præfrontal. Eye surrounded by a circle of plates. Body long and slender. Colour above dull yellow, with numerous dark bands. Below pale yellow, with a dusky greenish hue along the centre. Grows to 30 inches.

Inhabits the estuaries of Pegu.

*FORDONIA, Gray.**F. BICOLOR, Theobald.*

Scales smooth, in 25 rows. 5 upper labials, the eye over the fifth. One præfrontal. Colour yellowish grey, dark spotted. Sides and belly white. Colours distinctly separated.

Inhabits Pegu.

F. UNICOLOR, Gray.

Scales smooth, in 25 to 29 rows. 5 upper labials, the third entering the orbit. Colour above dark ash. Sides and belly white. Grows to 25 inches.

Inhabits Pinang.

*HYPHIRHINA, Wagler.**H. PLUMBEA, Boie.*

Scales smooth, in 19 rows. A single præfrontal. Colour brown, with a dark-edged yellow stripe. A median dotted line down the belly, and a dark line along the ends of the ventrals and along the junction of the subcaudals. Grows to 21 inches.

Inhabits Upper Burma and Pegu.

H. ENHYDRIS, Schn.

Scales smooth, in 21 rows. A single præfrontal. Colour variable. Hair-brown above, olive tinted, and with a blue iridescence. A pale stripe down each side, margined above and below with a dark line. Sides and belly whitish. Along each side, above the scuta, a stripe of pale salmon red. Scuta and scutelle dark-edged. Grows to 28 inches.

Inhabits Pegu and Tenasserim.

H. MACULATA, W. Blanford.

Scales smooth, in 25 rows. A single præfrontal. Colour blackish-ashy, with three rows of irregular dark spots down each side, and a blackish band along the margins of the ventrals.

Inhabits the Bassin River.

*FERANIA, Gray.**F. SIEBOIDII, Schl.*

Scales smooth, in 29 rows. Two very small præfrontals. Thirteen lower labials, the sixth the largest. Colour pale brown, with over 30 large brown black-edged spots down the back, and below a row of alternating triangular brown spots. Belly and sides yellow. Belly black-chequered. Grows to 25 inches.

Inhabits Pegu, and probably all Burma.

*HYPISTES, Gray.**H. HYDRINUS, Cantor.*

Scales smooth, in 39 rows. Loreal large. 7 upper labials, the fourth being below the suture of the præ- and postoculars. Ventrals sharply keeled. Colour greenish

yellow above, broadly barred with dark grey. Sides and belly white or yellowish. Grows to 21 inches.

Inhabits the tidal rivers in Burma.

The colouration of this snake strongly resembles that of the poisonous sea snakes, but the presence of a loreal shield proves it is harmless. It is captured with numbers of sea snakes in the sluice nets in the Bassein River below Guaputan.

CERBERUS, *Cuvier*.

C. RHYNCNOPS.

Scales keeled, in from 21 to 25 rows. Nasals two. Eye surrounded by a ring of small orbitals. Snout only shielded; occiput scaly. Loreal as large as a postocular. Colour blackish ash with a greenish tint, and irregular black cross bars. The outer rows of scales yellowish. Grows to 4 feet, though usually much smaller.

Inhabits the coasts of India and Burma.

This is a repulsive and venomous-looking snake, but its loreal shield shows its harmless nature.

HOMALOPSIS, *Gunther*.

H. BUCCATA, L.

Scales striated and keeled, in 37 to 47 rows. Nasal single. Eye surrounded with a ring of small orbitals. Colour brownish-olive, with narrow grey black-edged cross bars. A brown patch on the snout, a round spot on each side of the occiput and a streak from the eye to the neck. Belly and outer scales yellowish, usually a row of black spots along the sides of the belly. The head shields are usually very irregular and the colours also. Grows to 42 inches.

Inhabits Pegu, Tenasserim, and the Malayan Peninsula.

Family **Acrochordidæ**.

CHERSYDRUS, *Cuvier*.

C. GRANULATUS, *Schn*.

Tail compressed vertically as in the sea snakes. Scales tubercular in over 100 rows, those of the belly forming a serrated ventral keel. Colour above grey descending in stripes to the belly, below yellow, ascending in stripes to the back. Grows to 37 inches.

Inhabits the sea and estuaries of Burma.

This wholly aquatic species closely resembles the sea snakes, and like them is viviparous. The greater number of its rows of scales serves to distinguish the species.

Family **Psammophidæ**.

PSAMMOPHIS, *Boie*.

P. CONDANURUS, *Merr*.

Scales smooth, in 17 rows. One præocular. Two postoculars. Nasal single, oblong, pierced posteriorly by a moderate nostril with an oblique slit to the first labial. 8 upper labials, the fourth and fifth entering the orbit. Colour buff or yellowish, Isabelline brown (the colour of the dirty smock of Isabella the "catholic"), with a dark stripe two scales broad down either side of the back, and a broader dark stripe down either side of the belly. Belly yellowish, colours strongly contrasted. Grows to 40 inches.

Inhabits Pegu and India. A very active snake.

PSAMMODYNASTES, *Gunther*.

P. PULVERULENTUS, *Boie*.

Viviparous. Scales smooth, in 17 rows. Two præoculars. Two postoculars. Nasal single. 8 upper labials, the third, fourth and fifth entering the orbit. Colour uniform dark umber brown, with some light reddish patches and black spots down the back. Throat, belly and tail brown. Some yellow about the sides. Throat and each alternate ventral white-spotted. Or sometimes uniform ochraceous, and below

bright yellow, with two dotted streaks of reddish brown along the sides. The head is short and lips swollen, and the snake is very venomous-looking. Grows to 21 inches.

Inhabits Pegu and Tenasserim.

Family Dendrophidæ.

Form compressed, elongate or slender. Head narrow, distinct. Snout obtuse. Eye moderate or large, with round pupil. Scales narrow, imbricate. Ventrals keeled.

GONYOSOMA, *Wagler*.

G. OXYCEPHALUM, *Boie*.

Scales smooth, in 25 rows. Loreal very elongate. 11 upper labials, the fifth and sixth or sixth and seventh entering the orbit. Colour uniform grass green, paler below. A dark loreal streak. Grows to 90 inches.

Inhabits Tenasserim, the Andamans, etc.

DENDROPHIS, *Boie*.

D. PICTUS, *Günther*.

Form slender. Eye large. Scales smooth, in 13 or 15 rows. The vertebral series enlarged, the other scales narrow. Colour above bronze-brown, with a black-edged yellow band along either side. Belly yellowish or white. Grows to 48 inches.

Inhabits Assam, Pegu, the Andamans, etc.

CHRYSOPELEA, *Boie*.

C. ORNATA, *Shaw*.

Scales smooth, in 17 rows. Vertebrae enlarged and ventral scutes keeled, almost tritid. Colour black, with bright gamboge spots. Sometimes a red tinge on the back or a series of red rosettes. Grows to 53 inches.

Inhabits Assam, Pegu, and Tenasserim.

Family Dryiophidæ.

Form very slender. Snout pointed. A single nasal shield. Scales narrow, imbricate, in 15 to 17 rows. Pupil horizontal.

TRAGOPS, *Wagler*.

T. PRASINUS, *Rein*.

Scales smooth, in 15 rows. Nasal single, pierced by the nostril posteriorly. 1 to 3 loreals. 9 upper labials, the fourth, fifth and sixth enter the orbit. Colour light green, sometimes yellowish or brown or pale grey. A white or yellow line runs along the edge of the belly. Skin chequered with white and black bars. Grows to 71 inches.

Inhabits Arakan, Pegu, and Tenasserim.

T. FRONTICINCTUS, *Günther*.

Scales keeled, in 15 rows. Nasal very elongate, and separates the rostral from the præfrontals. 2 loreals. 7 or 8 upper labials, the sixth under the orbit, and some of the anterior ones horizontally divided. Colour green, or brown with a black line margined with white or yellow along the edge of the belly. Grows to 36 inches.

Inhabits mangrove swamps on the Arakan coast.

T. JAVANICUS, *Stein*.

Closely resembles *T. prasinus*, but the anterior upper labials are smaller, and the fifth and sixth only enter the orbit. Colour green, with four longitudinal white stripes on the belly.

Inhabits Java and Pegu.

PASSERITA, *Gray*.

P. MYCTERIZANS, *L*.

Scales smooth, in 15 rows. Loreal none, replaced by the frontal, which is bent down to meet the labials. Snout long and pointed, and ending in a flexible appendage.

Colour bright green, paler below, occasionally brown. A yellow line along each side of the belly. Grows to 72 inches.

Inhabits India, Upper Burma, and Northern Pegu.

Family *Dipsadidæ*.

Body elongate, compressed. Head distinct, sub-triangular. Eye large, with vertical pupil. Scales smooth.

DIPSAS.

D. MULTIMACULATA, Schl.

Head triangular, body much compressed, vertically. Scales smooth, in 17 or 19 rows. The vertebral series enlarged. Colour pale reddish-olive, with a series of round brown spots, pale within, and bordered with white, down each side of the spine, and with a smaller and less distinct series below them. Grows to 35 inches.

Inhabits Pegu and Tenasserim. A very common and handsome snake.

D. HEXAGONOTA, Blyth.

Scales smooth, in 17 to 21 rows. The vertebrals enlarged. Colour red on back and sides. Below white. A black dot on the occipitals, and sometimes a black median streak anteriorly. Grows to 45 inches.

Inhabits Sikkim and the Andamans.

D. OCHRACEA, Theobald.

Scales smooth, in 17 rows. Vertebrals enlarged. Upper labials 9, the fourth, fifth, and sixth entering the orbit; the fifth small; the three next very large. Colour uniform dusky grey, or ochraceous. Below whitish. Grows to 35 inches.

Inhabits Pegu and Martaban.

OPIHITES, Wagler.

Scales keeled, in 17 rows. Nostril between two shields. Pupil erect. An enlarged tooth anteriorly in both jaws.

O. FASCIATUS, Anderson.

The long loreal enters the orbit. One præocular. Two postoculars. 8 upper labials, third, fourth, and fifth entering the orbit. Scales feebly keeled, in 17 rows. Keels more pronounced posteriorly. Anal entire. Ventrals 213. Subcaudals 90. Body encircled by 55 broad purplish black bands, separated by reddish interspaces of half their width. Head above dark-brown.

Head and body 16·66; tail 4·34=21 inches.

Ponsee in Yunan.

Family *Lycodontidæ*.

Eye small, with vertical pupil. Head somewhat elongate and depressed.

LYCODOX, Boie.

L. AULICUS, L.

Scales smooth, in 17 rows. Præfrontals very small. Loreal large, its anterior angle being inserted between the præ- and post-frontals. Nostril small, between two shields. Colour reddish brown, barred and reticulated with yellow or white. Sometimes uniform, without conspicuous markings. A collar on the nape in young individuals. Some specimens much resemble the poisonous *Bungarus caruleus*, but the loreal shield shows they are harmless. This is the 'carpet snake' of India, so much dreaded.

Grows to 24 inches, and ranges throughout India and Burma.

ULUPE, *W. T. Blanford*.

Body slender, compressed. Loreal and præocular united. Nasal one. Scales smooth, in 13 rows. Ventrals keeled. Pupil vertical.

U. DAVISONI, W. Bl.

Nostril small, rather anteriorly pierced in the nasal shield. A single præocular in contact with the nasal. Upper labials seven, the third and fourth entering the orbit. Colour above black, with white cross bands, a third as broad as the interspaces.

Length 22; tail 6; total 28 inches.

The type was from Nawlabu hill, east of Tavoy.

TETRAGONOSOMA, *Gunther*.

Body slender. Nasals two. Loreal none. Colour deep purple, marbled with white and black. Beneath pearly. The type specimen is lost, and the species has not been rediscovered.

Inhabits Mergui.

Family Amblycephalidæ.

Body slender, compressed. Head short, thick, distinct. Nostril in a single shield. Eye moderate, with vertical pupil. Scales smooth or faintly keeled, in 13 to 15 rows, the vertebral row enlarged.

PAREAS, *Wagler*.

P. MARGARITOPHORUS, Jan.

Scales smooth, in 15 rows (or slightly keeled on the back). Nostril pierced posteriorly in a large shield. Loreal small. Eye surrounded by several small shields, which exclude the labials. Upper labials 6 or 7, the anterior ones very high and narrow. Three pairs of large transverse gular shields, the first forming a suture with the first four labials. Colour rich reddish-brown, with reticulate bars, formed by some particoloured scales, white in front, red behind. Belly brown-spotted and mottled. Grows to 24 inches.

Inhabits Tenasserim and Martaban.

P. MODESTUS, Theobald.

Scales smooth, in 15 rows. Postfrontals large, and bent over and entering the orbit. Loreal moderate. Præoculars 2, very small. Postocular 1, very small, with a band-like shield between the eye and labials. Upper labials 7, the sixth low, the seventh very long. Three pairs of large gular shields. Below pale yellowish.

Inhabits Rangoon.

Family Pythonidæ.

Tail prehensile. Some of the labial scales pitted. A spur-like prominence on either side of the vent, indicating a rudimentary limb or style beneath the skin.

PYTHON, *Daudin*.

P. RETICULATES, *Schm*.

The first five upper labials deeply pitted, and the ninth to the thirteenth lower labials. Colour clear grey, superbly reticulated with black, with a rich glossy lustre. The ground colour is seen as a series of oblique lozenges separated by black and yellow. Yellow is also interspersed, and on the sides forms irregular ocelli. Head yellow, with a median black streak and two black dots on the occiput. Grows to 30 feet.

Inhabits Burma and the Malayan Peninsula.

P. MOLURUS, L.

The two anterior upper labials are pitted, and four of the lower ones. Colour light greyish brown. A brown lanceolate spot on the crown and nape, its point resting on the frontals, its end on or behind the vertical. A pale median streak divides its broader portion. A vertebral series of large quadrangular spots, and an oblong spot on each side of the square ones. Along the sides another row of brown spots, sometimes with a light centre. Grows to 30 feet.

Inhabits India, Burma, and the Malayan Peninsula.

The gall-bladder of the python is much valued by the Karens for medicine, and Dr. Mason writes: "The Karens have an apophthegm that the largest python can swallow a full-grown buck rusa or 'sambur' deer, horns and all, without inconvenience. According to a Karen legend, all the poisonous serpents derive their virulence from the python, which, though innocuous now, was originally the only one that was venomous. In those days he was perfectly white, but having seduced away a man's wife, aunt Eu (Eve), he made her, while she was in his den, weave figures on his skin in the forms which are now seen. At that time if he bit the footstep of a man in the road, such was the virulence of his poison that the man died, how far soever that man might have passed from the bitten track. The python had not, however, an ocular demonstration of the fact, so he said to the crow, 'Crow, go and see whether people die, or not, when I bite the foot-track.' The crow went to the neighbourhood of a Karen cabin, and found the people, as is their custom at funerals, laughing, singing, dancing, jumping, and beating drums. He therefore returned to the python, and told him that so far from his efforts producing death, on the contrary, they produced joy. The python was so angry when he heard this, that he ascended a tree and spit up all his venom, but other creeping things came and swallowed it, and people die of their malignancy to this day. The tree, however, from which the python spit up his venom became deadly, and its juice is used to this day for the purpose of poisoning arrows. The python made the other creatures promise not to bite without provocation. The cobra said, 'If there be transgression so as to dazzle my eyes, to make my tears fall seven times in one day, I will bite.' So said the tiger (whose bite the Karens esteem as virulent as a serpent's) and others, and they were allowed to retain their poison. But the water-snake and frog said they would bite with or without cause, as they liked; so the python drove them into the water, where their poison melted away and their bite became harmless."

According to Karen testimony, the female python incubates her eggs, covering both herself and them with leaves, in which she is assisted by the male, who remains on guard in the neighbourhood. Dr. Mason also says these snakes are occasionally killed by pigs; but this assertion would seem to require verification. The rarity of large-sized pythons is somewhat remarkable, considering the few enemies they have capable of coping with and destroying them. These creatures destroy their prey by suffocation. A rapid dart is made at the animal, and in an instant two or three coils of the snake's body are thrown round it. These coils are gradually tightened, so as to stop the breathing, and the animal dies suffocated in a few minutes. In the case of a large lizard, the time is longer, as these animals are more tenacious of life than a bird or mammal. When dead, the snake releases its victim from its folds, and takes the head into its mouth, gradually drawing itself over its prey. I have never heard of a case of a human being having been devoured, but no doubt such a thing is possible in the case of a large python. The flesh is much esteemed by the Karens as food.

VENOMOUS SNAKES.

Family Elapidæ.

A poison fang present. No loreal shield. Pupil round.

Naja, Laurenti.

Scales smooth, in 15 rows, on body; more numerous on the neck, which is more or less dilatable.

N. TRIPUDIANS, Merr.

Scales smooth, in 15 rows. Neck dilated into a hood, which is ornamented either by a 'spectacle' mark or an oval, the latter being the commoner form in Burma. Colour varies, pale yellowish or stone colour, pale brown, dark brown or black. Grows to 70 inches.

Inhabits the whole of India and Burma.

Dr. Mason writes: "Mr. Theobald is probably right when he says, 'This snake is I believe of inoffensive habits unless irritated';¹ but then it must be let alone, and no mistake, for the mistake may be fatal. On two or three occasions I have found it fight manfully when attacked; but it sometimes runs, and it has been known when pursued to clear a high pile of stones that obstructed its path. In May, 1871, I heard a disturbance among a litter of kittens in my dressing room, and on looking in, there was a cobra reared up in the form of a capital S, with its peculiar undulatory motions, at a young kitten, whose back was raised like a hedgehog's, and every hair seemed to stand out straight like the quills of the fretful porcupine, while it growled loudly at the snake and held its ground manfully. I was anxious to see the result of the fight, but after the sparring had continued at least two minutes, I incautiously approached so near the combatants that the cobra took the alarm, and ran under a box, leaving the kitten in possession of the field. With a view to bringing him out in front that I might get a blow at him, I threw a kitten in behind the box; but contrary to my expectation, he came out behind, and although I hit him, escaped down a hole in the floor. The kitten that I had thrown into his hiding-place walked feebly across the floor, staggered like one blind and laid quietly down and died without uttering a cry. The snake had struck it above the left eye, where there was a little swelling. In the evening I heard another disturbance among the kittens, and went into the room in the dark, not anticipating the return of the snake, when matters quieted down again. An hour afterwards another kitten was found dead. With such dangerous neighbours which we all have in the country, it is worthy of inquiry what is it that attracts them into our houses. A little Burman boy said that it was the kittens, and that he had two kittens devoured by snakes. There were two baskets of green mangoes in the room near to the kitten's nest, and our Tamil servant said that it was the mangoes which drew in the snake, and he fortified his opinion by quoting two deaths from cobra bites that had come to his knowledge among the Burmans, where the sufferers had thrust their hands into baskets of mangoes, and were bitten by cobras that had hidden themselves in the bottom of the baskets, and that within a few days the servants had turned up a cobra in a pile of mangoes in the mess house." The Burman boy may have been right, as a cobra could swallow a kitten as easily as a rat, or the snake might have entered the house in search of a dry spot, if the country outside was inundated. The wily Tamulian probably had his own reasons for wishing 'master' to keep his mangoes anywhere rather than in his own room. Dr. Mason adds: "The natives say the cobras make their homes in holes in the ground, but come into houses in search of food. In the forests they build nests of grass among rocks or under logs, and the snake charmers often take the eggs and raise from them docile snakes." This last observation is wholly incredible, no snake charmer that I ever saw being possessed of young cobras.

N. ELAPS, Schl.

The Hamadryad.

Scales smooth, in 15 rows. Subcaudals bifid, except the anterior ones, which are single. Colour brown, with paler cross-bands edged with black. Throat yellow. Or some specimens greenish olive, with numerous oblique black and white bands converging towards the head. Belly mottled or blackish, with yellow throat. The young are black, with narrow equidistant white bands and head white-banded. Grows to 170 inches.

Inhabits India, Burma and Tenasserim.

Dr. Mason writes: "The Hamadryad is the most formidable reptile in the country. It may be described in general terms as a magnificent variety of the cobra. It has

¹ The entire passage runs thus. "This snake is I believe of inoffensive habits unless irritated, but is of course a dangerous neighbour to have in a house. Not only in Burma, where the respect for life is greatest, but in India also I have known a cobra, enticed or forced into an earthen jar and then carried by two men across a river, or some distance from the village, and then liberated. The professional snake charmers, I believe, in Burma liberate their snakes after a few weeks' captivity, to prevent, I suppose, their dying of starvation in their hands, and in deference to that tenderness for animal life, which is so charming a trait of Buddhism." *Linnean Society's Journal*, vol. x.

an expanded hood like the cobra, but has no markings on it. It bears the character of being a very fierce snake, and of always pursuing when attacked. I met one, on the Toungoo Hills, two or three years ago, when accompanied by a dozen Karens. We all stopped, and the brute being some ten or twelve feet long, no one was disposed to attack him. He glided close by us in a very deliberate manner, seeming to say, 'Let me alone, and I will let you alone,' and we accepted the terms. Mr. Theobald writes: 'I was once descending the Tenasserim River in company with Professor Oldham, and saw one of these snakes on the bank. Thinking it was a *Ptyas*, I hastily sprang ashore and caught it by the tail as it was disappearing in the brushwood. My boatmen, however, quickly handed me up a "Dah" and with two blows I severed my dangerous prize in half. That I was not bitten I attribute to the gentle manner in which I held the snake, without pinching it; but the risk was great, and such as it is better to avoid, as the animal measured twelve feet, and its bite might have been fatal in a few minutes. The excitement, however, generally gets the better of one's prudence when a fine specimen is to be secured, as the following instance will show: I was one evening attracted by a noise of men and dogs near my tent, and found a large crowd round a bush, in which some creature was at bay. On coming up I found it was a magnificent "Gnan" (*Hamadryas*) twelve feet long, which was making furious charges at the dogs, but was protected by the bushes among which it kept from the men, who moreover were very much disinclined to come very close. Taking a stick from a boy, I directed all present to go the other side of the bush and keep quiet, whilst I stationed myself a few yards in the open. As I anticipated, in a minute or so, the "gnan," thinking the coast clear, came straight out on my side, with the idea of escaping; and when he was well clear of the bushes, I made one step forward and delivered a smart blow on the neck, and before he could recover himself, I was upon him and had him firmly by the nape. He was quite unhurt, and I had a hard job to hold him, but managed to drag him to my tent, where I severed the spine at the nape with a penknife, to the admiration of the crowd, who were convinced that I had some powerful charm, to enable me to overcome the dreaded "Gnan."

Dr. Mason says, "One of these serpents, about seven feet long and one foot in circumference, was caught in Shwagyen, and after being secured to a bamboo, was brought to Major Berdmore. He sent for a famous Burmese serpent charmer, who met the brute on the verandah in the confident expectation of subduing it, by a few 'brays,' a bold front, and a shake of the finger. At first the serpent appeared to cower beneath his glance; but when he approached and put forth his hand, it sprang on his wrist and bit him. The man felt the poison up to his shoulder in an instant, and ran off immediately to his house, which was near, for an antidote; but he fell exhausted on the threshold, and expired in less than half an hour after he was bitten.

"The Karens say they are sometimes three fathoms long, but from ten to twelve feet is the most common length of adults. A Karen at my side says that on three several instances he has seen a *Hamadryad* devouring other snakes, so one of its specific names 'ophiophagus' (snake-eater) is most appropriate. An intelligent Burman told me that a friend of his one day stumbled upon a nest of these serpents, and immediately retreated, but the old female gave chase. The man fled with all speed over hill and dale, till reaching a small river he plunged in, hoping he had then escaped his fiery enemy, but lo! on reaching the opposite bank, up reared the furious *Hamadryad*, its eyes glistening with rage, ready to bury its fangs in his trembling body. In utter despair he bethought himself of his turban, and in a moment dashed it upon the serpent, which darted upon it like lightning, and for some moments wreaked its vengeance in furious bites, after which it returned quietly to its former haunts. Yule wrote (*Embassy to Ava*, page 180): 'At about a mile from the Coal we came upon a large *Hamadryad* snake. One of the men had a double-barrelled gun, but when he attempted to fire at it, all the rest cried to him to stop. I said, "Shoot him!" but the snake looked at us and glided away unhurt. I asked him why he did not shoot it. The reply was curious as bearing out a statement in Mason's "Tenasserim," which I confess I did not credit before. They said it would, if hurt, turn after and chase them; so it got off. It was about 9 feet long.' The Burmese word '*gnan*' is used generically to denote both the '*Hamadryad*,' the

'Bungarus,' and the 'rat-snake,' the different species being distinguished by qualifying adjectives, and the same snake has sometimes two or three specific names. Thus the Hamadryad is most usually called '*guan pouk*,' 'the dark guan,' particularly applicable to the dark colour of old individuals. The name '*guan*' is derived from the word '*guan*,' signifying, 'a certain venomous influence supposed to occasion certain diseases' (Judson's dictionary). It cannot therefore be appropriately applied to any but venomous serpents; but owing in part to want of discrimination, and in part to ignorance, the name is often applied to others."

Callophis, Gray.

Scales smooth, in 13 rows. Caudal shield in two rows.

C. intestinalis, Lahr.

Scales smooth, in 13 rows. A red vertebral stripe bordered with black. A buff-coloured band bordered with black along the edges of the two outer rows of scales. Head brown, black-spotted. Belly barred alternately yellow and black, the black bars being broadest. Tail with three black rings generally. Grows to 24 inches. Inhabits Upper Burma.

This species is remarkable for the extraordinary development of its poison glands, which are somewhat more than one-third the length of the body, running along the ventral side, and occupying laterally the alimentary and respiratory canal. (J. A. S. B. 1870, ii p. 212.) *C. linigatus*, Boie, is the only other species known to possess the same remarkable structure, and it is readily known by its immaculate vermilion head, belly and tail.

C. trimaculatus, Daud.

Scales smooth, in 13 rows. Colour above light bay, an indistinct line formed by minute brown dots along each row of scales. Head black and yellow-spotted. Belly red. Tail with two black rings, marbled with yellow. Grows to 12 inches and probably more.

Inhabits Tenasserim.

C. maculiceps, Günther.

Scales smooth, in 13 rows. Colour uniform pale brown, with a chain of 36 distant black dots down each side of back. Head and a collar on the nape black. A sub-terminal black ring on the tail, and a black median line and a black band at the base of the tail expanded above into a rhomboidal esentcheon. Grows to 24 inches.

Inhabits Pegu and Tenasserim.

Bungarus, Daudin.

Scales smooth, in 13 to 15 rows. Caudal shields single or entire.

B. formosus, Gray.

B. flaviceps, Rein.

Scales smooth, in 13 rows. The vertebral series enlarged. Colour black. The head, neck, and a thin vertebral line bright red. Belly red, or red posteriorly, black in front. Gray's name for this snake is preferable, as '*flaviceps*' is only applicable after the animal has changed colour from keeping in spirits. Grows to 73 inches.

Inhabits Tenasserim and according to Dr. Mason Tomng-ngoo.

B. ceruleus, Schn.

Scales smooth, in 15 rows. The vertebral series enlarged. Colour above glossy black, with extremely narrow white reticulated cross-bands, often obsolete or indistinct. Grows to 48 inches.

This snake is rare in Burma, but occurs in Pegu and the Andamans. It is the 'Krait' of India, so justly dreaded, and is not unlike some of the varieties of the harmless *Lycodon aulicus*, or carpet snake, which may account for the dread that snake is held in. It also somewhat resembles the repulsive-looking *Xenopeltis unicolor*, but that species has five occipital shields, and no pale reticulations.

B. fasciatus, Schn.

Scales smooth, in 15 rows. The vertebral series enlarged. Body banded alternately black and yellow. Head black. Throat and belly yellow. Grows to 90 inches.

Inhabits Pegu and Tenasserim.

It is called by the Burmese 'Gnān-thān gwin-zok.'

Mason says, "The Karens call this snake the 'Necklace snake,' because they say it resembles a necklace of black and white beads. When they go up the streams at night with lights, and smite the fish that are attracted to the light, this snake often follows them, but never does them any harm. The snake seems to be fascinated by the light as well as the fish."

VIPERINE SNAKES.

These snakes are characterized by a long tubular poison fang on a short maxillary bone, and keeled scales; a stout habit of body, and a repulsive physiognomy. They are divided into two families, Vipers and Pit-vipers, the latter being provided with a pit in the loreal region. Viviparous.

Family Viperidæ.

No loreal pit.

DABOLA, Gray.

D. RUSSELLI, Shaw.

Scales strongly keeled, in 29 to 31 rows. Head covered with scales. Colour greyish or reddish-brown, with three rows of black, white-edged annular ocelli down the back and sides, the vertebral ones ovate, the outer ones circular, with some smaller supplementary ocelli interspersed. Two pale lines from the snout, over the eyes, to the temporal region. Belly yellowish, marbled with brown, with numerous semicircular spots on the hinder margins of the ventrals. Grows to 54 inches.

Inhabits the whole of India, Arakan, and Pegu, but not recorded with certainty from Tenasserim.

This snake is the '*tie polonga*' of Ceylon, '*Chunda bora*' of Bengal, the '*Cobra monil*,' or necklace snake, of early writers. Dr. Mason writes—"This viper is called by the Burmans '*Mywe-bwie*,' which signifies '*ringworm snake*,' so named because the spots on its skin are supposed to resemble 'ringworms.' It is generally found in sunny places near the foot-paths. Mr. Cushing encountered it repeatedly in the Shan states. On one occasion he killed a portly old fellow, while sunning itself on the banks of a small lake; but it almost proved to Mr. Cushing as great a mistake as Ptolemy's soldier made, when he killed a cat in Egypt, for the Shans declared it was the guardian spirit of their lake, that he had the freedom of the country given him, to go and come when and where he liked, and that he never abused his liberty by biting any one. He was, in fact, their tutelary deity.

"While travelling in the Shan state of Zimmay, half a day west of Merughaut, on one occasion Mrs. Cushing laid down in the shade to rest, in the middle of the day, but was woken from her slumbers, by feeling something crawling over her, up from her feet. The idea that it was a snake suggested itself at once, and she lay perfectly immovable while it crawled deliberately up over her arm, and then actually over one side of her face, and off over the temple. As it dropped its tail from her head, human nature could restrain itself no longer, and she jumped up and screamed, just in time to see a large spotted viper taking his departure, and Mr. Cushing came on the field in time to see the reptile. These facts prove that the viper does not bite when allowed to have his own way without let or hindrance; but knowing all this, there are very few people with sufficient presence of mind, coolness, and command of nerve, to allow a deadly serpent to crawl over them from foot to head without moving."

Mr. W. T. Blanford, writing of this viper, says, "It is a sluggish animal. A friend once told me he had carried one home under the belief that it was a young

Python, the markings being not much dissimilar; it made no attempt to injure him, and he was only undeceived by one of his dogs being bitten and quickly killed by the snake.'

Family Crotalidæ (Pit-vipers).

A deep pit in the loreal region.

a. *The second upper labial forms the front of the loreal 'pit.'*

TRIMERESURUS, Günther.

T. GRAMINEUS, Shaw.

Scales keeled, in 19 to 21 rows. Scales of the head smooth or faintly keeled. The supranasals are separated by a small shield or a pair of small shields. Colour grass green, paler on the sides. Belly greenish. A yellow or brick-red line runs from behind the eye along the outer series of scales. Tail sometimes reddish. Grows to 32 inches.

Inhabits Pegu, the Andamans.

T. ERYTHRURUS, Cantor.

Scales keeled, in 21 to 23 rows. Supranasals in contact behind the rostrals, or rarely separated by a small shield. Colour like the last, only lips and chin whitish, and a white lateral line bordered below with greenish or purple. The head is more elongate, oval and depressed than in either the last or the next species. Grows to 33 inches.

Inhabits Pegu, Tenasserim, and Upper Burma.

T. CARINATUS, Gray.

Scales strongly keeled, in 23 to 25 rows (rarely in 21). The supranasals usually separated by one or two shields, or if not, only just touch, without forming a broad suture. Colour grass green, paler below. Tail rusty. Grows to 37 inches.

Inhabits Pegu and Tenasserim.

These three species are closely allied, and individuals are often not easy to assign without a good series.

T. PORPHYRACEUS, Blyth.

Scales keeled, in 25 rows. Supranasals small, separated by a large shield. Colour grass green, brown or blackish, either uniform or variously mottled with a fine porphyraceous lustre. Upper lip and below whitish, or occasionally a side streak. Grows to 48 inches.

Inhabits the Andaman and Nicobar Islands.

T. CANTORI, Blyth.

Scales keeled, in 27 to 29 rows. Colour dull green, with several rows of dark alternating spots. A white lateral line, and another margined with dark green, from the rostral to the gape. Grows to 48 inches.

Inhabits the Andaman and Nicobar Islands.

b. *Shield in front of the loreal pit divided from the second upper labial.*

T. MUTABILIS, Stoliczka.

Scales keeled, in 21 rows. The second upper labial is sometimes undivided. Colour variable. Olive brown, darker on the head, with numerous greenish dark-edged cross-bands. A white streak from the rostral to gape, meeting a temporal streak, and thence continued along the ventrals. Two other bands down the side, with a dark interspace. Grows to 20 inches.

Inhabits the Andamans and Nicobar Islands.

T. ANDERSONI, Theobald.

Scales keeled, in 25 rows. The second upper labial sometimes undivided. Colour rich brown. Belly and sides conspicuously white-spotted, or greenish on sides and belly, spotted and barred with brown. Inhabits the Andamans.

These last seven snakes are essentially tree snakes, and coolies and others engaged in clearing jungle or in gardens are frequently bitten by them. The bite, however, of the Indian *Trimeresuri* is not usually (if ever) fatal to an adult, though it occasions pain, swelling, and great local and constitutional disturbance. Dr. Mason remarks: "These snakes may often be seen in trees, and their colouring so much resembles the foliage that I have had my hand drawn back by a native when about to lay it on one, that I was looking for among the branches, but with no intention of touching the reptile. They appear to bite more frequently than any other venomous terrestrial serpents in the provinces; but although the limb that is bitten always swells up to a monstrous size, and much pain ensues, yet I never heard of a case proving fatal. It is a popular idea that snakes have a fascinating power, but I have certainly seen a *Trimeresurus* fascinated by a light. It wound itself round a post, and then extended its head towards a candle, at which it gazed steadily for some ten minutes, and when considerable noise was made, it attempted no movement, but allowed the end of a bamboo to be thrust down upon it in front, without making the slightest effort to escape." The following account of the teeth in different poisonous snakes is from the pen of Dr. Nicholson and will be read with interest:

"The simplest form of poison apparatus is that of the sea snakes (*Hydrophidæ*), where the addition of a poison gland with duct, and of a canal through the front tooth of the maxilla, is attended with but little of the modification in the shape of the maxilla which is seen in the more highly developed venomous snakes. The *Bungarus* genus (and probably the genus *Callophis*) have the same structure of apparatus as that which will be described of the cobra, but on a smaller scale, and though the maxillary teeth are reduced in number from the shortening of the bone, yet there remain two or three of them behind the poison fang.

"On examining the mouth of the cobra, we find a very marked departure from the arrangement seen in that of a harmless snake. The palatine and mandibular teeth are unchanged, but a considerable modification has taken place in the upper jaw. Instead of a row of teeth, the maxilla shows a single tooth, of which the point is barely visible until a fold of mucous membrane which surrounds it is pulled up. Slit up this gingival fold and the fang will then be exposed; it will be seen to be fixed in very much the same position as a dog's fang, though curving more backwards, and to fit into a depression in the lower lip. Now dissect the skin off the cheek of the cobra, from the nostril in front, to the angle of the mouth behind. A large flask-shaped gland will be exposed on the cheek, extending for half an inch or more behind the eye. It is continued by a duct along the lower edge of the orbit as far forwards as the nostril; a dense fibrous sheath covers the gland and forms a point of attachment to many fibres of the maxillary muscles. Cut through the duct at its beginning just behind the eye, and a canal of very small calibre will be seen in its axis; pass a fine bristle down the canal and by careful manipulation this probe will be seen to go to the end of the maxilla, turn downwards over it, and enter the mouth inside the gingival envelope of the fang, and in front of an orifice in the base of the fang. If we now dissect away the soft parts and reopen the maxilla, we shall see a great modification in its form, compared with the normal type. It barely reaches as far back as the hinder part of the orbit, its shortness being compensated by increased length of the external pterygoid. A short tooth is found at its hinder part, but this is rarely perceptible until dissected down to, and appears to be rudimentary. The rest of the maxilla is flat and occupied on the lower surface by the matrix of the fang; in front, in line with the fore part of the orbit, is the socket for the fang. This part of the bone is thick and wide, and it bears, side by side, depressions for two fangs; one, the inner socket, is generally occupied by the fang in use, the other by the fang in course of growth. The new fang is generally found not yet set and then the outer socket is often open, at other times it is occupied by the newly set fang whilst the inner socket is vacant, and remains so until the new fang has worked

its way inwards. Sometimes these two fangs are found perfect at the same time, then one of them, generally the inner or old fang, will be loose. This occurs at the time of casting the skin, and I have several times removed the old fangs easily with the finger and thumb or a small forceps.

"The fang is slightly curved backwards and inserted at an angle so as to form a hook in the jaw. It is in shape like a short elephant-tusk and does not exceed 28-hundredths of an inch in the longest specimen I have seen. In structure it differs from other teeth in having, when fixed, two orifices communicating with the interior. Instead of a conical hollow, it contains a complete canal. Both orifices are in front, the upper close to and forming part of the base, the lower at a distance from the point equal to about one-tenth of the length of the fang; a groove connects the orifices, or rather did connect them during the growth of the fang, at which time the canal, originally open in its entire length, gradually closed from above downwards. The canal only occupies the front half of the fang; the hinder part is a bony column giving considerable strength to the structure.

"In the *Viperine* snakes a transition takes place, gradually culminating in the most perfect form of poison apparatus, viz. a long fang usually lying supine along the jaw, but capable of erection by a special muscle. The genus *Trimoresurus* is not nearly so complete as this, the fang is long, but there is no special muscle exterior of erection. The maxilla consists of an open shell communicating with the exterior of the cheek. But it is in *Daboia* that we see the perfection of mechanism; on removal of the skin covering the cheek, we come at once across a strong tendon lying below the eye; it arises from the muscles of the cheek and from the fibrous covering of the poison-gland, and is inserted into the maxilla. This bone is found to be considerably modified in form; it is no longer placed below the orbit, this position is occupied by the elongated external pterygoid, whilst the maxilla, only one-fifth of an inch long (in a large *Daboia*) but double that in height, is placed at the end of this bone like a hammer-head at the end of its handle. Imagine the head of a hammer, with the claw downwards representing the fang, hinged at its junction with the handle, and with a string fastened to the head so as to erect at will the claw from its usual supine state; you will then have a pretty accurate idea of the mechanism of a viper's upper jaw.

"In the vipers the fang is much longer than in the cobra and other *Elapidae*, but their length has been greatly exaggerated, as it rarely exceeds half an inch in the largest specimens. It is of larger calibre also, and the poison duct is plainly seen to enter the mouth just in front of its superior orifice; the duct winds round a groove in the surface of the maxilla, and a bristle passed along its canal from behind forwards can hardly fail to pass out at the buccal orifice at the bottom of the gingival envelope of the fang. Muscular pressure and spasmodic action of the gland cause an ejection of poison into the fang and through it into the wound. But under ordinary circumstances the poisonous saliva finds its way into the mouth just like the saliva of the other glands running down the inside of the gingival fold along the outer surface of the fang. I have seen the saliva ejected by an enraged cobra in quantities which could not have passed through the fang, for experiments enable me to affirm that a cobra could not inject through the fang with more force than would be necessary to expel one drop (a minim) in three seconds, so fine is the inferior orifice of the fang. A viper could, however, inject the same quantity in half a second, and fluid may be forced through its fang, in a fine stream, while small single droplets can alone be ejected from the cobra's fang."

To kill a snake, Dr. Nicholson recommends placing it in a bottle with some chloroform, the vapour from which soon destroys it painlessly; but this is not always practicable, and can only apply to small snakes, and Dr. Nicholson very justly adds: "Do not commit the cruelty of putting a snake alive into a bottle of spirit, for as long as a bubble of air remains in the bottle the snake can breathe, and the death is a most lingering one." My own plan is as follows. I first catch my snake. This is easily effected by pinning him down with a stick, and seizing him firmly by the nape. I then either divide the spine at the nape with a pair of nail scissors, or a penknife, or make a slit in the cardiac region of the abdomen, and extract the heart with the

finger and thumb. The pulsations of the heart indicate the proper spot to be opened. The snake dies quietly, and it may be presumed painlessly, of exhaustion in from 10 to 20 minutes, and can then be slit up and eviscerated. Coil the body now, belly uppermost, in a proper sized bottle and fill with spirit, rotating the bottle obliquely to get rid of air from between the coils. Previous to coiling, wash the snake in spirits to cleanse it of blood, mucous, etc., and fill up with spirits 20 to 60 over proof. If a large snake, change the spirits in 24 hours, and this spirit will do again for preliminary use in the case of another specimen. All snakes, lizards, bats, and small mammals, should have the abdomen slit up to allow the spirit to penetrate rapidly, but only the large ones need be eviscerated. In the interior of the bottle, in the space within the folds of the snake, lizards, frogs, or other animals may be stowed to economise space; but the spirit must be strong. Brandy or gin is altogether too weak. The stoppers should be smeared with grease, luted down with soft wax and fastened with rag.

Antidotes to snake poison.—With the sole exception perhaps of the vexed subject of unfulfilled prophecy, nothing has more fascinated men's minds than the question of snake bite and its antidote, and on no other subject has more utter rubbish and nonsense been written. Poor credulous beings, who hardly know which end of a snake it is which is poisonous, will all the same assure you of the infallibility of some nostrum or other they are in possession of, and the 'evidences' produced in the one case are fully as unconvincing and trumpety as those used to elucidate the other. Herbs and vegetable moses without number, brandy in which the gall bladders of snakes have been steeped, blue stone, acids, alkalis, alcohol, laudanum, cautery, excision, suction, ligature, electricity, and prayer, have all their particular advocates, but the whole results may be summed up in one word—Bosh!

Instantaneously sucking and ligaturing the wound may arrest the effects of the bite of a poisonous snake, but the chances of effectual intervention are small, as the three cases presently quoted will show.¹ Antidotes to the poison there are none, though diffusible stimuli, as ammonia and brandy in moderate doses, may be useful in cases where the results of the bite stop short of death; while all violent measures, compulsory locomotion, beating the patient, and the like are simply pernicious.

Family **Hydrophidæ.**

Body strongly compressed posteriorly, and tail paddle-shaped. Loreal none. Venom fang small.

The sea snakes are wholly marine or estuarine, and are incapable of progression on land, viviparous and deadly without exception. They abound on the coast of Burma, but the precise number of species met with has not been ascertained. A brief conspectus of species is therefore here given to facilitate their recognition. The colouration is very similar in the majority of species, being a yellowish ground colour, banded with dark grey or blackish. Their chief difference lies in the proportions, slender or the reverse, of the head, neck and body, and this is difficult to convey without a figure. The colouration too varies with age, being much brighter and the markings more distinct in the young than in aged individuals. The scales too in the young of many species are smooth, which in the adult are keeled or tubercular, so that it requires a large series of a species and its allied forms to satisfactorily determine these snakes.

In Burma vast numbers are caught on the coast in tidal inclosures made for fish, as at Mergui, or in the 'creels' or long baskets which are placed in tidal rivers, as below Bassein at Nga-poo-tai, into which fish, crustacea, snakes and even porpoises (as I am told), are swept by the force of the tide, which 'creels' are visited and emptied at slack water; and these localities are admirable ones for collecting the rich and varied tribute of the sea, of which so much remains yet to be learned.

PLATURUS, Latreille.

Shields of head normal, that is, as in colubrine land snakes. Scales imbricate smooth. Tail with two series of subcaudals.

¹ See page 321.

P. SCUTATUS, Laur.

Scales on neck, in 21 to 23 rows. An azygos shield between the posterior frontals. Crown of the head black. Body surrounded by 25 to 50 black rings. Grows to 5 feet.

Bay of Bengal and Eastern seas.

P. FISCHERI, Jan.

Scales on neck, in 19 rows. No azygos shield between the posterior frontals. Body surrounded by 33 to 36 black rings. A black band across the occiput and vertical, extending to the lower jaw. Snout yellow. Lower labials black. Length 30 inches.

Bay of Bengal and Eastern seas.

P. AFFINIS, Anderson.

Resembles *P. Fischeri* in having 19 rows of scales, no azygos shield, and other details. It resembles *P. scutatus* in having 56 black rings and the head wholly black. Length 49 inches.

Tolly's Nullah, Calcutta.

Till more specimens are procured, there seems some doubt if there are three species, or only one rather variable one, of this genus.

HYDROPHIS.

Head shielded above. One pair of frontals. Nostrils superior in a single shield. Ventral shields narrow, rudimentary or absent.

A. *Scales imbricate.*

a. *Scales in not more than 17 rows round the neck.*

II. *JERDONII*, Gray.

b. *Scales in 38 to 43 rows round the neck.*

II. *GRANOSA*, Anderson.

Habit moderately slender. Scales in 43 rows round the neck. Keels slightly dilated at either extremity. One præocular, one postocular. The ventrals are twice the size of the adjoining scales, and carry either 2 or 4 tubercles. Six anal shields, the outer very large. 52 non-confluent black bands down the body.

This species is nearest to *II. Stokesii*, which it may represent in the Eastern seas.

II. *TUBERCLATA*, Anderson.

Scales in 38 rows on the neck, longitudinally bitubercular. One præocular, two postoculars. The fourth and fifth labials below the eye. Scales of the head profusely granulated. Two pairs of large chin shields. Ventrals 321, about twice the size of the adjoining scales, irregular, anteriorly largest, each ventral minutely tubercled at the sides. Four anal shields, the external largest. Body encircled by 59 black bands and the tail by 8, broadest above. Colour above olive yellow, below bright yellow. A dark patch on the crown. A yellow band between the orbits, continued to the neck. A dark streak down the yellow upper labials.

Length 49 inches.

Differs from its nearest ally, *II. granosa*, by its reduced number of scales, two postoculars, chin shields, etc.

Tidal branches of the Hugli.

c. *Scales in 23 to 38 rows round the neck. Head not very small.*

Neck moderately or not slender.

* *One postocular.*

II. *MAJOR*, Shaw.

Belly with only a few ventral shields. Scales keeled, 31 rows on neck. Four

large anal shields. One labial below the orbit. 31 large rhombic black spots on the back posteriorly, which do not descend to the middle of the sides.

H. ROBUSTA, Günther.

Scales tubercular. 31 rows on neck. Two or three labials below the orbit. Ventrals broad, 310. Trunk with 35 narrow distant black rings, extending round the belly, but sometimes interrupted on the sides and dilated on the back.

H. CERULESCENS, Shaw.

Scales strongly keeled, 37 rows on neck. One labial shield below the orbit. Ventrals bituberculate, 300, and not much larger than the adjoining scales. Yellowish, with 37 to 46 rhombic blackish spots on the back, broadest on the vertebral line, and not descending to the middle of the side, or they may be continued to the belly as faint greyish cross-bands.

H. SPIRALIS, Shaw.

Scales tubercular, 31 rows on neck. Third and fourth labials enter the orbit. Ventrals 320, twice or thrice as large as the adjoining scales. Trunk surrounded by 42 to 48 black rings, scarcely broader on the back, and half as wide as the interspaces. A series of vertebral black spots posteriorly. Head black above, with a yellow horse-shoe mark. Belly black. Tail black posteriorly.

H. MELANOSOMA, Günther.

Head rather small. Scales strongly keeled, 27 rows on neck. Two labials enter the orbit. Ventrals 335, twice as large as the adjoining scales and posteriorly bicarinate. The yellow ground above only shows as narrow vertical stripes on the sides. Black rings 60. Head blackish.

H. TORQUATA, Günther.

Head small, neck slender. Scales keeled, 35 rows on neck. The fourth labial under the orbit. Ventrals 284, bicarinate, and twice as large as the adjoining scales. Trunk with 50 to 52 blackish-olive cross-bands, broadest above, and very faint on the belly. Snout black, with a yellow band behind. Lower jaw and throat blackish, belly white.

** *Two postoculars.*

H. BELCHERI, Gray.

Scales keeled, 25 rows on the neck. The fourth labial under the orbit. Ventrals simple, 317, more than twice as broad as the adjoining scales. Back brownish-olive, sides and belly yellowish. The back dark-barred anteriorly, with yellowish interspaces. Head and throat blackish, with yellow horse-shoe on the crown.

H. ASPERA, Gray.

Scales strongly keeled, 30 rows on the neck. Two labials below the orbit. Ventrals 340, twice as large as the adjoining scales, and each with several minute tubercles on each side. Dirty yellowish. Back with 47 black rhombic tangential cross-bands, faint on the sides. Crown blackish.

H. CYANOCINCTA, Daud.

Scales faintly keeled, 31 rows on the neck. Two labials below the orbit. Ventrals 320 to 426, twice as large as the adjoining scales and bitubercular. Greenish olive on the back, yellowish on the sides and belly. Trunk with 50 to 75 black cross-bands, broader than the interspaces, and sometimes fading on the sides. Very common, and grows to more than 6 feet.

H. SUBCINCTA, Gray.

Head rather small and narrow. Scales keeled, 23 rows on the neck. The fourth labial under the orbit. Ventrals 342, not twice as large as the ordinary scales, bitubercular, and posteriorly divided. Trunk with 41 dark cross-bands, as broad as the interspaces, and not reaching to the middle of the sides. A row of spots along lower part of the side.

H. NIGROCINCTA, Daud.

Head small. Scales keeled, 29 rows on the neck. The fourth labial under the orbit. Ventrals 320 to 331, not twice as large as the adjoining scales, and smooth. Trunk surrounded by 53 black rings, narrower than the interspaces, 3 and 5 scales broad respectively. Colour greenish olive, yellowish on the sides. Tail with 9 to 11 black bars.

d. Head very small. Neck very slender.

** One postocular. The third upper labial not in contact with the nasal.*

H. CHLORIS, Daud.

Scales tubercular and faintly keeled, 31 rows on the neck. Ventrals 473 to 500, not much larger than the adjoining scales. Greenish-olive above, yellowish on the sides. From 59 to 67 rhombic bands on the back, which are narrower and fainter on the sides, but extend round the belly, where the yellowish ground colour sometimes is reduced to a pair of spots.

H. LINDSAYI, Gray.

Hardly separable from the last, but is said to have a shorter neck and fewer bands.

H. LATIFASCIATA, Günther.

Head small. Scales keeled, 23 rows round the neck. The third labial not in contact with the nasal. Ventrals 322, distinct. The anterior twice as broad as the scales, the posterior bicarinate. Terminal scale of tail very large. Trunk with 38 broad black cross-bands, confluent above and below, and darker below. The yellow colour only shows as large rounded lateral spots.

Mergui.

H. CORONATA, Günther.

Head very small. Scales keeled on the back, tubercular on the sides. Ventrals 321 to 337, bitubercular, nearly twice as large as the adjoining scales. Trunk with 53 to 59 complete black rings, broader than the interspaces, which are yellowish-olive. Head and under the neck black. A yellow horse-shoe on the head. Tail with 11 blackish bars.

*** Two postoculars. The third upper labial not in contact with the nasal.*

H. ATRICEPS, Günther.

Head small. Scales, with a small apical tubercle, 26 to 28 rows on the neck. Ventrals 376, anteriorly twice as large as the adjoining scales, posteriorly smaller, bitubercular. Back with 62 blackish-olive cross-bands, tangential on the vertebral line. Sides yellowish white. Head black.

H. DIADEMA, Günther.

Head very small. Scales tubercular, 33 rows on the neck. Ventrals 318, only on the neck twice as large as the adjoining scales. Trunk with 63 blackish rings broader than the interspace, and narrower and paler on the belly. Head blackish, with two yellow converging superciliary bands. Tail 7 to 9 blackish cross-bars.

B. Scales not imbricate, placed side by side.

a. Head very small, and neck very slender.

** One postocular.*

H. ORACILIS, Shaw.

The third upper labial not in contact with the nasal. Scales tubercular, 21 rows on the neck. Ventrals 230 to 290, anteriorly twice as large as the adjoining scales, posteriorly smaller, and divided. Trunk anteriorly surrounded by blackish rings. Behind greenish-olive, whitish below. Throat and crown of head blackish.

H. FASCIATA, Schin.

The third upper labial not in contact with the nasal. Scales tubercular, 25 rows on the neck. Ventrals bitubercular, 316, and twice as large as the adjoining scales, and undivided to the vent. Six small anal shields. Trunk with 43 deep black rings, nearly twice as broad as the yellow interspaces, and confluent on the belly. Head black, with yellow dots behind the eye. Tail black, with 3 basal yellow bars.

H. CANTORIS, Günther.

The third upper labial in contact with the nasal. Scales tubercular (smooth in young), 23 rows on the neck. Ventrals 412 to 440, anteriorly twice as large as the adjoining scales, posteriorly divided. Some 30 blackish rings on the slender part of the body, confluent above and below, the yellowish-green ground showing as rounded spots or interspaces. Posteriorly uniform olive, with yellowish sides. Two blackish bands on the tail.

b. *Head moderate. Neck moderately elongated.*

* *One postocular.*

H. STRICTICOLLIS, Günther.

Scales smooth (in the young type). 34 rows round the neck. Ventrals 398, only anteriorly twice as broad as the adjoining scales. 56 blackish rings on the body, not quite so broad as the yellowish interspaces. Head yellow above, with darkish confluent spots.

H. CURTA, Shaw.

Head short, thick, obtuse. Body stout throughout. The occipital shields always divided. Scales in 30 to 34 rows round the neck. Ventrals nearly twice as broad as the adjoining scales and 156 to 160. 50 to 53 blackish bands across the back, equal to the interspaces, and not usually descending to the belly. A yellow temple streak. Tail black, with basal yellow spots. The type was from Madras.

H. HARDWICKII, Gray.

Habit as in *H. curta*. Scale tubercular, in 29 to 33 rows on the neck. No distinct ventrals. 4 to 6 small præanal shields. A long central spine to each scale of the 8 ventral rows. 41 to 43 broad blackish bands across the back, descending to the middle of the sides. Beneath yellowish. Tail black, with 3 to 5 yellowish bands.

H. FAYRERIANA, Anderson.

Habit as in *H. curta*. Body nearly equal throughout, but narrower for its anterior fifth. Scales smooth, in 34 rows on the neck. No enlarged ventrals, but 193 scales from vent to chin. Five pairs of præanal shields. 39 broad olive-brown bands across the back, not descending to the belly, separated by pale interspaces half a scale broad.

Body 30·2; tail 3·1 = 33·3 inches.

Puree.

Distinguished from *H. Hardwickii* by its smooth scales, and by the partial imbrication and greater number of the ventral scales.

H. LOREATA, Gray.

Habit as in *H. curta*. Scales tubercular, 27 to 31 round the neck. No distinct ventrals, but the three or four lower lateral rows are enlarged. 29 to 34 black rings round the body, tapering on the sides and belly. Head yellow, banded across the frontals. Tail with 6 white bands across its upper and basal half.

** *Two postoculars.*

H. LAPEMOIDES, Gray.

Head narrow, neck elongate. Scales keeled, 30 to 32 rows on the neck. Ventrals 350, twice as broad as the adjoining scales. Trunk with from 37 to 43

black rings dilated on the back and belly, and equal to the interspaces. Head black, with two lateral yellow bands converging on the nasals. Tail black, with a basal white ring, and some half rings across the back.

H. LONGICEPS, Günther.

Head elongate, body slender. Scales keeled, 30 rows round the neck. Ventrals 271, twice as broad as the adjoining scales. Back barred by 53 broad blackish-olive bands, which do not reach the middle of the sides, the interspaces one-third as broad as the bands. Sides and belly uniform whitish. Tail with 11 vertical bars.

H. ORNATA, Gray.

Snout elongate, body rather elongated anteriorly. Scales tubercular, 35 rows round the neck. Ventrals 252 to 260, twice as broad as the adjoining scales. Colouration as in *H. longiceps*, but the interspaces are narrower. A wedge-shaped spot, point upwards, separates the end of the cross-bands, and a vertical bar below each band. Head blackish-olive, with white superciliary ridge. Tail black, with narrow whitish cross-bars.

H. ELLIOTI, Günther.

General aspect as in *H. ornata*, but as many as 300 ventrals, and with white stripes between the bands. Head greenish-olive. Tail with yellowish cross-bars.

H. PACHYERCUS.

The third upper labial enters the orbit, and is not in contact with the nasal. Scales tubercularly keeled, 28 rows on the neck. Ventrals 258, and more than twice as broad as the adjoining scales. Body brownish-yellow above, indistinctly banded. Belly and sides white. Tail black behind.

H. CRASSICOLLIS, Anderson.

Neck and body of nearly equal girth. Scales almost smooth, in 34 rows round the neck. Scales feebly bitubercular posteriorly. Ventrals twice the size of the adjoining scales, and smooth. Two pairs of præanal shields, the outer very large. Colour olive-yellow above, yellowish below. 62 broad black bands across the back, coming to a point on the sides, and indistinctly produced below, where they expand into a large blackish spot. Tail with six black rings and its terminal third black.

Body 49.3; tail 4.3 = 53.6 inches.

Hugli River.

H. VIPERINA, Schmidt.

Head and body moderate. The third upper labial does not enter the orbit. Scales keeled, 29 rows round the neck. Ventrals 237, anteriorly six times as broad as the adjoining scales, diminishing to the breadth of a single scale towards the vent. 31 to 38 rhombic black spots along the back, sometimes confluent in front.

H. ANOMALA, Schmidt.

Head short, thick, obtuse; body stout. Scales hexagonal, with a strong white keel. Ventrals bicarinate, and as large as the adjoining scales. Trunk with 26 or 27 large rhombic bluish-grey transverse spots.

ENHYDRINA, Gray.

Differs from *Hydrophis* only in having a deep longitudinal notch in front of the lower jaw. Rostral shield very small; lobuliform, its point fitting into a cavity in the lower jaw.

E. BALAKADYEN, Boie.

E. Bengalensis, Gray.

Head short, and all its shields granular. Scales hexagonal or suboval, carinated in the centre, and contiguous rather than imbricate, in 38 to 44 rows round the neck. Back with rhombic bands, which disappear with age.

E. schistosa, Daud.

Hoogli pattee, Russell.

Form more slender than in *E. balakadyen*. Scales on the neck elongated, pointed, imbricate, in 56 to 60 rows. Head more ovately prolonged, and the gape wider than in the last species; and consequently the head shields are more elongate and are all smooth. Colouration as in the last.

The two species of *Enhydryna* are very similar, and *E. schistosa* would seem to be comparatively rare. Russell was the first to point out the distinction, which was subsequently confirmed by Stoliczka (J.A.S.B. 1870, p. 213) and Anderson (P.Z.S.L. 1871, p. 193).

E. balakadyen abounds in tidal waters and estuaries in Burma, and is frequently taken in fishermen's nets.

PELAMIS, *Günther*.

Head flat, with long spatulate snout. Nasal shields contiguous, pierced posteriorly. Ventrals none, or very narrow. Lower jaw without a notch in front.

P. PLATYRUS, L.

Scales impressed or concave, on the neck, in 45 to 51 rows. Scales from mouth to vent 378 to 440, the lower rows sometimes spiny or tubercular in adults. Colour variable, above black, below olive or yellow; colours sharply defined and separated by a yellow band, and sometimes with an inferior black band as well. Brown spots sometimes on the sides, and tail reticulated black and yellow. It also occurs yellow, with black-edged brown bars across the back, the interspaces on the belly being marked with vertical dark streaks. Grows to 3 feet.

Andamans and Nicobars, and Eastern seas generally.

There are few subjects, respecting which more profound ignorance prevails, than the means of determining whether a snake is poisonous or not; for the question is eminently a special one, though neither difficult nor obscure when once the few facts and rules are mastered, which are necessary for the purpose. With the exception of a few well-known and justly-dreaded snakes, like the *Cobra*, the *banded Bungarus*, the *blue Bungarus*, or *krait*, or the *Russell's viper*, no native testimony in regard to the poisonous or nonpoisonous character of a snake can be relied on, as natives generally attribute poisonous powers to all snakes with which they are unfamiliar, or which have bright colours, or a repugnant physiognomy, and are as wholly guiltless of any accurate knowledge of the subject as the bulk of Europeans.

Practically, as regards poisonous snakes which are dangerous to man, the question is narrowed to the consideration of a limited number of species, since many from their small size, and others from their rarity, may be disregarded, and hence, perhaps, the simplest way of learning what are poisonous snakes would be to pass an hour or so in some museum where acquaintance might be made with the commoner or more deadly species. The snakes I should characterize under this head would be, 1stly, the Hydrophidæ, or marine snakes, possessing a flattened tail, the whole of which are very deadly without exception, their fangs being small, but their venom extremely potent. 2ndly, the vipers possessing tubular erectile fangs of great length. The venom of some of these is very deadly, as in the *Daboia*, or *Russell's viper*, and the Javanese *Calloselasma*, whose bite is said to be fatal to man in five minutes, which is far quicker than that of the *Cobra*, whilst others, such as the *green vipers*, seem to be less dangerous, recovery generally taking place from their bite, with merely local pain and some constitutional disturbance. 3rdly, the ordinary poisonous snakes, such as the gigantic *Hamadryas*, the *Cobra*, the *blue Bungarus*, or *krait*, the *black and yellow banded Bungarus*, and some of the larger species of *Callophis*.

There are only two harmless snakes which, from their peculiar colouration and from their also inhabiting estuaries and coasts, can be mistaken for any of the poisonous family of Hydrophidæ. The one, *Hipistes hydrinus*, has, however, a loreal shield, which at once shows its innocuous character, whilst the other, *Chersydrus granulatus*, may be easily discriminated by possessing over 100 rows of scales.

The poisonous viperine snakes are easily distinguished by their long tubular and erectile fangs, by their triangular head, keeled scales, and repulsive physiognomy, their short tails, stout form, and in the majority of Indian species by a *præorbital pit*, whence the name of one section of them of pit-vipers, the most celebrated of which is the American rattle-snake. Among the ordinary venomous or colubrine snakes, the *Hamadryas* is undoubtedly the most formidable, whilst commoner than any are the *Cobra*, the *blue* and the *banded Bungarus*, the bulk of the other Elapidae being too small or too rare to merit particular notice.

To determine a snake it is necessary first to become familiar with the shields which cover the head. The nostril of a snake is either situated between two shields or pierced in one. These shields are the *nasals*, anterior or posterior. The eye is bounded on either side by one or more shields called respectively the *præ-* and *post-oculars*. The shield which is interposed between the *nasals* and *oculars* is the '*loreal*,' and there may be several or none. The other shields of the head are the '*rostral*' in front, followed by one or two pair of '*frontals*,' then a '*vertical*' occupying the crown of the head, and two occipitals behind the vertical. Over the eye is the '*superciliary*,' and along the jaws the upper and lower '*labials*' respectively. Below the chin are the '*mental*' or '*chin shields*.' The shields of the belly are the '*ventrals*,' and below the tail the '*subcaudals*,' which may be either entire or divided.

On a snake being brought in, the first point to ascertain is, whether or no it has a loreal shield, *for the rule is absolute, and without exception, that every snake possessing a loreal shield is harmless*. If no loreal shield is present, a very brief inspection will show if it belongs to the Hydrophidae with a flattened tail; or to the Crotalidae or Viperidae with erectile tubular fangs and rough scales, and if to neither of these groups, it still remains to determine whether it belongs to one of the innocuous species which possess no loreal or to a poisonous species, *none* of which possess it. The poisonous Elapidae are all characterized by a small eye with a round pupil, and by the presence of a venom fang, grooved in front, and terminating in a slit. There are only four genera, and if the snake under consideration belongs to none of these, it is harmless, though no loreal is present. The four genera of poisonous colubrine snakes are: *Naja*, with 15 rows of scales round the body; *Xenureclaps* and *Bungarus*, with 15 rows also, but the vertebrals are enlarged; and *Callophis*, with 13 rows only.

The number of poisonous snakes is therefore practically very few, but a great many harmless snakes are equally unprovided with a loreal shield, of which a list is here appended for convenience of reference.

The snake is harmless though the loreal shield be absent—

<i>If</i> the scales are smooth and the nostril in an undivided shield—	Cylindrophis.
<i>If</i> there are five occipitals—	Xenopeltis.
<i>If</i> the tail is truncated—	Fam. Uropeltidae.
<i>If</i> there are less than 6 upper labials—	Calamaria.
<i>If</i> there are 8 upper labials—	Macrocalamus.
<i>If</i> the nostril is in a single shield—	Blythea.
	Cyclophis.
	Odontomus.
	Paras.
	Ulupe.
<i>If</i> the præocular is elongate and the body stout—	Geophis.
<i>If</i> there is but a single præfrontal—	Aspidura.
	Oligodon breviceauda. Fordonia.
<i>If</i> the third upper labial of six forms the lower rim of the orbit—	Oligodon modestus.
<i>If</i> the scales exceed 15 rows—	Gonyosoma frenatum. Tetragnosoma.
<i>If</i> the tail is flattened and the scales exceed 100 rows—	Chersydrus.
<i>If</i> the pupil is horizontal—	Tropidococeyx. Passerita.

As regards the treatment to be pursued in cases of snake-bite, it would seem as though the only remedy of the slightest value in the case of the effective bite of

a venomous snake is a ligature applied within a few seconds of receiving the injury, and either suction or excision of the wounds. If the poison once gains an entry into the system, it is next to useless drenching the unfortunate patient, as is too often done, with either such antidotes as ammonia, ardent spirits or any so-called specifics, or torturing him with the actual cautery of live coals, gunpowder, etc., or hounding the poor man about till he dies to prevent his sinking into sleep. If the patient does not object to it, a glass or two of brandy and water might be given, as cases sometimes occur where nothing more than fear is the cause of very alarming prostration, and in such cases a stimulant would do good; as where a man has been bitten by a harmless snake, which he believes to be a Cobra. I once heard of a man who, walking in the dark, trod on one end of a thin coil of tin plate, the other end of which flying up, slightly punctured one of his calves. The impression on the man was, that he had been bitten by a large snake, and an alarming state of prostration supervened, which however was cured by some one going out and finding the cause of the mischief. It cannot, therefore, be too widely known that in the case of snake bite, the sufferer's life is in his own hands, as nothing but instantly sucking the wound, with or without ligaturing it, can prove of the slightest value, all recoveries from snake bite, under treatment, being cases which would probably have recovered no less speedily without it. I cannot resist here extracting the philosophic remarks of Dr. Fayer on the prevalent mode of worrying to death the unfortunate victim of snake-bite. "But another popular mode of treatment of the so-called lethargy induced by the poison, that by walking the person violently about and keeping him awake by flogging, pinching and other such violent measures, is in my opinion of very doubtful efficacy, if not altogether wrong. *The man who is dying from snake bite is perishing from rapid exhaustion of nerve force.* To make him take violent exercise and deprive him of rest seems to me more likely to do harm than good. It would be almost as reasonable to give a man a blow on the head to recover him from concussion of the brain, or to give him antimony to cure him of sea-sickness. Let him lie down. Leave him to rest, to sleep if he can."

Speaking of chemical antidotes, Dr. Fayer thus expresses himself: "I have no hesitation in saying that I believe them to be useless, and that, excepting for their stimulant action when they have any, they are inert. When the symptoms of poisoning have set in, either when the ligature and excision or caustic or cautery have failed, or when they have not been used, I believe that the only rational treatment is to endeavour to rouse the sinking energies and arrest the tendency to fatal paralysis of the nerve force, by the aid of alcohol or other stimulants such as ammonia or ether judiciously administered, avoiding anything that can depress, such as over-exertion or fatigue, especially that produced by the popular practice of making the sufferer walk when his force is almost expended. Brandy or whisky or indeed any form of alcohol should be given freely and frequently, though not in the large quantities sometimes recommended. My belief is, that if a certain quantity of the poison has entered the circulation, we can expect but little benefit from treatment of any kind; where less has entered, yet enough to cause dangerous present and consecutive symptoms, we may do much to support the strength and save life by ordinary rational measures. But that we possess any drug or substance, solid or fluid, that either swallowed or inoculated can counteract or neutralize the poison once absorbed, and acting on the nerve centres, I do not believe,—and I think the notion that we do is a dangerous one, and liable to do harm by inspiring confidence in ways and means, in which none should be placed."—*Thanatophidia*, pp. 38, 39.

To show how small is the chance of recovery from an effective bite of a venomous snake in possession of its full powers, I will quote three experiments from Dr. Fayer's work, together with the reflection suggested by them.

"June 26, 1869. *Experiment No. 15.*—A pariah dog was bitten in the fore arm by a cobra (Kala Keantiah) at 3·2 p.m. A ligature had been thrown round the limb above the bitten part, which was immediately tightened. A pointed steel, heated to a red heat, was then, at 3·3 p.m., inserted into the punctures, and the wounds were thoroughly cauterised." Forty drops of liquor ammonia, in three parts water, were injected into the jugular vein, but the dog died in 43 minutes.

Experiment No. 16.—A dog was bitten by a fresh cobra (Kala Keantiah) in the fore arm at 3:38 p.m. A ligature was immediately tightened round the limb above the wound. The actual cautery was at once applied, until the fang wounds and the adjacent parts were completely disorganized. The dog died without further treatment in 35 minutes. On this case Dr. Fayrer remarks, "In this case, notwithstanding the ligature, which was applied as tightly as two persons could pull it round the leg, and the deep and thorough actual cauterization, immediately after the bite, the snake poison found entry into the system and proved fatal in 35 minutes. Nothing, it seems to me, can more strongly demonstrate the extremely subtle and virulent nature of the cobra poison, than these experiments. Nothing, I think, is more significant of the improbability of anything proving to be an antidote. If the poison find entry into the blood-vessels, and be carried to the nerve centres, I am inclined to believe that nothing can prove of any avail, excepting in those cases when the bite is imperfect, the quantity or the quality of the poison diminished or deteriorated, or the snake itself is young, weak, exhausted, or is one of a less poisonous family; such, I believe, are the only cases in which recovery occurs, through the inherent vigour of the animal or person bitten, perhaps aided by stimulants and excitement."—(Fayrer's *Thanatophidia*, p. 97.) Still more instructive is the third case. "A very large and vigorous pariah dog was bitten in the marginal fold of integument between the thigh and the abdomen, by a cobra, at 3:55 p.m. The part was immediately cut out by a bistoury, the places where the fangs had penetrated being completely removed. The instrument was at hand and the operation was done at once. Two seconds, not more, might have intervened between the bite and the excision. At 4 p.m. some brandy was poured down the dog's throat; 4:6 another dose of brandy administered; 4:16 he is excited, and respiration hurried, perhaps from the brandy; 4:25 the dog is not yet affected by the poison; 4:33 much the same, the breathing rather hurried; 4:42 no symptoms of poisoning, except the hurried breathing, and that may be from excitement; 4:47 more brandy given; 4:50 no symptoms of poisoning yet; 5:10 vomited, shows symptoms of being poisoned; 5:15 vomited again; 5:30 restless, breathing hurried, abundant flow of saliva; 6 p.m. slight convulsions, breathing hurried; 6:30 dead. Bitten at 3:55, dead at 6:30, in 2 hours and 35 minutes. Here again the extraordinary virulence of the poison is shown. The snake bit in a fold of skin, which was immediately excised, yet in the slight interval—it could not have been more than two seconds—enough of the poison had entered the circulation to cause death in 2 hours and 35 minutes, notwithstanding the free administration of brandy. The dog too, was an unusually large and vigorous animal."—Fayrer's *Thanatophidia*, p. 105.

Again on the critical question, the possibility of arresting the poison after an effective bite, Dr. Fayrer remarks—"That such *may* be done, I will not deny, but the two experiments just recorded, performed with the greatest care and speed by two surgeons accustomed to such operations, show that at the least it is very difficult. The moment of time that intervenes between the injection of the snake poison by the powerful maxillary muscles through the tube-like fang into the minute blood vessels of the part, and the application of the ligature and actual cautery, is sufficient to allow of the entry of the poison within the circulation, and thus reaching the nerve centres, even in a small quantity, may prove fatal."

For further details of this most interesting subject, reference must be made to Dr. Fayrer's work, but I will record the chief deductions from the experiments made and other data therein brought together and reviewed.

1. Snake poison is not only active when injected into the system, but develops its poisonous action when applied to a mucous surface, or the conjunctiva.
2. The blood of an animal killed by snake poison is itself a powerful poison when introduced into the system of another animal.
3. The milk of a woman bitten by a poisonous snake is fatal to the child, if allowed the breast.
4. The poison of the colubrine snakes does not interfere with the coagulation of the blood after death in the lower animals, but the blood remains fluid (as a rule) after death from the bite of a viperine snake. Authentic particulars on the state of the blood of the human subject after colubrine poisoning are still wanted.

5. Symptoms of poisoning after an effective bite are visible after the lapse of a few seconds only, and should the poison have penetrated a large vessel, death may result within the minute, though such a case is of course rare.

6. The bite of a poisonous snake seems to exercise no influence on another poisonous snake, of the same family, or on itself, but is fatal, though slowly, to a harmless snake.

7. The most deadly poison seems to be that secreted by the two *Najas* and Russell's viper, and scarcely less potent is that of the *Echis*, the Bungari, and *Hydrophidæ*. The poison of the Indian *Crotalidæ*, however, though certainly occasionally fatal, is not perhaps usually so, and there is always fair presumption of recovery from the bite of our green vipers (*Trimeresurus*).

8. Specific remedies or antidotes for snake-poisoning there are none. Where the bite has been, from any cause, only partially effective, diffusible stimulants, as ammonia and alcoholic mixtures, may be resorted to with benefit, to aid the flagging powers of life.

9. Cases have often occurred of men bitten by harmless snakes exhibiting symptoms of most alarming prostration, and being reduced to a moribund condition through fear only, so that every endeavour should be made to secure the snake, as its recognition as a harmless species is all that is wanted in such case to effect cure.

In the Madras Monthly Journal of Medical Science for November, 1870, Dr. E. Nicholson has a paper on some popular errors regarding Indian snakes. Dr. Nicholson's views on the true reason of the immunity of some snake-catchers from serious results from snake-bite, are very curious, and deserving of full investigation, as he sees reason to attribute it to a continuous system of inoculation with snake venom, the result of which is that the elder men among the Burmese snake-charmers possess greater powers of withstanding snake poison, than the younger, owing to the more perfect protection enjoyed by them from inoculation persevered in through many years. I doubt the fact myself, but it is certainly a curious assertion, to emanate, without good reason, from an Assistant Surgeon who for years has made these animals his companions, as well as subjects for study.

Order SAURIA.

Scaled reptiles, usually possessing eyelids and limbs, both never absent. The rami of the mandible united by a bony symphysis, and incapable therefore of dilatation like the jaws of snakes. Teeth adnate to the jaws, not in sockets. Vent linear, transverse. Tongue single or double. Reproductive organs double.

Family *Varanidæ*.

VARANUS, *Merrem*.

Nostrils in an oblique slit between the eye and snout. Scales elliptic, subangular. Tail compressed vertically. 5 claws on all feet.

V. NEBULOSUS, *Gray*.

Nostril nearer the eye than the nose. Scales of neck and back obtusely keeled. Superciliary scales enlarged.

V. DRACENA, *L.*

Nostril midway between eye and nose. Scales smooth. Superciliary scales small.

V. FLAVESCENS, *Gray*.

Nostril nearer the nose than the eye. Scales strongly keeled. Superciliary scales unequal.

All these species occur in Burma, and attain to about fifty inches. The tail is vertically compressed in all.

HYDROSAURUS, *Wagler*.

Nostrils rounded, near the end of the snout.

H. SALVATOR, Laur.

Nostrils anteriorly placed. Colour of adult blackish, with four transverse bands of yellow ocelli across the back. Grows to about seven feet in length.

All these lizards are highly esteemed for food, and are sought for in hollow trees by the aid of dogs. If not wanted at once, the wretched creature has its fore feet bent over its back, a few of its toes are broken, and the sinews drawn out and tied in a knot, so rendering the animal helpless. Dr. Mason observes:—"The Karens, who are extravagantly fond of their flesh, steal up the tree with a noose at the end of a bamboo, and often noose them while leaping for the water, or catch them in a boat which is brought under the tree. The head, the natives say, is venomous, and they discard it altogether; but the flesh of the other parts, which smells most odiously, is deemed by the Karens much preferable to fowls." The eggs of these animals are also highly esteemed for food, and eagerly sought for.

Family Lacertidæ.

TACHYDROMUS, *Daudin*.

Nostril in a single shield above the labials.

T. SEXLINEATUS, *Daud.*

Dorsal scales in four longitudinal rows, strongly keeled. Grows to fourteen inches, of which the tail is five-sixths.

Inhabits Arakan, Pegu and Tenasserim. An elegant and agile species.

Family Zonuridæ.

Scales large, squarish. A longitudinal fold along the sides.

PSEUDOPUS, *Merrem*.

P. GRACILIS, *Gray*.

Body and tail of nearly uniform bulk (the term *gracilis* is a complete misnomer). Vent placed about the middle. A distinct longitudinal fold, and a pair of rudimentary hind legs only. Colour yellowish-brown, and during life a number of irregular shining turquoise blue spots. This rare lizard has been obtained near Rangoon.

Anderson obtained this species in the Sanda valley in Yunnan, and, like the Khasi Hill specimen, these had 16 longitudinal rows of scales, and 10 ventral rows, whereas the Rangoon lizard had only 14 and 8 respectively. The head shields and colouration are rather variable.

Family Scincidæ.

Ground lizards of active habits. No femoral or inguinal pores. Tail very fragile.

Section A. *Keeled scales.*

TROPIDOPHORUS, *Dumeril et Bibron*.

Scales strongly keeled, or exceptionally smooth. Tail spinate. Nostril in a single small shield.

T. BERDMOREI, *Blyth*.

The keeled scales of the back form parallel ridges. Colour pale olive brown, with oblique transverse red bars, margined with black. Grows to a little over seven inches. Scales dull.

Ranges from Tenasserim through Pegu to Yunnan.

The specimens of this lizard procured by Dr. Anderson in Yunnan are smooth, and not keeled as is the case with all hitherto captured in Tenasserim or Pegu; but

the resemblance in other respects of these smooth lizards is so complete that they can only be regarded as a local race, and not a distinct species.

This lizard differs from all others of the same family in its habit of readily entering water. The specimens captured by myself in Tenasserim were taken beneath stones and amongst the gravel of a stream bed, in which the water was close to the surface, and into which water the lizards readily entered when endeavouring to escape from pursuit, beneath the submerged stones, which seemed to be their habitual sheltering place.

EUPREPES, Wagler.

Each scale of back with several keels. Tail rounded.

a. *Lower eyelid scaly.*

E. CARINATUS, Schneid.

Scales 3 or 5, keeled. Colour rich olive brown or bronze, with a pale lateral stripe. Often black dotted. Belly yellow or silvery. Seasonably bright red. Viviparous.

Common throughout Burma. Grows to twenty inches in the Andamans, but is not usually found elsewhere more than twelve, of which the tail is more than half.

E. MACULARIUS, Blyth.

Scales 5 or 7, keeled. A smaller and more slender species than the last. Does not exceed seven and a half inches. Oviparous.

E. NOVEN-CARINATUS, Anderson.

Scales 9, keeled. Grows to seven inches.

Inhabits Upper Burma.

E. RUGIFERA, Stol.

Fore limbs feeble, reaching to the front edge of the eye. Nostril large. Two loreals and five occipitals. Scales on the back strongly 5-keeled. 8 rows on the belly, smooth. Dark brown, paler on the head. Two side streaks anteriorly. Belly yellowish, with a greenish tinge.

Inhabits Kamorta.

E. OLIVACEUS, Gray.

Scales with 3 or more slight keels. Colour brown. About 12 black transverse streaks, each black scale with a white spot. Below greenish olive. Tail scarlet (below?).

Inhabits the Nicobars and the Malayan Peninsula.

Section B. *Scales smooth.*

HINULIA, Gray.

Supranasal none. Lower eyelid scaly.

H. INDICA, Gray.

Colour bronze brown. Sides dark-banded, below white. Scales between fore and hind limb in forty-six rows. Grows to ten inches.

Burma.

H. MACULATA.

Colour pale bronze brown, with ten series of black dots. Sides dark-banded, below white. Scales between fore and hind limbs in ninety-six rows. Grows to over seven inches.

Pegu, Martaban, the Andamans.

MOCOA, Gray.

Supranasals none. Lower eyelid with a transparent disk.

M. EXIGUA, Andamans.

Ear without lobules. Four superciliaries. A pair of anterior occipitals, the azygos shield behind them rather large. 28 rows of scales round the body. 45 between the axilla and groin. Limbs feeble. The fore legs reach to the eye, the hind legs to half way to the axilla. A dark brown band from the snout to the tail. A pale greenish yellow band from the eye to the tail, and a broad brown band through the eye and ear to a little beyond the hind limbs. Below pale yellowish-brown. Tail olive, with a dorsal and lateral series of minute black dots. Limbs spotted brown and olive.

Inhabits Momiën.

RIOPA, Gray.

Body long. Limbs feeble.

a. *Lower eyelid scaly.**R. ALBOPUNCTATA*, Gray.

Lower eyelid scaly. Tail large and cylindrical. Limbs feeble, giving the lizard a snake-like look. Tail shorter than body. Colour brown, with six fine black lines down the back and tail. Sides white-spotted. Grows to four and a half inches.

R. LINEOLATA, Stol.

Like *R. albopunctata*, but the tail is longer than the body. The centres of all the dorsal and lateral scales are pale, giving rise to pale longitudinal lines. Length three and a half inches. Inhabits Martaban.

b. *Lower eyelid with a transparent disk.**R. ANGUINA*, Theobald.

Lower eyelid with a transparent disk. Five occipital shields, the central one being nearly as large as an anterior one. Colour brown above, white below. No stripes or dots. Length four inches.

Inhabits Pegu.

R. CYANELLA, Stol.

Like *R. anguina*, but the central occipital shield small. Colour brownish olive, with a few white spots on the neck and behind the shoulder. Size and habitat same as the last.

DIBAMUS, Dumeril et Bibron.

Limbs in male 2, lodged in an oblique cavity. Females limbless.

D. NICOBARICUS, Fitzinger.

24 rows of scales round the body. Colour dark brown, paler below. Grows to 6 inches, and inhabits the Nicobars.

Family Geckotidæ.

Toes adapted for pneumatic adhesion.

a. *Adhesive plates of feet undivided.**GECKO*, Daudin.*G. GUTTATUS*, Daud.

Tail without any enlarged subcaudal plates. Colour olive grey, slaty over the head, with four or five transverse white bands. Belly white, body, limbs and belly red-spotted.

Grows to about a foot. Inhabits Eastern Bengal, Burma and the Malayan peninsula.

It lays about eight hard-shelled white eggs as big as a musket-ball, cementing them to trees, rocks, or secluded buildings. Its cry is 'touk tay,' several times repeated, and ending in a long-drawn-out 'diminuendo' guttural rumble. The 'touk tay' of the Burmans, notwithstanding the persecution it suffers from the lower orders of Europeans, is an interesting and really useful animal, from the number of insects it consumes. It does not confine itself to insects, but will eat young rats; and Dr. Mason has seen it devour the smaller species of house lizard. I have myself seen it seize on the wing a bat as it flew round the room, and devour it.

G. STENTOR, Cantor.

Tail with a double row of enlarged subcaudal plates. Colour brown, with some dark markings. Grows to fourteen inches. Inhabits Akyah, Burma, the Andamans, the Malayan Peninsula. The voice of this species is a 'tuk-tuk-tuk' several times repeated.

PTYCHOZOON, Kuhl.

Skin of sides expanded into a longitudinal flap.

P. HOMALOCEPHALUM, Creveldt.

A flap or expansion of skin runs along the sides of the neck and body, and the tail has a similar fringed border, scalloped. Prevailing colour some tint of olive with numerous markings. Grows to seven inches. Ranges from Arakan to the Malayan Peninsula. The Nicobars.

PRELSUMA, Gray.

Claws none. Pupil round.

P. ANDAMANENSE, Blyth.

Claws none. Colour of the live animal emerald green above, yellow below. Grows to six inches. This is a diurnal and arboreal gecko, with considerable power of changing its hues.

Inhabits the Andamans.

b. *Adhesive plates of feet divided.*

HEMIDACTYLUS, Cuvier.

Fingers and toes dilated, ovate, clawed, 5 on each limb. Pupil vertical.

H. MACULATUS, Dum. et Bib.

Femoral pores 20 to 28, in an interrupted line. Grows to five and a half inches (usually smaller). Back with numerous trihedral tubercles. A larger form, with femoral pores, 32 to 36, in a nearly continuous line, and growing to nine and a half inches, has been separated in Ceylon, as *H. Pèresi*, Kelaart.

India, Burma, and the Andamans.

H. COCTEAU, Dum. et Bib.

Femoral pores 6 or 8 on each thigh, widely separated in the pubic region. Back granular with a few tubercles in the sacral region. Grows to 9 inches, but is usually smaller.

Inhabits Northern India and Burma.

H. FRENATUS, Schl.

Femoral pores 27 to 35, in an uninterrupted line. Back granular, with scattered tubercles. Thumb very small. Grows to 5½ inches.

Ranges over the whole of India, its Islands, Burma, the Andamans and Nicobars, and the Malayan Peninsula and islands.

H. MORTONI, Theobald.

Resembles the last, but has the thumb well developed. A single female only taken at Rangoon. It approaches *H. Leschenaultii* closely.

These animals (*Hemidactylus*) are the common house Geckos of warm regions,

and are the animal intended by the word "spider" of the English Bible (Proverbs xxx. 28), rendered Gecko in the Syriac version; and in the Vulgate later translated, "The Gecko taketh hold with her hands and dwelleth in king's palaces." They are useful animals, as they feed wholly on insects, but are pugnacious little creatures, and often lose their tails in fights. During these fights the tail of one of the combatants will sometimes fall down on the tea-table, where it will wriggle like a worm for a minute or so.

NYCTERIDIUM, Gunther.

Sides with a cutaneous expansion.

N. SCHNEIDERIANUM, Shaw.

This lizard stands in the same relation to *Hemidaectylus* that *Ptychozoon* does to *Gecko*, and probably occurs in Burma.

PERIPHA, Gray.

Thumb rudimentary, clawless. 5 claws on hind feet.

P. MUTILATUS, Weigm.

P. Peronii, Dum. et Bib.

Femoral pores 37 to 42, in an angular continuous line. Back uniformly granular. A cutaneous fold behind the ham. Colour pale translucent grey, with a few whitish freckles. Three pairs of chin shields. Length 6 inches.

Inhabits Ceylon, Burma and the Andamans.

Anderson says this is a common tree and house lizard at Bhamo.

P. CANTORIS, Günther.

Very like the last, but has no chin shields. The Andamans. Anderson records it from Poncee, in Yunan, at 3300 feet.

DORYRA, Gray.

Tail sharp-edged, granular above, and with a median row of plates below.

D. BERDMOREI, Blyth.

Tail granular above, edge denticulate, with a median row of enlarged scales below. Back granular. Grows to four inches.

Inhabits Pegu and Tenasserim.

D. GAUDAMA, Theobald.

Resembles the last, but the tail is segmented. 38 femoral pores separated on the pubis. Inhabits Toung-ngoo.

D. KARENORUM, Theobald.

Back granular, with twenty longitudinal rows of white tubercles. Tail segmented, and with some transverse rows of spines. 24 femoral pores separated on the pubis. A row of median enlarged subcaudals, margined with granular scales. Grows to four and a quarter inches. Captured at Karen-choung, near Toung-ngoo.

GYMNODACTYLUS, Spix.

Pneumatic plates on the basal joints only of fingers and toes. The two terminal joints free. 5 claws on all limbs.

G. WICKSI, Stol.

Transverse plates on the basal joints of the toes only. The two terminal joints free. Femoral pores 4 or 5 on each thigh. Length two and a half inches.

Inhabits Preparis Island.

G. VARIEGATUS, Blyth.

Body finely granular, with numerous enlarged tubercles. Femoral pores 16 on each thigh. Colour grey (fleshy during life), beautifully spotted with black. Tail black-banded and black-tipped. Back dark-banded, and a dark horseshoe mark on the occiput. Length over six inches. Captured at Maulmain.

*CYRTODACTYLUS, Gray.**C. RUBIDUS, Blyth.*

Femoral pores, 3 or 4 on each thigh, in a groove. Body and tail covered with unequal tubercles. Toes free and slender, with sharply-curved claws. Colour light fleshy brown, with a dark mark on the nape, and another on the shoulders. Body and tail dark-spotted and striped. Grows to 6 inches.

Inhabits the Andamans.

Family **Agamidæ.**

Head covered with small shields. Tail long, and not fragile. Pupil round. Femoral or preanal pores none.

DRACO, Linnæus.

A semicircular membrane, supported by the posterior ribs, forming a parachute. A gular sack in both sexes, largest in males.

a. *Tympanum scaly.**D. MACULATUS, Dum. et Bib.*

Gular sack very large. Nuchal crest indistinct. A series of large trihedral distant scales down either side of the back. Round black spots on the 'wings,' and pale longitudinal stripes. Grows to seven inches.

Inhabits Assam, Pegu, and Tenasserim, and Anderson got it at Ponsce in Yunan.

b. *Tympanum naked.**D. MAJOR, W. Blanford.*

Gular sack covered with scales twice as large as the ventrals. The central upper labials exceed the nasal in length. Enlarged single scales on the sides. Colour above pale, with dark bands across the parachute, broken up with pale spots. No dark fringe to the parachute. Throat greenish yellow, unspotted, and beneath the lateral appendages pale scarlet.

Length, head and body, 4.76; tail, 9.25; total 14 inches.

This, perhaps the largest species of the genus, occurs at Naulabu Hill, near Tavoy, and is nearest akin to *D. Dussumieri*, but differs in its larger labial and gular scales, size and colouration.

D. TENIOPTERUS, Günther.

Tympanum naked. Gular sack moderate, covered with large smooth scales. Some large scales down each side of back. Male with a low nuchal crest. 'Wings' with five arched black bands not extending to the margin.

Inhabits Tenasserim.

JAPALURA, Gray.

A small gular found in males.

J. YUNNANENSIS, Anderson.

A large spinose tubercle behind the superciliary ridge. A ridge of large tubercles over the hidden tympanum. A nuchal fold. Two canines in each jaw. Colour olive, with a tinge of brown. A black band with a yellow anterior margin from the eye to the gape. Five transverse bands on neck and back, separated by narrow olive-yellow bands. Tail banded. Under surface olive yellow.

Head and body 3; tail 7 = 10 inches.

Momien.

DILOPHYRUS, Gray.

A high nuchal and dorsal crest, the lobes of which are united by a membrane.

D. GRANDIS, Gray.

Head, neck, and gular pouch yellowish. Back purplish-brown, lilac on the sides. Seven oblique dark blue streaks down the throat. Sides of body with oblique lozenge-shaped red or yellow spots. A discontinuous mulberry-brown nuchal and dorsal crest. Scales of crest partly green and yellow. Tail banded. This is the colouring of the male. The female is probably much duller.

Length twenty-two inches, of which the tail measures sixteen.

Inhabits Penang and Pegu.

BRONCHOCELA, *Kaup.*

Scales regularly arranged with the tips directed backwards and downwards. Tympanum naked. Gular sack small. Tail very long.

B. CRISTATELLA, Kuhl.

Scales small, in 40 rows, between the vertebral line and the belly, and 14 on the belly = 94 in all. Colour uniform grass green. Grows to 20 inches.

Inhabits the Malayan countries and the Nicobars.

The Karens call a green lizard the "green viper bloodsucker," and it may be either this species or *Calotes viridis*, Gray, of which little is known. In *Bronchocelela* the scales are directed backwards and 'downwards,' whereas they point 'upwards' in *Calotes*.

B. JUBATA, Dum. et Bib.

Scales in 20 rows between the vertebral line and the belly. Colour green, with usually some yellow spots on the neck. Stoliczka records this species from the Nicobars.

B. BURMANA, W. Bl.

Scales in about 24 longitudinal rows, between the vertebral line and belly, on the belly in 12 rows, sharply keeled, = 60, all sharply keeled. Dorsal row distinctly larger. No fold before the shoulder. No enlarged scales behind the superciliary ridge. The hind limb does not quite reach the snout. Colour grass green, paler below, without bands or patches.

Length, 3.7; tail, 12.0 = 15.7 inches.

Inhabits Tavoy.

Another species has been described from Travancore, *B. Indica*, Theobald, with also over 50 rows of scales round the body, but with a distinct shoulder fold, lined with minute black scales.

CALOTES, *Cuvier.*

Scales with the tips directed backwards and upwards.

C. MYSTACEUS, Dum. et Bib.

A fold before the shoulder. Colour brown or ruddy vinous, with a conspicuous white band from nostril to behind the shoulder. Seasonably the males (and some females) assume a gorgeous livery, the entire fore part of the body turning a bright deep blue, red-mottled on the throat. The largest specimen I ever measured was thirteen inches, of which the tail measured eight and a half; but Stoliczka records one sixteen inches, and Günther one of *twenty-four*; from Ceylon, though no Burmese specimens attain that size.

Inhabits Arakan, Pegu, Tenasserim, Ceylon, Siam and the Nicobars.

Dr. Mason thus writes of this species: "This is a very common species in gardens in Toung-ngoo. A pair made their home in the mango trees near my study window. The female blundered into the house a few days ago, but I found her a very unattractive animal of a uniform earth-brown colour. The male, however, is sometimes a beauty. He may be often seen jerking his head up and down, with the head, pouch and whole front of the body a glowing ultramarine blue, contrasting beautifully with the reddish-brown of the hinder part of the body and the tail. From the nose to the shoulders, below the eye, is a broad white band, which is interrupted by three reddish-brown patches, in line with the white band, before reaching the uniform

reddish-brown of the hinder part of the body. Occasionally the white band below the eye assumes a brownish colour, and the animal appears to have a brown band down each side. He does not always, however, appear in this gay dress. While I am writing I see him coming down the trunk of one of the trees in a very faded garment. His skin suggests a bright calico, after it has been washed, whose colours succumb to soap. The blue is there, but it is no longer the bright blue of yesterday. It has changed to a dull light indigo colour. He runs across the grass to the foot of another tree and stops on the bare ground at its base, where for a minute or more he bites with great energy at a struggling grasshopper (?), and while thus exercising himself the blue fades out from his body altogether and his whole body takes the colour of the brown earth on which he stands. After tarrying a minute or two he ran up the other tree and the dull light blue colour seemed to return to him as he ran up the tree."

C. EMMA, Gray.

A black fold in front of the shoulder. Colour brownish olive, with brown bands across the back and a pale lateral streak. Grows to 11 inches, of which the tail is not quite three-fourths.

Inhabits Assam, Pegu and Tenasserim.

C. VERSICOLOR, Daud.

No fold in front of the shoulder. Colour brown, with darker bands or lozenges on the back, and a pale lateral band. Two black specks on the occiput. Seasonably the head and fore limbs become bright red (whence its European name of 'blood-sucker'), or limbs and tail black. Grows to sixteen inches, of which the tail is eleven.

Inhabits the whole of India and Burma.

ORIOCALOTES, Günther.

Scales keeled, those above pointing upwards, those below downwards. Tail round. A fold before the shoulder. A gular sack in males.

O. KAKHIENSIS, Anderson.

No spines on the head. Scales of the body imbricate, keeled, those on the side of the back pointing upwards, those below downwards. A few large scales on the sides. A fold over the shoulder. 50 transverse rows between the limbs, and 60 or more round the body. The fore leg reaches the tip of the snout, the hind one to the gape. General colour olive, variegated with brown and yellow. Under surface olive green. A broad black band from the eye to the tympanum, two narrow ones below the eye, one in front and three above.

The upper Irrawaddy valley, where, in Anderson's opinion, it replaces the nearly allied *O. minor*, Günther.

ACANTHOSAURA, Gray.

A. ARMATA, Gray.

No gular sack. A fold before the shoulder not extending across the throat. Colour greenish-brown, with roundish light spots. Length twelve and a half inches. Inhabits Tenasserim.

A second species occurs near Rangoon with an orange vertebral line.

TIARIS, Gray.

T. SUBCRISTATA, Blyth.

A gular sack in males, and a fold before the shoulder in both sexes. Scales of the body very small, with some larger ones intermixed. Subcaudals in two rows, sharply keeled. Colour greenish, with some dark stripes before the shoulder. Males obliquely striped and reticulated with brown and variegated with red and yellow. Grows to fifteen inches, of which the tail is eleven.

Inhabits the Andamans and Nicobar Islands.

Family Uromasticidæ.

Herbivorous agamoids, wholly or in part of social habits.

LIOLEPIS, Cuvier.

Scales minute and granular. Tail depressed, with small square scales in transverse bands. Femoral pores. Skin of sides lax. Edible.

L. GUTTATUS, Cuv.

Colour pale reddish-brown, with numerous dark-margined orange spots on the back, and the sides sharply barred with black and orange. Tail greenish-brown, minutely yellow-dotted above. Grows to nineteen inches, of which the tail is thirteen.

Inhabits Arakan, Pegu and Tenasserim.

This very handsome lizard is herbivorous, feeding on the crocus-like flower which springs up in commencement of the hot weather in March, and is identified by Dr. Mason with *Kämpfera candida*. This lizard has been supposed, from its expansile skin on the sides, to fly like *Draco*; but the species is entirely terrestrial and a burrower, and is never seen on a tree and never attempts to fly. It is somewhat gregarious in its habits, and is highly esteemed as food. It is called 'Padat' by the Burmans and the *Kämpfera* accordingly 'Padat-za.'

Order LORICATA.

Reptiles with the body covered above by bony plates imbedded in the skin. Teeth lodged in sockets, and reproduced by endogenous succession. Vent linear, longitudinal. Vertebrae proœclous.

Family Crocodilidæ.

The fourth tooth of the lower jaw fits into a notch in the upper, so as to be visible when the gums are closed. Five toes before, four behind.

CROCODILUS, Cuvier.

C. PALUSTRIS, Less.

Dorsal plates in six rows. Muzzle very blunt.

This species is rare in Burma, but is found inland about Thayetmyo, and thence up the Irrawaddy.

C. POROSUS, Scheid.

Mijyoung.

Dorsal plates in eight rows. Muzzle narrower than in the last. Very common in Pegu and Burma in every tidal creek. It grows to thirty feet in length, and is a dangerous animal, especially in the rains, when an old male will sometimes attack small boats. It is dangerous, too, to walk at dusk near a river or creek tenanted by these creatures, as at such a time they are specially active, and on the look out for animals which approach the banks. They invariably drown their victims, and delay their meal till decomposition has rendered the flesh easier to tear off.

The flesh is much esteemed by the Burmans.

GHARIALIS, Cuvier.

G. GANGETICUS, Gmel.

The long-nosed gharial is found in the Koladyne, but has not yet been obtained in Pegu.

Order CHELONIA.

Shield reptiles. Vent circular. Tongue and reproductive organs single. Oviparous.

Of the three orders of Reptiles, the Chelonia are by far the most important and beneficial to man. The flesh of some marine species enjoys a world-wide celebrity for its nutritious properties and fine flavour, and in America the 'Terrapins' are an acknowledged delicacy. In Burma all species save the coarser and rank marine turtles (*Couana*, *Caretta*, and *Dermatochelys*) are highly esteemed by the natives, and undoubtedly yield a pleasant and wholesome food. Some prejudice may perhaps be allowed in the case of carrion-eating species (though few turtles feed more foully than ducks and fowls); but the hard-shelled herbivorous river turtle (*Batagur*) and the majority of land and marsh tortoises, are excellent food, and both wholesome and palatable. The eggs of all species of turtle are so highly prized in Burma that it is much to be feared that the numbers of these useful creatures will be greatly reduced by the eager search for eggs, which, so far from being checked as it should be by Government, is rather encouraged, by the right to collect them being farmed out. If this practice may perhaps not be so injurious to the sea turtles, who possess numerous island resorts not very accessible to their enemies, it is alarmingly destructive to river turtles, as the *Batagurs*, who not only lay but few eggs, 25 or thereabouts, but are compelled to resort to banks of rivers, as near Zalon for example, where every egg laid is appropriated, and the race is recruited only, as it seems to me, from hatchlings in stray spots away from the main resort of the species. As, however, the country becomes cleared and settled, the fate of these creatures will become yearly more precarious, until the species is threatened with extinction. In India, where no one scarcely eats either the turtles or their eggs, this danger does not exist; but in Burma it is a real danger to an important food supply of the people.

Family Testudinidæ.

Terrestrial Chelonians, with feet adapted for walking on land, in a few species only, partly webbed. Sternum concave in males, convex in females. Herbivorous.

TESTUDO, *Oppel*.

Caudal plate single. Toes five before, four behind.

T. ELONGATA, Blyth.

Colour of adults pale yellow, black-mottled, with no trace of rays, and in aged individuals but little black. Head yellow, with the soft skin of the eyes and nostrils pink. Grows to about 12 inches, and inhabits Pegu and Tenasserim. Anderson also records it as occurring in Chaibassa, in Singhhum.

T. PLATYNOTUS, Blyth.

Lêk-goung-ni.

Colour black, with yellow rays. Aged individuals have the back flat; half-grown specimens are more globose. Grows to about 12 inches.

Inhabits Northern Pegu and Upper Burma.

The caudal plate in these two species is single.

MANOURIA, *Gray*.

Characters much as in *Testudo*, but hinder toes webbed. Pectoral plates separated in males. Tangential in females.

M. EMYS, Müll. and Schl.

Tôr-lêk.

Colour of adults wholly black. Caudal plates two, therein differing from *Testudo*. Grows to 20 inches, and ranges from Assam through Arakan, Pegu, and the Tenasserim Provinces.

GEOMYDA, *Gray*.

Differs from *Testudo* in possessing divided caudals, and hind toes webbed. Zygomatic arch none.

G. GRANDIS, Gray.

Colour above very dark brown, almost black; below handsomely black and yellow rayed. Caudal plates 2. Grows to 18 inches.

Inhabits Pegu and Tenasserim.

This species is more aquatic in its habits than the last, and the shell is often encrusted with weeds.

G. DEPRESSA, Anderson.

G. Arakana, Theobald.

The following were the characters of an Akyab specimen in my possession.

Colour uniform yellowish, dark-mottled; below yellow. Claws of hind feet very long. An aged female measured 9.5 inches on a straight line.

Inhabits Akyab.

G. SPINOSA, Bell.

Shell keeled and serrated. Colour brown above; yellow below, handsomely brown-rayed. In the young each costal plate is armed with a distinct spine, which in aged animals is worn down to a tubercle. In a young shell before me, of 5 inches, the tendency to a spinous development in the plates is shown by the nuchal plate being bispinous in front and keeled, and by the 3rd and 4th vertebral keels being distinctly bispinous behind. The gular, too, presents the lateral curved spine mentioned in Günther's description.

Grows to 10 inches or more, and inhabits Pinang and Tenasserim.

Family Cistudinidæ.

Feet adapted for walking or swimming. The sternum usually flat in both sexes, attached to the thorax by a ligamentous suture and transversely divided into two mobile lobes.

CORA, Gray.

C. AMBOINENSIS, Daud.

Colour above dark brown or blackish, with a pale vertebral line. Below pale primrose yellow, with a black blotch on the outer posterior angle of each plate. The sternum is attached to the thorax by a ligamentous suture, and divided into two mobile lobes. Grows to ten inches.

Inhabits Pegu, Tenasserim, the Malayan Peninsula, Java, and Amboina.

CYCLEMYS, Bell.

The transverse pectoral suture in *Cyclemys* is formed by the permanent non-anchylosis of the pectoral-abdominal suture, indicated externally by a curious fold traversing the plates, and is more obvious in aged than in young animals.

C. DENTATA, Bell.

Colour pale olive, radiately brown streaked. Grows to 8 inches or more.

Inhabits Pegu and Tenasserim.

PYXIDEA, Gray.

No transverse sternal hinge.

P. MOUOTII, Gray.

Colour yellowish, browner on the sides. Shell with three keels. Sternum separated from the thorax, as in the last species, but with no transverse suture. Grows to 7 inches or more.

Inhabits Cochin China and Kachar, and probably therefore Burma, though as yet unrecorded there.

Family Emydidæ.

Fresh-water Chelonians, of small and medium size, with sternum and thorax united into a bony case, without lateral or transverse joints. Sternum flat in both sexes. Habits active, carnivorous. Zygomatic arch complete.

BELLIA, Gray.

Shell three-keeled, when young. Zygomatic arch strong.

B. CRASSICOLLIS, Gray.

Colour deep clouded olive above and below, without markings, but paler in spots. A small nuchal shield. The second, third, and fourth vertebrals mushroom-shaped, semicircular in front. Young shells are three-keeled. This species readily takes the hook, but is a foul feeder, not to be recommended for food. Common in Tenasserim. Grows to 7½ inches.

MELANOCHELYS, Gray.

Shell three-keeled. Zygomatic arch weak.

M. EDENIANA, Anderson.

Colour black, edges of keels and sternum yellowish. Shell three-keeled.

Grows to 12 inches.

Inhabits Arakan, Pegu, and Tenasserim. This is the Burmese representative of *M. trijuga*, Gray, of India, and *M. Sebae*, Gray, of Ceylon.

Family Bataguridæ.

River or estuary Chelonians, mostly of large size, with solid shells, contracted internally at each end. Sternum flat in both sexes. Food mainly vegetable.

MORENIA, Gray.

Small-sized *Bataguroids*, with an ocellated pattern of ornamentation.

M. OCELLATA, Dum. et Bib.

Emys Bermorei, Blyth.

Colour pale greenish-olive, with an ocellus on each costal plate. Beneath pale yellow. Shell globose. Females grow to 8 inches or more. Males are smaller.

Inhabits Pegu and Tenasserim, where it replaces or represents the allied species *M. Petersi*, Anderson. It is a thoroughly aquatic form, but during the inundations, numbers find their way from tanks and rivers over the country, and on the subsidence of the water, and the clearance of the grass by fire in April, are either captured alive, or their scorched bodies are picked up by scores by the people, who greatly relish their flesh for food.

An examination of the type specimen in Paris has enabled Dr. Anderson to decide that it belongs to the Burmese animal, and did not come as stated, from Bengal,¹ where the species is unknown.

BATAGUR, Gray.

B. KACHUGA, Ham. Buch.

Colour uniform greenish olive-brown, beneath yellowish. Back of the neck brownish, with seven red-brown streaks. The chin with ten yellow spots on the side. Seasonably the colours become very brilliant. Grows to 24 inches.

Inhabits Pegu and Tenasserim.

¹ For the Bengal species, Dr. Anderson therefore adopts a new name.

M. PETERSI, Anderson.

E. ocellata, apud Blyth.

Adult male 4·95; female 7·70.

B. TRIVITTATA, Dum. et Bib.

Lĕk-pōk.

A nuchal plate always present. Colour in males pale olive-green, with three conspicuous pitchy black bands down the back. Beneath pale orange yellow. Females uniform umber brown. Seasonably the males are very brightly coloured, the head and neck being a pale crimson, fading on death to waxy white. Grows to over twenty inches.

Inhabits Pegu and Tenasserim.

An allied species, *B. affinis*, Günther, inhabits the Malayan Peninsula, and may range into Tenasserim; it is distinguished by having no nuchal plate.

B. TRIVITTATA, Dum. et Bib. (?).

B. Iravadica, Anderson.

This species appears to have originated in the fact that Dr. Anderson obtained a male specimen, of seven inches in length, which was uniform brown, and without the black streaks which characterize the males of *B. trivittata*, whose adults attain to eighteen inches. No adult brown male of *Iravadica* is known, and if, as Anderson maintains, the brown females of *B. trivittata*, as described by me, pertain to *B. Iravadica*, rather than to it, then the females of *B. trivittata* are unknown. The adult male of *B. Iravadica* is unknown, and Dr. Anderson himself states that the "skulls of the adult males and females referred by Theobald to *B. trivittata* are so alike to one another, and so resembled by the skull even of the uniformly coloured male, that I cannot seize on any animal character which would separate them specifically, unless it be the greater upturning of the nasals in the latter" (!). Dr. Anderson then adduces certain differences in the shields, but in recollection of how the scutation of some species varies with age (e.g. *Bellia crassicollis*), and the great probability that the pitchy bands of *B. trivittata* are a sexual adornment of the adult male, it seems more than probable that the young male whereon *B. Iravadica* is founded is merely the immature male of *B. trivittata*, no black-streaked male of that species being, it would seem, known of the size of Dr. Anderson's typical male, viz. 7 inches.

TETRAONYX, Lesson.

T. BASKA, Ham. Buch.

A nuchal plate always present. Four toes on all feet. Colour uniform brown. Grows to twenty-four inches.

Inhabits Pegu, Tenasserim, the Malayan Peninsula, and also Bengal.

An allied species in Borneo has no nuchal plate (*B. pictus*, Gray).

Family **Platysternidæ** (Parrot Tortoises).

PLATYSTERNON, Gray.

P. PEGUENSE, Gray.

Head large. Tail long. Shell small. Colour above grey, below orange. A black-edged yellow stripe behind the eye. Grows to fourteen inches, of which the shell is five only.

Inhabits the streams falling into the Sittoung and Salween Rivers.

Nearly all the above-mentioned species of tortoises are excellent eating, especially the large hard-shelled herbivorous species. Some small species, as *Bellia*, are of scavenger habits, and the flesh of these animals, when captured near towns, is to be avoided; but the objection is not so strong to animals taken in the jungles. I doubt not that all species would make good soup; but the way I myself was in the habit of having the flesh dressed was in the shape of broiled cutlets, which I found very palatable and wholesome.

The next division embraces the soft or 'snapping' turtles as they are sometimes called.

Family Chitridæ.

Cartilaginous river turtles, with weak jaws.

CHITRA, Gray.

Head elongate, eyes placed very forward. The semidiameter of the skull across the mandibular condyles is contained more than three times in the distance between the occipital condyle and the palatal opening of the nostrils.

C. INDICA, Gray.

Colour dark olive brown, lineately marbled. Below yellowish white. No ocelli in the young. Grows to 240 lbs.

Inhabits the Irrawaddy and other rivers and estuaries of Burma. This savage and dangerous creature can be distinguished from all other 'soft' turtles, except the next species, by its weak lower jaw, and from *Pelochelys* by the proportions of the head.

PELOCHELYS, Gray.

Head short. Eyes placed very forward. The semidiameter of the skull across the mandibular condyles is contained twice only between the occipital condyle and the palatal opening of the nostrils.

P. CANTORII, Gray.

Resembles *Chitra* externally very closely, but is a smaller species, and but little known. Ranges probably the same as *Chitra*. Tickell got it at Akyab, and the British Museum possesses a specimen from Borneo.

Family Trionycidæ.

Cartilaginous river turtle, with strong jaws.

TRIONYX, Geoffroy.

T. STELLATUS, Geoff.

Shell brown, with vermiculate markings in the young. Head and neck grey, profusely yellow mottled.

Inhabits Pegu and Tenasserim.

T. PHAYREI, Theobald.

Adults brown, handsomely vermiculated. Head and neck handsomely marbled with subreniform markings.

Inhabits Pegu, Tenasserim, and the Malayan Peninsula.

T. FORMOSUS, Gray.

Young only known, perhaps the young of the last.

T. PEGUENSIS, Gray.

Head of adult pale olive-green, minutely and closely punctulated with black. Inhabits the Tsittoung.

T. GRAYII, Theobald.

Head mottled as in *T. Phayrei*, but the sternal callosities much more developed. Type immature (10 inches).

Inhabits Pegu.

The whole of the above species belong to that section of the genus which has the mandible inside traversed by a median ridge. *Trionyx Gangeticus*, on the other hand, and all the Bengal species, have the same part smooth, or traversed by a median furrow. *T. Gangeticus*, from Burma, is probably *T. Phayrei*, but this is not settled. All the species probably grow to a large size.

Dr. Anderson, in reviewing the various species of Burmese Trionyces in his Zoology of Yunnan, p. 786, falls into some serious misconceptions of my views, which it is as well to correct. First of all Dr. Anderson, speaking of *T. Grayii*, Th.

(p. 790 l.c.), describes me as recognizing the correspondence of its skull with that of *T. Peguensis*, Gray, but remarking "that the plastral characters indicated a totally different animal," and quoting in support Proc. A. S. B. 1875, p. 176. It will however be seen by turning to this reference, that I allude to *T. Peguensis*, Gray, only to remark that it is a species hitherto only known to us by its head, which is "pale olive green minutely and closely punctulated with black."

As I had never seen any sternum of *T. Peguensis* (which was founded on a head in spirit procured by me in the Tsititong, but the body of which was not preserved), I never made any such comparison, and as a matter of fact my words quoted by Dr. Anderson refer *not* to the sternum of *T. Peguensis*, but of *T. Phayrei*. My words were, "The head (*T. Grayii*) was dried, but on moistening it the colouration of the skin was seen closely to resemble that of *T. Phayrei*, which I at first concluded it to be. *The sternal characters however indicated a totally different animal.*" Neither has Dr. Anderson any warrant for saying that I recognized any correspondence between the skulls of *T. Grayii* and *T. Peguensis*, their colouration being wholly different; what I did say was that the skulls of *T. Grayii* and *T. Phayrei* exactly corresponded in colouration, though their sternal characters did not. The head whereon *T. Peguensis* was based was fully adult, "*minutely and closely punctulated with black.*" The head of *T. Phayrei*, of the same size, is very peculiarly and differently marked, being marbled with handsome subreniform spots or marks, and not punctulated. The skulls may correspond, as Dr. Anderson asserts, but the markings are wholly unlike; and unless Dr. Anderson can show this to be a sexual character, we must hold with Dr. Gray that *T. Peguensis* "is very different from any species that has before come under my notice" (Sup. Cat. I. R., p. 99).

Not content with endeavouring to refer the well-known and abundantly represented *T. Phayrei*, Th., to *T. Peguensis*, Gray, based on an isolated head, Dr. Anderson then endeavours to sink *T. ocellatus* and *T. Grayii*, Th., to a synonym of the same species. His words are, "The head however of the latter (*T. Phayrei*) corresponds to the heads of eight turtles from the Irrawaddy, in the Indian Museum, Calcutta, which have their plastra covered with coarse granulations, and which in the form of their entoplastron piece exactly correspond to the plastron referred to *T. stellatus*, and to the plastron of *T. Grayii*" (Zool. Yunnan, p. 791). From this and contextual passages, Dr. Anderson seems to regard *T. Phayrei*, Th., *T. Grayii*, Th., *T. ephippium*, Th., *T. formosus*, Gray, *T. stellatus* (Theobald's figure), with more or less doubt in each case, to *T. Peguensis*, Gray, and the Irrawaddy species described by me as *T. Phayrei* to it *unhesitatingly*, despite its totally different colouration, and the fact that *T. Peguensis*, Gray, is based on a solitary head!

EMYDA, Peters.

Margins of the shell strengthened with numerous small bony plates.

E. VITTATA, Peters.

Colour brown above, white below. Grows to 8 inches, and has the odd plate on the sternum large. *Emyda* is more cartilaginous than *Trionyx*, and consequently can more completely retract its head and limbs within its shell.

The flesh of the soft turtles is generally eaten by the Burmese, and may be good, but as they are carnivorous animals, I never liked trying it myself. In the great rivers in India, where these turtles so largely feed on human bodies, the idea of using their flesh for food is repulsive; but in Burma this is not the case, and less objection exists to its use. So my advice is, for each one to try and judge for himself. After the revelations we have had of the horrors of cows fed on the warm slush and refuse of whisky stills, I would sooner eat a snapping turtle, than preserved American beef, possessing such a history and such antecedents. To help to discern this wicked trash, it may be mentioned that the beef of the wretched animals so fed is totally destitute of fat. *Verbum sat sapienti.*

A writer, in the *Field* gives the following amusing account of the trouble some cat-fishes and these soft turtles sometimes give the fisherman whose hook they have taken:—

"Before I close this letter I must warn you against a couple of fish with which

you may meet when fishing for mahseer. One of these is a silvery-looking gentleman, with one long fin which goes all down his belly and half way up his back. He takes the spoon very freely, and you had better be very careful to knock him on the head, and make quite certain that he is dead before you start 'clearing,' as his mouth is a complete mass of small teeth like wool-carders, and he has a 'grip' like a bulldog. The other gentleman frequently makes his appearance at the end of your line when you are fishing with 'atar' for small fry. He is an innocent-looking little fellow enough; but when you pick him up to get out your hook, he suddenly shoots a spike up out of his back, and another out of each fin, and generally succeeds in giving you a reminder. I missed my shot once when stabbing at one of these fish with a shikar-knife, and got a prod in the wrist which has made me pretty careful ever since. I dissected one of these brutes last year; he could not have weighed more than half a pound, yet his fin-spikes were some three inches in length, of solid bone, and as thick as an ordinary penholder.

"The only other troublesome beast is the turtle. He eats any sort of ground-bait he can get, and runs up to an enormous size. I shall never forget the fun a friend and I had with the first one I caught. It was at Chowmook on the Poonch: the river was in a state of flood, and we were fishing in a small mill-race close to the village for such small fry as we could catch. I hooked a large turtle on strong single trout gut. Of course, hauling him out with such tackle and a ten-foot rod was an impossibility; so we kept on, chucking stones on top of him and making him run about. After a bit he seemed to be getting rather blown, and we accordingly tossed up who should go in after him and work him up to the bank with a gaff. I lost the toss, handed the rod over to my friend, denuded myself of my nether garments, and proceeded to stalk the wily turtle from the rear—a rather 'jumpy' proceeding, as, though the water was only about two feet deep, it was as thick as mud, and, although we were both ignorant, as far as personal experience went, of any facts connected with the natural history of turtles, except that they made very good soup, my friend consoled me with a casual remark that I had better look out, as a friend of his had told him that 'they bit like the devil.' I therefore approached my enemy with great care, and commenced prodding him up in the rear with the gaff. For a time all went well. He seemed quite to fall in with our views, and my elum hauled away at his head, and I shoved him from behind, until we got him with his nose and fore paws (or flappers, or whatever you like to call them) on the bank. Now, my young friend, not entirely without reason, rather fancied himself as to his personal appearance; but whether on account of the eccentricity of his costume—which consisted of a pair of bathing drawers and a 'sola topce,'—or from the fact that he had his hair cut a fortnight before within an inch of his head and hadn't shaved since, I know not, but he fairly frightened that turtle into a fit. The moment he saw him, he (the turtle I mean) threw a hand spring off the bank and 'scooted all he knew,' as the Yankees say, for my legs. I fortunately managed to check him in his wild career with the gaff, and a regular rough and tumble ensued, during which I had the luck to get the gaff hook fast in the slack skin which forms the telescopic portion of the hind limbs, and drew him on to the bank, where we laid him on his back and executed a war dance over his prostrate form. This beast weighed 22½ lb. Having ascertained this fact and let him have a few bites at the gaff handle—the results of which experiments made me thankful that he hadn't got hold of my toe—we held a board to determine how he was to be killed. The natives proposed inducing him to put his head out and then chopping it off with a hatchet; but I was very anxious to save the hook and gut, so I handed him over to my bearer to finish, and we went to dinner.

"Just as we had finished this meal, my bearer came in with a long face and said that the turtle was a 'shaitan,' and that they couldn't manage to kill him anyhow. I then got a double-edged pigsticker, and 'went for' for that turtle. I turned him over on his back, so as to get a fair shot at the thin part of his shell, and stuck him clean through the body several times. He now bled like a pig, and, as he lay quite still, I thought he was dead. My friend, however, maintained that he was only 'playing possum'; so, to make assurance doubly sure, we placed him in an inverted

'mora,' or hollow cane stool, and put a couple of heavy shingles on top of him. We then smoked a couple of pipes and turned in for the night. About midnight I was suddenly aroused by my friend's exclaiming, 'Oh, Lord, there's that infernal turtle broke loose again! He's playing the deuce all over the shop!' We jumped out of bed, and found that it was true; the gentleman had 'resurrected,' and was making even time of it round the cowshed which forms the so-called travellers' bungalow at Chowmook. We stuffed him into the 'mora' again, and piled some three hundredweights of heavy stones on top of him. In the morning we again inspected him, and were relieved to find that he was dead; probably from thirst, for he was apparently as fit as a four-year-old in the middle of the night, and was only stopped by the crushing weight we put on him. A friend joined us in the course of the day, and we had turtle soup for dinner. I don't think this was quite the right sort of turtle; at any rate, we all felt very unwell for some days afterwards, and, as my cook was an excellent one, I am sure no blame attaches to him.

"My friend killed another of 25 lbs. in the same mill-run last year. We got a native to go in after him and land him in a basket, and I killed him by getting him to bite hold of an iron tent peg and hammering it down his throat with a big stone. The ferocity of these beasts is as remarkable as their vitality. If you catch two of them and place them facing each other, they will set-to like a couple of bull-terriers. We were dragging a small one out on heavy tackle last year, and had just got his snout on the bank (I call it a 'snout,' as the head is more like that of a pig than anything else), when a retriever dog belonging to my friend ran up to have a sniff at him. The brute made a regular rush and a snap at the dog, fortunately just missing his nose. I have since heard many stories concerning the habits of the turtle, which have caused me to change my youthful idea of him, which was that he was a quiet and inoffensive animal which made excellent soup. This may be the case with the West India branch of the testudo family; but his Asian brother is a 'bad hat all round,' vicious in his temper, plebeian in his appearance, filthy in his habits, and unfit for human food; so, if you get hold of one, cut your casting line and let him go. Though he cannot bite through it, he will 'chaw' and fray it until it is utterly useless. You will take a long time killing him; and, if you make soup of him and eat it, he'll go very near killing you, unless you have the digestion of an ostrich."

As regards the best method of killing them, I know of no better than a revolver bullet through the brain. If laid on their back, the head will soon be extended with the object of righting themselves, and getting once more on their legs. A more clumsy way is by jamming the animal into a corner and extracting the heart by a slit along the hind legs. Or the animal's head may be caught in a noose, dragged out, and cut off. To do this, place a slip noose in front of the animal's retracted nose, holding the ends very short in either hand. When the head is well protruded through, draw tight, with an instantaneous jerk, but if not very sharp, the noose will miss, and the animal being alarmed will not readily put its head out again. If only wanted for food, the animal can be instantly killed by cutting through its back, the spinal marrow being thus divided and sensation at once extinguished. To boil the wretched animal, as is sometimes done, is a brutal and stupid proceeding.

Family Chelonidæ.

Marine turtles, with fins in place of feet.

COUANA, Gray.

Five pair of costal shields, often subdivided. Carnivorous. Inedible.

C. OLIVACEA, Eschs.

The Indian loggerhead.

CHELONIA, Fleming.

Four pairs of costal shields, often subdivided. Algivorous. Edible.

C. VIRGATA, Schw.

The Indian edible turtle. Leik-pyen-wōn.

These two species closely resemble each other, the latter only is algivorous and edible, the former being a coarse feeder, and the flesh rank. Both species inhabit the Bay of Bengal, but the former seems the most numerous.

The possession of four pairs only of costal plates forms a ready means of distinguishing the delicate and edible *Chelonia* from the coarse and rank *Couana*, which is so often unknowingly consumed in its place. The butler of the Bengal and Madras Clubs should be specially instructed in the mystery of diagnosing the two species. Dining myself once at the Bengal Club in Calcutta, I was struck with the poor quality of the turtle soup, so in the morning, I visited the turtle tank, where the fellow turtle, of the one I had feasted on, awaited his turn for the same evening. A glance sufficed to show that it was a nasty 'loggerhead' (*Couana*), and moreover that the poor beast was dead, perhaps from being put into fresh water. Let us hope there was no turtle soup that night for dinner, but these things require very sharp looking after. Of course if one does happen to die from eating bad turtle, it is put down to Cholera—or the Climate!

CARETTA, Merren.

Four pairs of costal shields. Shields keeled and imbricate. Carnivorous. Inedible.

C. SQUAMOSA, Bontius.

The 'tortoise shell' or Hawk's-bill turtle.

This species grows to 2 feet in length, and yields the tortoise shell of commerce. In *Couana* and *Chelonia* the plates are thin, almost papyraceous, and of little value.

DERMATOCHELYS, Blainville.

Shell subcordiform, covered with a coriaceous skin, and traversed by 7 longitudinal ridges.

D. CORIACEA, L.

A female of this rare species was captured near the mouth of the Ye River, in Tenasserim, on 1st February, 1862, where she had resorted to lay eggs. The shell was covered with a leathery skin of a blackish neutral colour above, covered with white spots, like splashes of whitewash. Below a pale flesh colour, blotched with neutral. The shell measured five and a half feet, and it took six men to lift the animal. This species is found in the Mediterranean Sea and on the English coast, and grows to eight hundred pounds weight. Tickell gives an excellent figure of the animal (J.A.S.B. 1862). The fore paddle of his specimen measured three feet three inches, and the body was two feet high. When surprised by Burmese fishermen, she dragged six men along with her, nearly into the sea, but was overpowered by others running up, and is now in the Indian Museum, Calcutta.

ORNITHOLOGY.

IN the earlier edition, Dr. Mason thus prefaced his account of the birds of Burma, with a glance at the progress which a couple of decades had made in that branch of Natural History:—"The *dodo* may possibly be found there—and the *cassowary* may perhaps be met with,' observed Dr. Pearson in his official charge to Dr. Helfer, when the latter was about to proceed on his scientific mission to the Tenasserim Provinces. The *dodo* and *cassowary* were about as probably inhabitants of Burma as the phoenix and ostrich; but the remark shows how little was known of our ornithology fifteen or twenty years ago. Indeed it was quite a blank until Major Phayre, then in Arakan, commenced his collections, and Mr. Blyth entered on his duties as curator of the Museum of the Asiatic Society of Bengal. When I went over the birds of Burma with Mr. Blyth in 1854, I found eighty-eight species in the Museum, represented by specimens sent up by Major Phayre, and these were but a fraction of the number he had furnished, many having been replaced by fresher specimens from more recent contributors. Since that period, I find more than fifty specimens, acknowledged in the Journal, as having been received from him on one occasion, in Pegu. The next largest contributors from Burma are Rev. Mr. Barbe, Captain Abbot, Mr. O'Riley, Major Berdmore, and Major Tickell."

Since Mason penned these words, many good men and true have taken up the work, as their predecessors fell out of the ranks of that army which is ever marching on—and some not unworthy successors to the first pioneers may here be quoted, Tytler, Blanford, Ramsay, Oates, de Roepstorff, Fielden, Armstrong, Ball, Davison, Bingham, Viscount Walden, the discriminating editor of Blyth's posthumously published list of Burmese Mammals and Birds (Jour. As. Soc. Bengal, Extra Number for 1875), and last, but not least, A. O. Hume, the zealous, able and entertaining editor of *Stray Feathers*. The present list has been mainly compiled from the lists given by Blyth and Hume, but below¹ are enumerated a few of the principal papers

¹1. List of Birds known to occur in the Andaman and Nicobar Islands, by V. Ball. *Stray Feathers*, I. p. 51. Species 133.

2. 'Die Papageien.' A review, hot, strong, and well laid on, by A. O. Hume, S. F. II. p. 1.

3. The Islands of the Bay of Bengal.

This is an account of a cruise undertaken by Mr. Hume in company with Dr. Stoliczka, Mr. Ball, and Mr. Wood-Mason. It is highly interesting, and crammed with amusing and instructive matter. S. F. II. p. 29.

4. A first List of the Birds of the Tenasserim Provinces, by A. O. Hume. S. F. II. p. 467.

5. Additional Notes on the Avifauna of the Andaman Islands, by A. O. Hume. S. F. II. p. 49.

6. A first List of the Birds of Upper Pegu, by A. O. Hume and Eugene W. Oates, C.E. S. F. III. p. 1.

7. A second List of the Birds of Tenasserim by A. O. Hume. S. F. III. p. 317.

8. Notes on some Burmese Birds, by Eugene W. Oates, C. E. S. F. III. p. 335.

9. Additional Notes on the Avifauna of the Andaman Islands, by A. O. Hume. S. F. IV. p. 279.

10. Notes on some Birds collected in the Eastern or Rangoon district of the Irrawaddy Delta, by James Armstrong, B.A. S. F. IV. p. 295.

11. Notes on the Nidification of some Birds in Burmah, by C. F. Bingham. S. F. V. p. 79.

regarding Burmese ornithology, which have appeared in the pages of *Stray Feathers*, and which will all repay perusal. That the present list is satisfactory cannot be admitted, some species it doubtless omits which should be inserted, and many I fear it contains, which in reality should be expunged, but anything like a critical examination of the conflicting claims of allied species to recognition is as far beyond the power of the compiler, as it is beyond the scope of the present work.

Class AVES.

Vertebrate, warm-blooded, oviparous animals, breathing by lungs, and clad with feathers. The lower jaw is articulated to the skull by an *os quadratum*, and the skull to the atlas by a single occipital condyle.

Order PICI.

Woodpeckers. Thit-touk.

Bill wedge-shaped. Tongue highly extensile, fleshy, barbed at the tip. Tail stiff at the points, and an organ of support in climbing. Feet short, stout, first and fourth toes turned backwards (*zygodactylous*). The two horns of the hyoid bone extend round to the back of the head, forming a loop, which can be lengthened or shortened by appropriate muscles. The *Pici* are mainly insectivorous and breed in holes of trees, laying white eggs, the males sharing the task of incubation.

Family Picumnidæ.

SASIA OCHRACEA, Hodg.

Arakan. Pegu. Tenasserim.

S. abnormis, Tem. apud Hume (juv.) (S.F. vi. p. 148).

This species makes a wonderfully loud noise for its size. Davison writes:—“I have more than once thought it must have been some large woodpecker, and was astonished that I could not see it, and when at last I did discover the tiny object, I felt quite as much astonished at the sound it was able to produce, as it was at my sudden advent.”

Family Picidæ.

HEMICIRCUS CANENTE, Less.

Arakan. Pegu. Tenasserim.

Hume is inclined to separate a race from Karen-ni, described by Lord Walden as having the head “uniform deep black,” which is a style of colouration wholly abnormal and unknown in the present species (Hume, S.F. vi. p. 128). Blyth

12. Notes on the Nidification of some Burmese Birds, by Eugene W. Oates, C.E. S. F. V. p. 141.
 13. Notes on some Burmese Birds, by Eugene W. Oates. S. F. V. p. 247.
 14. Notes on the Nidification of some Burmese Birds, by W. Davison. S. F. V. p. 453.
 15. A Revised List of the Birds of Tenasserim, by A. O. Hume and W. Davison. S. F. VI.
 16. After the Adjutants, by C. T. Bingham. S. F. VII. p. 25.
- This is a paper to make a naturalist's mouth water, describing the author's adventures in company with Mr. Kurz, and the results of his sealing the limestone rocks near Maulmain, on which the Adjutants breed.
17. Notes on the Nidification of some Burmese Birds, II., by Eugene W. Oates, C.E. S. F. VII. p. 40.
 18. A first Tentative List of the Birds of the Western half of the Malay Peninsula, by A. O. Hume. S. F. VIII. p. 37.
 19. A rough Tentative List of the Birds of India, by A. O. Hume. S. F. VIII. p. 73 (and Index p. 123)
 20. The Birds of the Western half of the Malay Peninsula, Second Notice, by A. O. Hume. S. F. VIII. p. 151.
 21. Notes on the Nidification of some Burmese Birds, by Eugene W. Oates, C.E. S. F. VIII. p. 161.
 22. Notes on some Tenasserim Birds, by Lt. C. T. Bingham. S. F. VIII. p. 190.
 23. On the Nidification of *Dromas ardeole*, by A. O. Hume. S. F. VIII. p. 381.
 24. Notes on the Nidification of some Horubills, by C. T. Bingham. S. F. VIII. p. 459.

describes this species as only differing from *H. cordatus*, of South India, in being constantly larger. Davison adds, "Both sexes of this species, like *H. cordatus*, bear tufts of bristly feathers in the middle of the back, which are usually covered with a gummy substance, which has a very strong, peculiar, somewhat resinous, but decidedly pleasant smell. Both the viscidly and the scent completely disappear after the specimen has been preserved a short time."

H. sordidus, Eyton. South Tenasserim. Java.
H. Brookeanus, Salvad. Sumatra. Borneo.

Hume also inclines to unite *H. Hartlaubi*, *H. sordidus* and *H. concretus*, Tem., and to regard the Javan birds as a local race of the present species (S.F. vi. p. 128).

ALOPHONERPES PULVERULENTUS, Tem. Arakan. Pegu. Tenasserim.
Picus gutturalis, Valen.

This is the largest Oriental woodpecker. It goes about, says Davison, in parties of from four to eight, following each other from tree to tree, keeping up a querulous call totally unlike any other woodpecker. They work high up on trees, and will desist work to utter their call and receive a reply from a comrade on some neighbouring tree. They are as wary, however, as woodpeckers in general, and dodge round a tree when seen.

THRIPONAX CRAWFURDII, Gray. Pegu. Martaban and Northern
Hemilophus Feddeni, Blyth. Tenasserim.
T. Jerdoni, Cabanis.

T. javensis, Horsf. South Tenasserim. Java. Philippines.

This species replaces the last, south of Mergui, where it is not uncommon. Hume considers there is an intermediate belt of country wherein neither species occurs, but this is highly improbable.

T. hodgii, Blyth. Andamans.

CHRYSOCOLAPTES GUTTICRISTATUS, Tickell. Arakan. Pegu. Tenasserim.

C. sultaneus, Hodg.
Indopicus Delesserti, Mulh.

TIGA JAVANENSIS, Ljungb. Arakan. Pegu. Tenasserim.

Picus tiga, Horsf.
var. *rufa*, Stoliczka. A small race of the Malayan Peninsula and Sumatra.

Hume considers *T. rubropygialis*, Math., and *T. intermedius*, Blyth, as identical also (S.F. iii. p. 328, iv. p. 390).

T. shorii, Vigors (S.F. iii. p. 73). Arakan. Pegu.

GEVINUS STRIGOLATUS, Blyth. Pegu. Toung-ngoo.

Brachylophus xanthopygius, Bonap.

G. vittatus, Vieill. (S.F. iii. p. 69). Pegu. Tenasserim.

One of the commonest woodpeckers in Burma, but does not range south of the Pakchan creek.

G. nigrigenis, Hume (S.F. ii. pp. 244 and 471). Tenasserim.

This bird inhabits open bamboo jungles in the lower ranges, and, like other *Gecini*, habitually feeds on the ground. Hume considers it possible that this species may eventually prove identical with *G. erythrogygius*, Elliot, in which case *nigrigenis* will sink to a synonym (S.F. vi. p. 137).

G. occipitalis, Vig. Arakan. Pegu. Tenasserim.

This species has not been noticed by Davison south of Tavoy.

CHRYSOPHEGMA FLAVINUCHA, Gould. Arakan. Pegu. Martaban and
Tenasserim north of Mectan.

C. chlorolophus, Vieill. Khasi Hills. Arakan. Tenasserim.

This species is usually found in pairs, but Davison describes once meeting with a troop of woodpeckers near Myawudi consisting of this species, *C. flavinucha*, *G. occipitalis*, *nigrigenis*, *vittatus*, *C. Sultanus*, *T. intermedia*, *M. phaeiceps*, *T.*

Craufurdi, *G. viridis*, *Y. canicapillus*, all working together, and mixed up with a lot of *Garrular Belangeri* and *montiger*, *Cissa spectiosa*, etc. "Such a paradise of woodpeckers I never saw." They were probably drawn together in pursuit of a swarm of winged white ants or expelled, *en masse*, from some burning forest.

CALLOLOPHUS MENTALIS, Tem. Southern Tenasserim only. Sumatra.
C. PUNICEUS, Horsf. Southern Tenasserim only.

A solitary bird, according to Davison, which never feeds on the ground, and has a note differing from other woodpeckers. It will ascend to the summit of a tree and there utter its peculiar cry, becoming very noisy towards dusk, when other woodpeckers are silent.

C. MALACCENSIS, Luth. Southern Tenasserim.

Davison writes that this is a bird of the evergreen forests, not occurring in the open country, but, unlike the other *Callolophi*, being rather partial to mangrove swamps.

BLYTHIPICTUS PYRRHOTIS, Hodg. Toung-ngoo. Northern Tenasserim.

This bird frequents dense grass and underwood, is very shy, and moves about in pairs, and never, according to Davison, ascends a tree till disturbed.

B. PORPHYROMELAS, Boie. Tenasserim south of Mergui.

This species has all the shy stealthy habits of the last. It is fond of working on fallen trees, and avoids the open forest and large trees (Davison).

GECINTULUS VIRIDIS, Blyth. Toung-ngoo. Tenasserim.

This bird is solitary, or seen in pairs, and is commonly found in bamboo jungles.

MICROPTERNUS RUFINOTUS, Malh. Arakan to Tenasserim.

M. Phaiiceps, Blyth.

M. Burmanicus, Hume.

This is quite a bird of the open country, writes Davison, and fond of gardens and bamboo clumps. It is always smeared with some gummy substance, and has a strong peculiar smell. The tails too are usually studded with ants' heads. These are the large reds of the open jungle, who, when once they seize anything, never quit their hold. These ants seize the tail feathers of the bird, but in time their bodies get rubbed off, leaving their heads adhering, sometimes in scores, on the lateral web of the tail feathers. Mr. Oates, on the other hand, remarks, that in Pegu this species is confined to the evergreen forests, and adds, "The head, top of tail, and abdomen are much smeared with some gum, or rather, as I fancy, with honey. The contents of the stomach of three specimens were black ants and a small yellow bee-like insect, the latter in considerable quantities." From this, it may be inferred that the main food of this species consists of *Hymenoptera*, both adults and larvæ, in pursuit of which its plumage gets rather daubed (S.F. iii. p. 72). A still more curious trait in this bird is that it breeds in ants' nests, according to the observations of Mr. J. Gammie, who took several so situated near Sittoung. The species of ant is not clear, but I take it *not* to be *F. smaragdina* (the edible yellow ant, whose nests are sold in the bazaar, for the acid flavour the crushed ants impart to it), but some species which makes its nests on bamboos, and of a more or less globose shape, constructed of loose materials, in the midst of which the eggs are laid. According to Mr. Gammie, the ants desert a nest so treated, and he thinks the strong smell of the bird may conduce to this result; but the habit quite explains the presence of ants among its feathers, as noticed above. As a note to Mr. Gammie's communication, Mr. Hume adds that *Haleyon occipitalis* also breeds in ants' nests (S.F. iv. p. 511).

M. BRACHYURUS, Vieill. Tenasserim south of Mergui.

MEIGLEPTES JUGULARIS, Blyth. Arakan. Pegu. Tenasserim.

M. TRISTIS, Horsf. Southern Tenasserim. Java.

M. TUKKI, Less. Southern Tenasserim. Singapore.

All these three species are birds of dense forest, and have the usual woodpecker note, a rolling "kirr r-r" (Davison).

- Picus Macul*, Vicill. Arakan. Pegu. Karen-ni, at 3000.
 Blyth records this bird from Tenasserim, perhaps using the term vaguely, but Hume says it does not occur south of Karen-ni.
- P. atratus*, Blyth. Martaban. Karen-ni. Tenasserim, between 3000 and 4000.
- P. analis*, Horsf. Toung-ngoo. Karen-ni. Java.
P. pectoralis, Blyth (monote auct.).
 Not hitherto recorded from Tenasserim.
- P. andamanensis*, Blyth. Andamans.
P. maharattensis, Lath. Toung-ngoo.
- Birds from Ceylon and Pegu have more white about them than those of Continental India.
- Yungipicus canicapillus*, Blyth. Khasi Hills. Arakan. Pegu. Tenasserim, up to 5000.
- Gauropicoides rafflesii*, Vig. Tenasserim.
- A rare bird, confined to the evergreen forests at the bases of the Southern and Central portions of the outer ranges of hills.
- Vivia innominata*, Burton. Karen-ni and Tenasserim.

Family Yungidæ.

- Yunx torquilla*, L. Arakan. Pegu. Toung-ngoo.

Order VOLITORES.

Bills various, with mostly a wide gape. No cere. Legs small and weak. Wings strong, the whole order moving solely by flight. This order embraces the King fishers, Hornbills, Barbets, Swifts, Swallows, Bee-eaters, Hoopoes, Goatsuckers, Trogons, and Humming-birds.

Family Megalaimidæ.

The 'Barbets' are nearly related to the *Toucans* of South America, the clavicles being imperfect as in that family, and the feathers possessing the same supplementary plume. Their colours are green and bright, and are strikingly similar to that of the leaves of the trees they frequent. They are mainly if not wholly frugivorous, and nestle in holes of trees, laying white eggs. Their beaks are strong, and furnished at the base, or gape, with stiff bristles projecting forwards. Their voice is loud and their monotonous cries repeated without ceasing from some tree-top are among the most familiar sounds in our Indian forest-clad valleys.

Megalaima Ramsayi, Wald., S.F. iii. p. 402. Karen-ni. Tenasserim.

M. franklini, Blyth, apud Tickell.

According to Col. Tickell, this species "swarms from 3000 to 5000 feet elevation, not higher, nor lower, and from the first level it suddenly supplants *M. Hodysoni*."

M. franklini, Blyth. Khasi Hills.

Hume considers this species to be replaced in Burma by the last.

M. cyanotis, Marshall (S.F. iii. p. 77). Khasi Hills. Arakan. Karen-ni. Pegu. Tenasserim.

M. mystacophanus, Tem. Tenasserim. Rare in the North.

The note of this bird is Tok-tok-tok uttered incessantly. It is more often heard than seen, as it frequents the tops of high trees, or else densely foliated ones. It is fond of clinging to the trunks of trees and tapping away like a woodpecker.

M. HEMACEPHALA, Müll. Arakan. Tenasserim. Java.
Xantholama indica, Lath. The Philippines (Blyth).

Theet-pa-dain.

Davison says it is universally distributed, but rare in Southern Tenasserim.

Jerdon remarks of this species, "Luteous varieties of this species occur occasionally, what Mr. Blyth calls '*lutinos*': these are sometimes observed in all normally green birds, as Parrakeets, and analogous to ordinary *albinos*. Its food is fruit. Blyth observed that it would munch an insect if offered, but did not swallow it. Its note is a remarkably loud 'Took-took-took,' uttered with monotonous iteration from the summit of some tree, and the bird moves its head first to one side and then another whilst uttering it." In India it is known as the 'Copper-smith,' and in Burma as the 'Smith,' and among the Karens as the 'Gong-ringer' (Mason).

M. GRANDIS, Gould. Arakan. Karen-ni.

M. Marshallorum, Swinhoe.

This species, if it occurs in Burma, is probably confined to Arakan, being replaced to the South by the next.

M. VIRENS, Bodd. Martaban.
 M. HODGSONI, Bonap. Khasi Hills. Arakan.
M. lineata, Marshall. Pegu. Tenasserim. Java (Blyth).

Pho-goung.

Davison doubts its occurring much south of Tavoy.

M. ASIATICA, Lath. Arakan. Pegu. Martaban.

Koh-kha-loung.

M. DAVISONI, Hume (S.F. v. p. 108). The Tenasserim 'Yo-mah.'

M. INCOGNITA, Hume (S. F. ii. p. 442-446). Tenasserim north of Tavoy.

CALORAMPHUS HAYI, Gr. South Tenasserim.

Davison says its note is a low soft whistle, and that it hunts singly or in pairs about the leaves and branches of trees, peering into every crevice and cranny of the bark, and clinging in all sorts of positions like a Tit (S.F. vi. p. 149).

Family Coraciidæ.

CORACIAS AFFINIS, MacClelland. Pegu.

Hnet-kah.

Of this species Blyth remarks:—Generally diffused, and always typically coloured; whereas specimens from Tippera, Sylhet, Assam, and Lower Bengal are mostly crossed more or less with *C. indica*, showing every gradation from one to the other. Gould's figure assigned to *C. affinis* in his 'Birds of Asia' represents a hybrid of the kind; and *C. indica* also interbreeds with *C. garrula* in localities where those two races meet. Eastward, the present species extends at least to Siam.

EURYSTOMUS ORIENTALIS. Arakan. Tenasserim. Malacca.

Family Bucerotidæ.

The Burmese, says Mason, call the larger crested Hornbills *young-yen* from *young* the kind of hair worn by men. The smaller species are called *ouk-kyen* (or *ou-chin*), perhaps from *ouk* 'to be dark,' 'gruff in countenance.'

DICHOCEROS CAVATUS, Shaw. Forests throughout Burma.

B. bicornis, L.

Young-yen.

This fine species is said to be excellent eating (S.F. 1877, p. 20), a fact worth knowing when camping out.

HYDROCISSA ALBIROSTRIS, Shaw. Toung-ngoo.
 Ouk-chin.

This species is said (i.e.) to feed, when the chance offers, on fish, and to be so intent on its prey, that it may be then sometimes killed with a stick. It is probable that all species of the family prey, when they can, on any small mammal, bird or fish they can surprise.

ANORHINUS TICKELLI, Blyth. Martaban Hills up to 4000.
 A. GALERITUS, Tem. Malewön and Bankasun.

A very shy and strictly arboreal species.

ACEROS PLICATUS, Latham. Arakan. Tenasserim.

Young-yen-net.

A. SUBRUFICOLLIS, Blyth. Arakan. Toung-ngoo. Tenasserim.
 A. NARKONDAMI, Hume (S.F. i. p. 411). Narkondam Island.

The female is an exact miniature of the last, and weighs one pound only, or a third of the other. The male again is a miniature of the male of *ruficollis* from New Guinea.

A. NIPALENSIS, Hodg. Kachar. Tenasserim.
 A. UNDULATUS, Shaw. Tenasserim south of Amherst.
 BERENICORNIS COMATUS, Raffl. S. Tenasserim. Bankasun. Malacca.

In addition to fruit, these birds eat lizards and small birds. This species has a remarkably soft flight, flapping its wings rapidly but noiselessly, and without the intermediate sailing periods so characteristic of the flight of *Hydrocissa* and *Dichoeros* (Davison).

RHINOPLAX VIGIL, Forst. Malewön and Bankasun.

The solid-billed hornbill derives its specific name from its extreme wariness, which renders it next to impossible to shoot one without days and days of laborious work. This is no doubt produced by the ardour with which they are pursued and harassed by the natives, who carve their heads into obscene love-charms, which sell for 50 rupees apiece among the superstitious people (Davison, S.F. vi. p. 115).

The Hornbills are striking objects in a Burmese forest, and the cry and noise made by the flight of *D. cavatus* is something alarming, and must be heard to be fully realized. This species lays a single egg, the smaller species laying three brownish cream-coloured eggs without gloss. When a female hornbill has excavated a hole in a tree, she is confined to her nest by the male plastering up the orifice with clay and his own dung, and so preventing her egress till the young are hatched. While so confined, the female is assiduously fed by the male with fruit, which the female is said to refuse unless fresh and choice. A singular habit is possessed by some hornbills of voiding, in the form of a sac, the lining membrane of their stomachs, which in a short time would seem to be reproduced without ill effects to the bird.

There are two papers in the Proc. Zool. Soc. Lond., which exhaustively treat of this curious phenomenon. The first is by Mr. A. D. Bartlett, P.Z.S. 1869, p. 142; the other by Dr. Murie, P.Z.S. 1874, p. 420. Mr. Bartlett from the first advocated the correct view, that this casting up the lining membrane of the gizzard was not the result of diseased action, but a curious provision for more readily feeding, by means of such a 'bolus' or 'capsule,' the imprisoned female during the period of incubation. For the fact of this imprisonment, and the assiduous attention of the male bird, he quotes both Tickell, Wallace, and Dr. Mason, and correctly remarks that the latter observer could of course not distinguish at a distance between the 'sac,' with its contents, which the male puts into the mouth of the female, and a 'fig' or fruit, as Mason presumed it to be.

Dr. Livingstone also noted the same act with respect to the African Hornbills, and added the remarkable discovery, that the bird sometimes becomes so emaciated by his attendance on the imprisoned female as to pay the forfeit of his industry with his life. Livingstone says, "During all this time, which is stated to be two or three months,

the male continues to feed her and the young family. The prisoner generally becomes quite fat and is esteemed a very dainty morsel by the natives, while the poor slave of a husband gets so lean, that on the sudden lowering of the temperature, which sometimes happens after a fall of rain, he is benumbed, falls down and dies."

It cannot be supposed, Mr. Bartlett urges, "that the mere collecting food for the female is the cause of this fatality; it is doubtless overtaxing the system, by the constant secretion of this nutritive matter, reminding one of the blood in the nests of the esculent swifts, after the birds have been robbed of the first and second nests." "That parrots and pigeons and many other birds reproduce their partially digested food during the pairing and breeding season for the support of the female and young, is well known. The tame male hornbill is particularly distinguished at all seasons by this habit of throwing up its food, which he not only offers to the female, but to the keepers and others who are known to him. The male concave Hornbill (*Buceros caratus*) now in the gardens, will frequently throw up grapes, and holding them in the point of the bill, thrust them into the mouth of the keeper, if he is not on the alert to prevent or avoid this distinguished mark of the bird's goodwill and kindness." Mr. Bartlett might have also instanced the somewhat analogous act in many young birds which void their 'fæces' in a 'bag' or 'sac' which the mother flies away with in her bill, and drops at a safe distance from the nest.

Dr. Murie, in his paper (*I.e.*), figures two empty 'gizzard sacs' as he terms them, ejected by the *Buceros subcylindricus*, and conclusively proves that they are nothing more nor less than an epithelial horny bag, "the veritable gizzard lining itself, as opposed to any glandular or secretive product," and adds: "That the ejected 'sac' should retain the shape and peculiar corrugated appearance of the interior of the gizzard, is not to be wondered at, when we consider that it is but a solid, though flexible, impress of the sinuosities, elevations, and depressions of the mucous folds of that organ."

Family **Upupidæ.**

UPUPA LONGIROSTRIS, Jerdon.

Pegu.

Toung-pi-tsok.

Blyth considers this as merely a "deep-coloured race of *U. epops*."

Family **Meropidæ.**

MEROPS PHILIPPINUS, L.

Arakan. Pegu. Tenasserim. Java.

M. DAUDINI, Cuv.

Pegu. Toung-ngoo. Andamans.

M. LESCHENAULTI, Vieill.

Arakan. Pegu. Tenasserim.

M. erythrocephalus, Gm.

Penang.

M. Swinhoei, Hume.

Andamans.

Lord Walden remarks: "The Malaccan habitat is doubtful. For reasons already stated (*Ibis*, 1873, p. 301), Gmelin's title, taken from Brisson, cannot be adopted. If, however, the title of *quinticolor*, Vieillot, is to be used for the Javan race, the continental form must take the name of *M. Leschenaulti*, Vieill. In either view the necessity of coining the new title of *M. Swinhoei*, Hume, does not seem apparent."

M. VIRIDIS, L.

Arakan. Tenasserim to Mergui.

var. *M. ferrugiceps*, Hodg.

NYCTIORNIS ATHERTONI, Jard. and Selb.

Pegu. Tenasserim. Karen-ni.

Pyā-twe-lmet.

N. AMICTA, Tem.

N. Malaccensis, Cab. (juv.)

Martaban. Pegu.

This bird is usually found in pairs, and never gregariously, as other bee-eaters are. When uttering its note 'quo-quā-quā-quā,' the bird leans forward, stretches out its neck and puffs out the feathers of its throat, and at each syllable of its note bobs its head up and down (Davison).

Family **Alcedinidæ.**

(Peing-nyen, *generic*).

CARCINEUTES PULCHELLUS, Horsf. Malacca to Martaban and Pegu.

C. amabilis, Hume (S.F. i. p. 474).

C. amabilis, from Northern Pegu, is separated by Hume, from its wanting the red collar so marked in Karen specimens and in some from Malacca, but which is often absent in other Malaccan individuals.

PELARGOPSIS BURMANICA, Sharpe. Tenasserim. Andamans. Pegu. Karen-ni.
P. INTERMEDIA, Hume. Nicobars.

Intermediate between *P. Fraseri* of Java and *P. leucocephala* of Bengal.

P. AMAUROPTERA, Pearson. Tenasserim. Karen-ni.

A species not usually found far removed beyond the tideway, though in India it also haunts the Eastern Terai.

HALCYON PILEATA, Bodd. Pegu. Martaban. Tenasserim.

H. COROMANDA, Lath. Martaban. Tenasserim. Andamans.

This is a species more usually found near the sea.

H. CONCRETA, Tem. Southern Tenasserim.

H. ATRICAPILLUS, Gmel. Andamans. Nicobars (rare).

H. OCCIPITALIS, Blyth. Nicobars.

Davison was the first to describe the curious habit possessed by this bird, of excavating its nest in ants' nests. "I found three nests on the island of Camorta, and all of them were excavated in deserted ants' nests. These ants' nests are generally placed against the trunks of very large trees, but occasionally against those of the coconut palms, at heights of from 4 to 20 feet from the ground, and vary from 12 to 30 inches in diameter, being composed, as I believe, of some sort of clay; they are extremely hard and difficult to break. It is in the larger ants' nests that this kingfisher's nest-holes are excavated. The tunnel, about 2 to 2½ inches in diameter, is in the centre of the ant's nest, and goes in for about 6 inches, where it terminates in a chamber about 7 inches in diameter" (S.F. ii. p. 172).

H. CHLORIS, Bodd. Martaban. Tenasserim. Andamans.

H. SMYRNNENSIS, L. Universally distributed. Andamans.

SAUROPTATIS CHLORIS, Bodd. Common along the coast.

CERYX TRIBACTYLA, Pall. Pegu. Tenasserim. Andamans.

ALCEDO MENINTING, Horsf. Bankasun. Southern Tenasserim.

A. BENGALENSIS, Gmel. Pegu. Andamans. Nicobars.

A. BEAVANI, Wald. Martaban. Tenasserim. Andamans.

A. NIGRICANS, Blyth. Southern Tenasserim.

A. ASIATICA, Swainson. Tenasserim. Andamans.

Lord Walden considers *A. Beavani*, Hume, a synonym of this species. It really, however, matters little whether we distinguish an animal as a *variety* or *race*, or distinct *species*, so long as we do not hamper ourselves with any preconceived notion of the fixity of species, an idea certainly more strongly supported by Semitic tradition, than by the study of nature.

It is remarked by Mr. W. T. Blanford, that *Pelargopsis burmannica*, *Halcyon smyrnensis*, and *Alcedo bengalensis*, are apparently replaced in the Irrawaddy delta, where the water is salt, by *P. amauroptera*, *H. pileata*, and *A. asiatica*. According to Helfer, *Alcedo beryllina*, Vieillot (*biru*, Horsfield), is also an inhabitant of the Tenasserim provinces, but Blyth had never seen it even from the Malayan Peninsula. The present, however, is one of the species which Helfer did procure.

CERYLE RUDIS, L. Martaban. Tenasserim.

C. GUTTATA, Vig. Martaban.

Writing of this species Hume, remarks that, contrary to the assertion of Sharpe and other authors, the sexes are not identical in colouring. The under wing coverts

of the males are *always* white, in the females mostly pale cinnamon. This is an "absolute sexual diagnosis in adults" (S.F. vi. p. 86).

Family **Eurylaimidæ.**

The 'Broadbills' form a small family, which may be said to represent in Asia the Todies of South America.

CALYPTOMENA VIRIDIS, Rall. Tenasserim south of Amherst.

This lovely bird is difficult to procure, as during the day they remain seated on the tops of trees, where they can hardly be discerned. They are not shy, neither are they stupid like 'broadbills,' from which they differ in habits, note and food, feeding entirely on fruit (Davison).

PSARISOMUS DALHOUSIE, Jamieson. Assam. Arakan. Pegu. Tenasserim.

This species preys on insects, which it seizes on the wing.

SERILOPHUS LUNATUS, Gould. Pegu. Karen-ni (3000 to 4000). Tenasserim as far south as Ye.

This 'Broadbill' is so stupid that if one is shot, its next neighbour will hardly move, or only to the next branch, so that the whole of a flock may be secured in rotation.

S. RUBROPYGIA, Hodg. Khasi Hills. Arakan.

At Pahpoon it is very common. The call consists of a single 'Chirr-r-r.' They never walk or hop about the branches, but fly from one to another. They feed chiefly on insects, many of which they seize on the wing.

EURYLEMUS JAVANICUS, Horsf. Toung-ngoo. Tenasserim.

This is very tame, but not crepuscular like *Corydon*.

E. OCHROMELAS, Rall. Southern Tenasserim. Java.

CYMBORHYNCHUS MACRORHYNCHUS, Gmel. Bassein. Tenasserim. Borneo.

CORYDON SUMATRANUS, Rall. Toung-ngoo. Tenasserim.

This species is so stupid that you may pelt it without sometimes getting it to budge, according to Tickell. It is crepuscular in its habits.

C. AFFINIS, Blyth. Arakan. Tavoy.

Family **Trogonidæ.**

The Trogons, says Jerdon, are a remarkable family of resplendent beauty, the most gorgeous being American. They manifest an affinity to the *Caprimulgidæ* in their tender skins, downy plumage, feeble feet, and other points. Their plumage is dense, but so lightly implanted as to readily come out, and the feathers have a very large supplementary plume.

The genus *Harpactes* embraces the Asiatic Trogons.

HARPACTES DUVAUCELLII, Tem. Tenasserim, rarer above Mergui.

H. ERYTHROCEPHALUS, Gould. Arakan. Karen-ni. Tenasserim.

H. Hodgsoni, Gould.

Htok-taru.

H. ORESKIUS, Tem. Arakan. Tenasserim. Java.

According to Col. Tickell, *Harpactes Hodgsoni* is "common on the hills from 3000 feet upwards. Below that it is replaced by *H. orescius*. It flies in small flocks, and is active and vociferous on the wing, solitary and quiet during the heat of the day, sitting in the shade."

Family **Caprimulgidæ.**

The Burmese term these birds Myaywote or earth-crouchers. Bill usually small and weak. Gape very wide, guarded with strong bristles. Plumage soft and mottled.

Eyes large, habits crepuscular and nocturnal, during the day the birds perching on the ground in some sequestered spot. Eggs two, stone colour, mottled and blotched, and laid on the bare ground.

LYNCORNIS CERVINICEPS, Gould.

Darjiling. Arakan. Tenasserim.

Of this grand nightjar Davison remarks, "It makes its appearance soon after sundown, flying at a great height, and numbers coming from the same direction, uttering its full and clear whistle. As the evening advances, they descend lower and lower, till by the time it is quite dark, they are flying about within a few feet of the ground . . . I cannot imagine, and I have often wondered, where these birds roost during the day. I have walked up hill and down dale over many hundred miles of country, . . . yet only once have I flushed a *Lyncornis*, and that was brooding. . . I have noticed that when they make their appearance of an evening, they always come from the direction of the mountains, numbers following exactly in the trail of those that have gone before, and all going back exactly the same way at dawn the next morning. This I have not only noticed to be the case with *L. cerviniceps*, but also with the smaller *L. Temminckii* of the Malay Peninsula." On this point Mr. Hume suggests as just possible that they roost in caves in the hills, but the question is one that still awaits an answer, where the birds retire to, during the day.

CAPRIMULGUS INDICUS, Lath.

This species ranges, according to Blyth, throughout Burma to Malacca and Sumatra. Many Tenasserim specimens have, however, been referred to *C. Jotaka*, from Japan, and birds of this *Jotaka* type range, according to Hume, right up through Sikkim and Gurlwal to Abbottabad in Hazara. Hume, in summing up, points out that these Indian *Jotakas* never quite attain the dimensions of the Japanese type, and are scarcely separable from *Indicus*. Blyth would seem to be right in regarding all as a race of *Indicus*. Its note is described by Jerdon as being *teu-yo-yo* frequently repeated.

C. MACROURUS, Horsf.

Throughout Burma and ranging to North Australia.

Lord Walden points out that Barmese specimens exceed in size typical Japanese ones, which is just the reverse of what occurs with the supposed Barmese *Jotakas*. Davison says of this species, "I know of nothing so thoroughly disagreeable when one is lying ill with fever in the jungle, as the monotonous call of this nightjar, which goes on incessantly from early in the evening till dawn next morning." The fever had doubtless something to say to this; for the sound to me is very soothing and pleasant, recalling calm scenes of serene beauty and many a tranquil and placid hour spent beneath the greenwood tree with the sky for canopy over all. Capt. Fielden remarks, "This bird closes its eyes, whilst seated on its eggs. This must be a great protection from hawks, as its great eyes are the most conspicuous things about it. The first time I saw this I thought the bird was dead, and stooped to pick it up, nearly touching it before it rose" (S.F. iii. p. 46). The next species has been separated, though little more than a race or plumage variety of the present.

C. ALBONOTATUS, Tickell.

Toung-ngoo.

This bird may be distinguished from the last by its larger size, and by being lighter coloured and more buffy. The lower parts, too, are uniform, whereas the last species has the dark breast strongly contrasted with the paler abdomen.

C. MONTICOLUS, Franklin.

Pegu. Martaban. Tenasserim.

C. ANDAMANICUS, Hume.

Andamans.

C. ASIATICUS, Lath.

Arakan. Pegu. Tenasserim.

The note of this species, according to some, is '*Tyook-tyook-tyook*,' or as Jerdon happily suggests, like the sound made by a stone skudding over ice. There is first the ringing ti-i-ook of the stone striking the ice, and the same note repeated as though the stone had given three or four great bounds, and the note then gradually falls, as though the stone were gradually vanishing in the distance. It is a most weird and curious sound, ringing out close to one's path on some glorious bright

night when all is still around, and the early traveller is hurrying on to reach his destination before sunrise.

I once picked up a *Caprimulgus* lying dead in the road, evidently suffocated by spasm of the glottis, caused by the fore legs of a large *Mantis* impacted therein, which the bird had endeavoured, but failed to swallow. The curious thing was that the bird had not been able to free itself, even under the pangs of suffocation, from the insect which filled its mouth.

BATRACHOSTOMUS, *Gould.*

Bill broad, depressed and strong. They resemble in their plumage the little Scops-owls, and like them have a grey phase and a ruddy phase.

B. HODGSONI, Gray.

Karen-ni at 6000.

B. AFFINIS, Blyth.

Malayan Peninsula, not certainly recorded as yet from Tenasserim.

B. CASTANEUS, Hume.

Hume is not certain if this is not one sex of *B. Hodgsoni*, and entirely dissents from Lord Walden's uniting it with *B. affinis*. For a lengthy disquisition of the question, which requires more data for decision, see S.F. ii. p. 348, and vi. p. 53.

Family Hirundinidæ.

The swallows form a well-known and peculiar group of birds, comprising several groups marked by different habits of life and nidification. The 'common swallows' build saucer-shaped nests of mud, and lay white eggs spotted with red, all the other groups laying white eggs. The House martins build globular nests of mud. The Crag martins, saucer-shaped nests of mud. The Sand martins excavate holes in river banks, and the Republican swallows build retort-shaped nests of mud agglutinated together literally in masses on cliffs almost as closely as bees do their 'comb.'

HIRUNDININÆ.

Pyān-thwā.

H. RUSTICA, L.

India and Burma.

H. gutturalis, Scop.

H. gutturalis is a small race of the common European *H. rustica*, or chimney swallow. On the West of India *rustica* is the species met with, whilst in Burma all the specimens seem to belong to the smaller race *gutturalis*, both races blending in India and being specifically inseparable (S.F. vi. p. 41).

H. TYTLERI, Jerdon.

Thayet-myo. Karen-ni.

H. ANDAMANENSIS, Tytler.

Andamans.

Hume's remarks on this species (S.F. vi. p. 41) leave little doubt that this is a local race of *H. eahirica*, in process of differentiation, so to speak, and already arrived at the stage of demanding recognition *sub nomine proprio*.

H. HORREORUM, Bart.

Toung-ngoo (*vide* Walden).

H. JAVANICA, Sparfm.

Southern Tenasserim (migrant).

H. FILIFERA, Steph.

Martaban.

H. NIPALENSIS, Hodg.

Martaban. Tenasserim.

H. DOMICOLA, Jerdon.

Andamans.

H. STRIOLATA, Tem.

Karen-ni, 2000 to 3000 feet.

This species depends on the authority of Lord Walden, B. B. p. 127. Hume dissents and says, "The birds referred to, more probably belong to *Nipalensis* or *substriolata*. No one who has at all studied this group could talk of *erythroptigia* as barely separable from *rufula*! The distinctions are pointed out S.F. v. p. 265 *et ante*."

H. ERYTHROPTIGIA, Sykes.

Pegu.

COTYLE RIPARIA, L.

Thatōn (Martaban).

C. SINENSIS, Gray.

Pegu. Tenasserim (where rare).

C. obscurior, Hume.

These sand martins (*Colyble*) are distributed over the whole of India and Burma and breed in vast companies in the sandy banks of rivers, giving a very animated appearance to the locality.

CHELIDON URBICA, L. Martaban.

The English house martin has been noted as an occasional visitant at Maulmain.

PRYXOPROGNE. Tenasserim.

A species of crag martin occurs about the inaccessible cliffs of Mooleyit, but was not secured. It was smaller and darker than *rupestris*, and possibly it might have been *concolor*.

CYPSELINÆ.

The swifts are distinguished from the swallows by their excessively long and pointed wings, and prodigious powers of flight. They rarely descend to the ground or perch on trees, but roost in crannies of buildings or cliffs. Their nests are composed of feathers or such light objects as can be collected on the wing. Sometimes these feathers are agglutinated together into a cardboard-like substance, on which, without any lining, the eggs are laid, and in some species the entire nest is formed of overlapping strings of mucus, secreted by the salivary glands, and these constitute the 'edible bird's nest' of the Chinese epicures. In the genus *Acanthylis* the tail feathers end in rigid spines. All the swifts lay spotless white eggs.

A. CORACINA, Müll. Southern Tenasserim.

CYPSELUS SUBFURCATUS, Blyth. Choungthapee, Southern Tenasserim.

C. PACIFICUS, Lath. Assam. Tenasserim. Australia.

C. BATASSIENSIS, Gray.

C. palmarum, Gray and Hard.

Hume doubts the occurrence of this, the common Indian Palm-swift, in Burma and supposes that the next species has been mistaken for it.

C. INFUMATUS, Selater. Pegu. Martaban. Tenasserim.

The common Burmese palm-swift.

C. ACUTICAUDA, Blyth. Andamans.

Distinguished from *C. apus* and *C. leuconyx* by wanting the white band of the latter across the rump, and by having the feet bare and whitish, and the tarsus less feathered, in place of the black feet and densely feathered tarsus of *C. apus*.

The next genus, *Acanthylis*, is distinguished by the shafts of the tail feathers ending in rigid spines.

ACANTHYLIS GIGANTEA, Hass. Arakan. Tenasserim. Andamans. Ceylon.

A. INDICA, Hume. Southern Tenasserim.

Lord Walden considers this as a synonym of the last, but this is not admitted by Hume.

A. INDICA, Hume. Andamans. Southern India.

The birds which now follow form a small group wherein the peculiar development of the salivary glands in the breeding season reaches its maximum. In the palm swift we see the salivary secretion sparingly used to affix light feathers to the palm leaves, to form the nest, but in the *Collocalias* the secretion in question is more largely used, till in *C. spodiopygia* (and perhaps another species or two) it is solely used, and to the complete exclusion of any extraneous materials, in the construction of the beautiful gelatinous nests, so prized in China as an invigorating delicacy.

COLLOCALIA LINCHI, Horsf. Mergui Archipelago. Andamans. Nicobars. Java.

A race of this species has been named *C. affinis* by Tytler, and should the Java bird prove distinct, Tytler's name must be adopted for the Andaman bird generally recorded as *C. linchi*, S.F. ii. p. 157. This species breeds abundantly in the Andamans and Nicobars in caves, but of late years it has taken to building inside houses. Their

nest is brown, and mainly composed of moss agglutinated to the rock by the salivary secretion. They roost according to Davison at night like a swarm of bees all huddled together, and clinging to the bare boards in a wonderful manner. These nests of course are never collected.

C. FRANCICA, Gmel. The Andamans. Tenasserim.
C. sueiphaga, Horsf. (fide Walden).

This species no doubt produces an edible nest, but I am unaware if it has been taken in Burma.

C. SPHODIOPYGIA, Peale. The Andamans.

This is the species which affords an edible nest in the Andamans (Little Button Island). Mr. Hume thus describes it: The nest, except just at its junction with the rock (where it is brownish), is composed of the most exquisitely silvery white gelatine, exteriorly the surface is compact and somewhat roughened in laminae, interiorly it is a network of the finest and whitest threads, reminding one of the *Euplectella*. The true nest, which is pure white, and in shape rather more than half of a shallow cup, is from 2 to 2 $\frac{3}{4}$ inches broad, stands out from 1 $\frac{1}{2}$ to nearly 2 inches from the wall, and varies interiorly in depth from little more than one-half to a full inch. The attachment films and foundation below the true nest, both of which are somewhat brownish, vary excessively according to the site chosen for the nest; in some they are almost wanting, in others the film extends for an inch on either side beyond the nest; and the foundation below the most projecting point of the true nest may be 1 $\frac{1}{4}$ inches in depth. The nests are dotted about in the darkest corners, and as a rule are separate, though occasionally two or even three may be found joined together.

"The nests of this species (*not linchi*) are collected for the Pinang market, and it has not as yet been noticed at the Nicobars, where *linchi* abounds."—S.F. ii. p. 160.

C. INNOMINATA, Hume. The Andamans. Tenasserim.

Allied to the Nilghiri *C. unicolor*, Jerdon, but twice the weight of that species, besides other differences (S.F. i. p. 294, vi. p. 49.)

DENDROCHELIDON CORONATA, Tickell. Pegu and Martaban.

This species is rare in Southern Tenasserim, and replaced by *D. klecho* on the Malayan Peninsula.

D. COMATA, Tem. Tenasserim south of Mergui.

D. LONGIPENNIS, Raf. Tenasserim south of Mergui.

This species Davison thinks ranges a little farther north than the last.

Order SCANSORES.

Bill never arched from the base, no cere. Tongue not extensile. First and fourth toes turned backwards. In some the bill is small (*Cuculidæ*), in others as large almost as the rest of the bird (*Rhamphastidæ*).

Family Cuculidæ.

Many of this family are remarkable for the habit they have of laying their eggs in the nests of other birds, and in such cases we often find that the bird lays an egg similar in character to that of the bird selected by it, as foster-parent for its young. For example, *Endynamys orientalis* lays in the nest of the common Indian crow (*C. impudicus*), and its egg is accordingly green and blotched and spotted, something in corvine style. *Coccyzus*, too, lays a pure and deep blue egg, identical in colour with the eggs of the *Malaccocerei*, whose nests it honours with its choice. On the other hand, we must not build too elaborate conclusions on these seemingly adaptive correlations, as the common cuckoo lays a spotted egg wholly unlike those of its most commonly adopted foster-parents, the hedge sparrow, whose egg is of a uniform delicate blue.

CUCULINÆ.

CUCULUS CANORUS, L.	Pegu and Martaban.
C. SONNERATHI, Lath.	Pegu. Tenasserim. Java.
C. MICROPTERUS, Gould, ♂.	Tenasserim. Java.
<i>C. striatus</i> , Drapiez, ♀.	Andamans. Nicobars.

Hume first discovered that these two species (as supposed) were merely different sexes of the same bird (S.F. iii. 79).

HIEROCOCYX NANES, Hume.	Southern Tenasserim.
H. NISICOLOR, Hodg.	Tenasserim.

For the doubtful synonymy of this species, see S.F. v. p. 96.

H. SPARVEROIDES, Vig.	Arakan. Pegu. Tenasserim.
<i>H. strenuus</i> , Gould.	

This species has a fine loud call, and from its hawk-like aspect and mode of flight, darting suddenly from one clump of trees to another, causes dreadful commotion among all the small birds of the neighbourhood, who mistake it for a hawk (Davison, S.F. vi. p. 157).

CACOMANTES THREXODES, Cab.	Bengal. Pegu. Tenasserim.
<i>C. rufiventris</i> , Jerd.	

The earlier name is applicable to the smaller race, which is found in Southern Tenasserim, whilst the larger race of Bengal spreads down into Pegu, and blends with the other to the south (S.F. vi. p. 158).

POLYPHASIA TENTIROSTRIS, Gray.	Bengal. Arakan. Tenasserim.
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The Indian race is distinguishable from the Burmese, where grey-billed specimens are not met with, but the two races merge into each other, and, according to Blyth, in Bengal you meet with "every variation and shade of intermediateness." It lays its eggs in the nest of some species of *Prinia*.

SURNICULUS LUGUBRIS, Horsf.	Arakan. Tenasserim. Java. Ceylon.
<i>S. dicruroides</i> , Hodg.	

Jerdon describes this remarkable cuckoo as "clad completely in the disguise of a common king-crow" (*Dicruvus*), whilst Davison shot a specimen in the act of being fed by its foster-parent, *D. annectans*, and Blyth plausibly conjectures that the pure white eggs sometimes found in the nests of *Dicruvi* belong to it.

LAMPROCOCYX MACULATUS, Gmel.	Arakan. Tenasserim.
<i>Cuculus Malayanus</i> , Raffles.	

CHALCOCOCYX XANTHORHYNCHUS, Horsf.	Pegu. Tenasserim. Andamans.
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A rare species described in S.F. ii. p. 191.

COCCYSTES COROMANDUS, L.	Arakan. Pegu. Tenasserim.
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This species lays bluish blue eggs in the nests of the *Malaccocerci* or 'Quaker thrushes.'

C. JACOBINUS, Bodd.	Pegu.
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Fielden describes this bird as hawking moths like a *Drongo*, and having noticed a pair of young birds together, concludes that it lays two eggs in one nest.

EUDYNAMYS MALAYANA, Cab. and Heine.	Arakan. Pegu. Andamans.
Oo-aw.	Nicobars. Tenasserim.

This species is migratory in Tenasserim, a few only being resident; but in March, according to Davison, "the whole place becomes alive with them, and they continue very numerous till July," when the bulk of them disappear. Their note resembles the words 'who are you,' and is so incessantly repeated as to become a perfect nuisance (Davison). This species is the Burmese representative of the common India 'Coel,' and doubtless, like it, lays its eggs in the nest of some crow.

PHENICOPHAINÆ.

This division of the Cuckoos embraces those non-parasitic species which build their own nests and lay white eggs. These nests are of sticks, domed, lined with leaves and concealed in dense bushes. The eggs are usually four in number, and blunt ovals.

PHENICOPHAUS TRISTIS, Less. Arakan. Pegu. Tenasserim. Siam. Malacca. Wā-phalae.

“The flight of this species is weak, and it relies more for its safety on the dense and impenetrable character of the places it prefers to frequent. It has a marvellous capacity for making its way through dense cover. Its note is a peculiar cat-like chuckle, often heard when the bird is threading its way through dense cover” (Davison, S.F. vi. p. 163).

P. SUMATRANUS, Raffl. Tenasserim south of Mergui.

This species is common at Mergui. Its note and habits are precisely the same as *P. tristis*.

P. DIARDI, Less. Tenasserim south of Mergui.

This species ranges as far north as Mergui, where it is replaced by the next. Hume makes representative species of each other north and south of Mergui, but Blyth makes both species co-exist at Pinang and Malacca.

P. JAVANICUS, Horsf. Tenasserim.

A rare species.

P. ERYTHROGNATHUS, Hartl. Tenasserim south of the Ye River.
Sumatra. Borneo.

RHINORHINA CHLOROPHLEA, Raffl. Southern Tenasserim.

In its habits this species, says Davison, resembles *Phenicophaus*, but has quite a different note, a peculiar cat-like *meow*, not the chuckle of the others. Adult males have the head rufous and black-banded tails, and adult females grey heads and chestnut tails (S.F. vi. p. 167).

CENTROPUS BENGALENSIS, Gmel. Pegu.

Bōk.

Oates says that both males and females call, as he shot a female in the act of calling. Its note Mr. Oates describes as ‘Hoop-hoop-hoop-kurrook-kurrook-kurrook,’ the first note being repeated three times, the last some six or seven (S.F. iii. p. 84).

C. INTERMEDIUS, Hume. Arakan. Pegu. Tenasserim.

C. rufipennis, Illiger (part).

This Burman race has been separated by Hume from that inhabiting Southern India, in which Lord Walden concurs.

C. ANDAMANENSIS, Tytler. Andamans.

C. EURYCERCUS, A. Hay. Tenasserim.

Lord Walden remarks:—“Introduced by Mr. Hume in his list of birds of the Tenasserim provinces (S.F. ii. p. 473), but without the exact locality being stated. Two distinct species seem to be included by him under the title. The smaller may possibly be *C. rectunguis*.”

Order PASSERES.

Bills various, but never arched from the base. Tongue not fleshy. No cere. Toes three in front, one behind. Feet strong, perching. Females smaller than the males and less highly coloured. Nests often elaborate. Young hatched naked and blind. This order embraces all the Song birds, the ‘Sun birds’ (*Nectarinidæ*), which in Asia so feebly represent the gorgeous *Trochilidæ* of the New World, the Creepers, Nut-hatches, Ant-thrushes, Fly-catchers, King-crows, Butcher-birds, Warblers,

Thrushes, Wagtails, Wrens, Tits, Weaver-birds, Avadavats, Finches, Larks, Wax-wings, Chatterers, Pastors, Starlings, Orioles and Crows.

Sub-order *TENUIROSTRES*.

Bill long, slender, mostly curved. Legs strong.

Family *Nectariniidæ*.

The Honey-suckers, like the Humming-birds of America, chiefly feed on the nectar of flowers, but add thereto the minute insects found about flowers, and some subsist mainly on spiders. The males only are adorned with brilliant plumage, which is seasonal in some, in others permanent (Jerdon). The nest is an elaborately constructed purse, suspended from a slender twig, and opening at the side, and the eggs 2 or 3 in number.

ARACHNOTHERA MAGNA, Hodg. Sikkim. Arakan. Pegu. Martaban.

This species frequents hilly tracts, but is rare in Tenasserim proper.

A. AURATA, Blyth. Toung-ngoo. Karen-ni, at 2500 feet.

A. LONGIROSTRA, Lath. Arakan. Pegu. Tenasserim.

A. pusilla, Blyth.

Frequents gardens, and is commonly seen clinging, back downwards, to the purple bract leaves of the young plantain bunches, its head turned up inside the bract, busily sucking the nectar from the inflorescence concealed beneath the purple sheath (Hume).

A. MODESTA, Eyton. Tenasserim south of Mergui.

The grey-breasted spider-hunter.

A. CHRYSOGENYS, Tem.

The lesser yellow-eared spider-hunter.

ANTHREPTES HYPOGRAMMICA, Müll. Southern Tenasserim.

A. SIMPLEX, S. Mull. Southern Tenasserim.

A. MALACCENSIS, Scop. Tenasserim.

NECTAROPHILA HASSELTII, Tem. Arakan. Pegu. Tenasserim. Java.

Leptocoma Braziliæna, Gmel.

Both the above species are rare in the North, but common towards Mergui.

ÆTHOPYGA CARA, Hume. Martaban. Tenasserim.

For a key of all the species of this genus, see S.F. v. p. 71.

Æ. MILES, Hodg. Pegu. Martaban.

Æ. DABRYI, Verf. Mooleyit and Karen-ni, at 4000 feet.

Æ. NICOBARICA, Hume. Nicobars.

Æ. SANGUINIPECTUS, Wald. Mooleyit and Karen-ni, at 3000 feet.

Æ. GOULDIE, Vig. Assam. Arakan.

Mr. Blyth also considers it probable that *Æ. Nipalensis*, *Æ. saturata* and *Æ. ignicauda*, will all be found to range from the Khasi Hills into Arakan.

CHALCOSTETHA INSIGNIS, Gould. Southern Tenasserim.

CHALCOPARIA SINGALENSIS, Gmel. Assam. Arakan. Pegu. Tenasserim.

ARACHNOTHERA ASIATICA, L. Arakan. Pegu. Martaban.

A. PECTORALIS, Horsf. Nicobars.

A. FLAMMAXILARIS, Blyth. Southern Tenasserim.

A. ANDAMANICA, Hume. Andamans.

DICEUM CRUMENTATUM, L. Arakan. Pegu. Tenasserim.

D. TRIGONOSTIGMA, Scop. Arakan. Pegu. Tenasserim.

D. CHRYSORRHEUM, Tem. Khasi Hills. Arakan. Tenasserim.

D. OLIVACEUM, Walden. Toung-ngoo. Karen-ni. Andamans.

D. virescens, Hume.

D. ERYTHRORHYNCHA, Latham. Arakan. Tenasserim.

Blyth describes this species as extremely fearless and familiar.

PRIONOCHILUS PERCUSSUS, Tem.	Southern Tenasserim.
Feeds mainly on small berries, and the <i>Loranthus</i> (Davison).	
P. MACULATUS, Tem.	Tenasserim south of Mergui.
P. MODESTUS, Hume.	Tenasserim south of Mergui.
MYZANTHE IGNIPECTUS, Hodg.	Karen-ni at 4000 feet and Mooleyit.

Family Certhiidæ.

The Creepers are divided into two subfamilies, the *Certhiinae* with the bill curved and the tail feathers stiff, and used to assist the birds in climbing trees, etc., and *Sittinae* with straight bills, and which do not use the tail as an aid in climbing.

CERTHIINÆ (Creepers).

CERTHIA DISCOLOR, Blyth.	Karen-ni, at 5000 feet.
Nearly allied to the common European creeper, <i>C. familiaris</i> , but has a longer tail.	

SITTINÆ (Nut-hatches).

SITTA MAGNA, Ramsay.	Karen-ni.
The type was a <i>female</i> , not a <i>male</i> , as originally stated (S.F. vi. p. 201).	
S. NEGLECTA, Walden.	Toung-ngoo. Karen-ni. Pegu Hills.
Specimens from Thayetmyo, shot by Oates, are described by Hume as intermediate in size, between <i>castanocœventris</i> and <i>cinnamomocœventris</i> , but referred to <i>neglecta</i> . Oates describes his birds as common on the hills, but replaced in the plains by the next species.	

DENDROPHILA FRONTALIS, Horsf.	Arakan. Pegu. Tenasserim. Ceylon.
<i>D. corallina</i> , Gray.	Java. Borneo.

Neither Hume nor Walden admit the attempts of Gray to separate *corallina* of Pegu from *frontalis* of Burma. It would be curious to know what Dr. Gray really understood, or supposed that he understood by these geographical expressions.

These birds are described by Davison as very active and rapidly uttering their cry of *Chick-chick-chick* the while. They never descend a tree, as woodpeckers sometimes do, backwards or tail first, but always head first.

Sub-order DENTIROSTRES.

Bill slenderly conical, the beak notched at the end. Food chiefly insects. Jerdon divides the thrush-like birds of this group into *Myiotherinae*, or ground-thrushes, *Merulinae*, or true thrushes, and *Timaliinae*, or babbling thrushes.

MYIOTHERINÆ.

Family Troglodytidæ.

The wrens are not numerous in Burma, and always at about 4000 or more.

PNOEPYGA SQUAMATA, Gould.	Karen-ni at 4000 feet.
P. PUSILLA, Hodg.	Mooleyit.
TURDINULUS ROBERTI, God.-Aust.	Mooleyit, above 5000 feet.
BRACHYPTERYX NIPALENSIS, Hodg.	Mooleyit, above 5000 feet.
B. CRUSALIS, Blyth.	Karen-ni at 5000.
B. DIANA, Less.	Pegu.
MYIOPHONEUS TEMMINCKII, Vigors.	Pegu.
M. EUGENEI, Hume.	Pegu. Toung-ngoo. Pahpoon.

One of these species occurs in Karen-ni, though, as Lord Walden unites both species, it cannot be said which it is. Davison is strongly of opinion the two are distinct, and can be distinguished in the jungle by the colour of the bill alone (S.F. vi. p. 237).

The next family comprises those interesting birds the 'Dippers,' or water ouzels (*Hydrobates*), and the bright-coloured Pittas (*Brachyurus*), or ant-thrushes.

The 'dippers' plunge into the water and run along the bottom, or even fly beneath the surface (as it is said). They form a large nest of grass, with a hole on one side, and lays 5 or 6 white eggs. The genus has not been recorded from Burma, but probably ranges into Arakan.

Family **Brachyuridæ** (Pittidæ).

HYDRORNIS OATESI, Hume. Karen-ni, 2000 to 4000. Tenasserim.
H. Nipalensis, Hodgs. apud Blyth, B.B.

Hume separates the Burmese race from the Indian (S.F. i. p. 477). They are very numerous at the base of Mooleyit, and have a clear full double-whistled note (Davison).

BRACHYURUS CYANEUS, Blyth. Arakan. Martaban. Tenasserim.
 Myai-young.
 B. MOLUCCENSIS, Müll. Arakan. Pegu. Tenasserim.
 B. MEGALHYNCIUS, Schl. Tenasserim. Banka.
 B. CUCULLATUS, Hartl. Nipal. Arakan. Pegu. Tenasserim.
 B. CERULEUS, Raffl. Southern Tenasserim.

The Tenasserim race is larger than the type, and for this race Hume has proposed the name *B. Davisoni*. They are very shy birds, and not at all like the other *Pittas*. Directly they catch sight of you, they rise, and fly low, but rapidly, for a couple of hundred yards, and then disappear in the forest (Davison).

B. GURNEYI, Hume. Southern Tenasserim.

This is a shy species, and when disturbed hops rapidly away to cover, keeping some obstacle intervening between itself and the approaching person. It has a habit of jerking up its tail and trailing its wings slightly as it hops along, which is not observed in its congeners (Davison).—S.F. vi. p. 344.

These bob-tailed thrushes, or *Pittas*, are handsome, but rather leggy and gaudy birds, which feed largely on ants, and have but feeble powers of flight. Jerdon, speaking of the *Pitta Bengalensis* in the Carnatic, describes them as literally blown away from their haunts by the strong winds which usher in the hot weather, at which time they take refuge in huts, out-offices, or any building that will give them shelter, and are thus caught alive in considerable numbers. Oates records a similar mishap which the Pegu *Pittas* (*Moluccensis*) suffer from: "This bird appears by fits and starts. A sharp gale from the south-west in May will bring them in by the dozen, but they disappear again a day or two afterwards" (S.F. vi. p. 107).

ANTHOCINCLA PHAYREI, Blyth. Pegu 'Yoma.' Tenasserim.

This bird is an aberrant, but undoubted member of this family. Its most remarkable feature, besides its unusually sober colouration, is a pair of remarkable aigrettes (so to speak), which project backwards fully an inch behind the occiput. The general colour is a rich brown, but the reddish hue of the lower tail coverts, as well as the habit and build, point to its relationship to this family.

ZOOTHERA MARGINATA, Blyth. Khasi Hills. Arakan. Karen-ni, at 2000. Mooleyit at 5000 feet.

MERULINÆ.

The true thrushes are birds of moderate size and of sombre colours, black or brown, or in some cases blue. They feed on the ground and frequent woods and gardens, preying largely on worms and mollusks. In winter many of them are migratory and gregarious in cold climates.

CYANOCINCLA CYANEA, L. Arakan. Pegu. Karen-ni.
C. solitaria, Müll. Tenasserim. Andamans.

Several species have been discriminated, which seem to have a certain geographical range: *C. longirostris*, Bl., from Kashmir and Afghanistan, identical with the European bird. *C. pandoo*, Tytler, from Western and Southern India; *C. affinis*, Bl., from Sikkim, Bengal and Burma; and *C. Manillensis*, auct., from China and the Philippines. Hume inclines to the view that in *Cyanocincla*, as in *Tora*, whilst the females exhibit little variation, the males differ greatly with locality, whence the *solutaria* of the present bird (S.F. vi. p. 247).

This is an abundant cold weather visitant, and a very tame and familiar bird.

OROCETUS ERYTHROGASTER, Vig.	Karen-ni.
O. CINCLORHYNCHUS, Vig.	Arakan.
GEOCICHLA CITRINA, Lath.	Arakan. Pegu. Tenasserim.
G. ALBOGULARIS, Blyth.	Andamans. Nicobars.
G. INNOTATA, Blyth.	Burma.

Hume considers these last two birds as distinct. They are not improbably local races of *Citrina*.

MONTICOLA SAXATILIS, L.	Upper Burma.
TURBUS OBSCURUS, Gmel.	Khasi Hills. Arakan. Pegu. Java. Tenasserim. Andamans. N.E. Asia.

A cold weather visitant.

T. PALLIDUS, Gmel.	Karen-ni and Mooleyit, at 5000 feet.
<i>T. rufulus</i> , Drap.	Andamans.

A rare cold weather straggler.

T. SIBIRICUS, Pall.	Karen-ni, Mooleyit 2500 to 6000.
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A rare cold weather straggler.

OREOCINCLA MOLLISSIMA, Blyth.	Karen-ni at 5000.
O. DAUMA, Lath.	Karen-ni at 5000 feet. Mooleyit.

A rare cold weather straggler.

O. INFRAMARGINATA, Blyth.	Andamans.
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Family Timaliidæ.

PARADOXORNIS GULARIS, Horsf.	Karen-ni, at 5600 feet.
P. RUFICEPS, Blyth.	Sikkim. Khasi Hills. Arakan.
SUTHORA BRUNNEA, Anderson.	Momien. Yunan.
S. MANIPURENSIS, God.-Aust.	
<i>S. Duflaensis</i> , God.-Aust.	

A species of *Suthora* was noticed at Mooleyit, which Hume thinks may perhaps be this species.

GAMPSORRHYNCHUS RUFULUS, Blyth.	Nipal. Sikkim. Arakan. Karen-ni.
<i>G. torquatus</i> , Hume.	

Torquatus is of course the Burmese race, with trivial variations which have led to its specific separation.

PYCTORIS SINENSIS, Gmel.	Arakan. Pegu. Martaban. Karen-ni.
P. ALBIBROSTRIS, Jerdon.	Thayetmyo.

This species has not been recognized since its discovery by Jerdon. Hume thinks it is identical with the last, to which indeed its describer likened it, whilst noting a difference in the bill and its approach to *Paradoxornis*. In other instances, it may be added, Mr. Hume exhibits an impatience with other men's species, *not* on the intelligible ground, that we have too many shadowy species already, but because (as it would seem) neither he nor Davison have come across them, and they are not in consequence 'hall-marked' in S.F.

TRICHOSTOMA ABBOTTI, Blyth. Arakan. Martaban.

Barely separable from *Brachypteryx sepiaria*. Horsf. = *Myiothera grisea*, Leyden Mus. = *Malacopteron olivaceum*, Strick., in Lord Walden's opinion.

T. MINOR, Hume. Tenasserim.

Drymocataphus fuscus, Walden.

Lord Walden thinks that "if distinct from the Indian species," this is true *Abbotti*. What this means is not clear, as *Abbotti* is the only Indian species of the genus!

T. RUBIGINOSA, Walden. Karen-ni.

ALCIPPE NIPALENSIS, Hodg.

A. Phayrei, Blyth (monente auctore, B.B., p. 115).

A. magnirostris, Walden (vide Hume).

Hume in his list keeps these apart, pointing out certain differences in colour and range, *Nipalensis* representing, as might be anticipated, the Maulmain race; *Phayrei* that occupying the plains.

TURDINUS CRISPIFRONS, Blyth. Limestone Ranges in Martaban and Tenasserim.

These are lively sprightly birds, always peering about the abrupt crags, which form their home, and with lowered wings and erected tail frequently pouring forth a fine and powerful song (Davison).

T. BREVICAUDATUS, Blyth.

Mooleyit at 5000 feet.

T. GUTTATUS, Tickell.

Lower spurs of the main Range of hills in Tenasserim.

SPACHYRIS NIGRICEPS, Hodg.

Arakan. Pegu. Tenasserim.

Tickell records it from forests at 3000 feet.

S. RUFIFRONS, Hume.

Butan. Arakan. Pegu.

S. pracognitus, Swinhoe (?).

Hume thinks that *S. ruficeps*, Blyth, which is inserted by Lord Walden in B. B. from Karen-ni, is really this species.

S. ASSIMILIS, Walden.

Mooleyit, above 5000 feet.

S. CHRYSEA, Hodg.

Arakan.

MIXORNIS RUBRICAPILLUS, Tickell. Pegu. Martaban and Northern Tenasserim.

M. GULARIS, Horsf.

Southern Tenasserim.

These are, it may be presumed, respectively the Northern and Southern races of one species, not improbably differentiated, as they seem, by the unexplored break of 110 miles between Thayetchoung and Mergui (S.F. vi. p. 267).

TIMALIA PILEATA, Horsf.

Nipal. Bengal. Arakan. Pegu.

T. Jerdoni, Walden, ?.

Tenasserim. Malayan Peninsula.

T. Bengalensis, God.-Aust.

Java.

Jerdon describes this species as having the greatest geographical range of any of its family, and as a consequence it was bound to undergo much, at the hands of earnest naturalists, its friends. Of necessity a widely-spread species will display local variations—but why magnify these into species? The practice really recurs *ad nauseam*, and should be abandoned. For some pungent remarks by Mr. Hume on *T. Jerdoni*, see S.F. vi. p. 268.

CYANODERMA ERYTHROPTERA, Blyth.

Southern Tenasserim.

In this species the plumage and size of both sexes are identical. The nest is a ball of reed leaves, with a circular entrance on one side very like that of *My. cornis rubricapillus* and *Dumetia* (S.F. vi. p. 270).

MALACOPTERON MAGNUM, Eyton (apud Hume). Pakehan.

A rare straggler from the south, and has much of the Bulbul in its deportment. (Davison). The males are larger than the female, and there are two allied races, of which the present is the *larger*. Some naturalists, however, bestow this title

on the *smaller* species, and Blyth's *synonym* of it to the larger. Only *magnum* apud Hume, occurs in Tenasserim (S.F. vi. p. 270).

M. CINEREUM, Eyton.

This species is not yet recorded in Tenasserim.

Hume amusingly sums up Eyton's work on these two species. *Magnum* is based on a *female* of the large species, described as a *male*. The *male* of *cinereum* he described as the *female* of *magnum*. Then a *female cinereum* is described as a *male*, but for all this, *mutatis mutandis*, *magnum* and *cinereum* must stand as the names of the two species (S.F. vi. p. 271). This I quote to show the absolute necessity of correctly sexing all birds whereon descriptions are based. Guessing, is highly misleading.

M. FERRUGINOSUM, Blyth.

Neighbourhood of Pakehan.

M. bicolor, Lesson (apud Hume).

Southern Tenasserim.

M. MAGNIROSTRIS, MOORE.

DRYMOCATAPHTUS NIGRICAPITATUS, Eyton.

Malewon.

A rare straggler into Southern Tenasserim, but common in the Malayan Peninsula. Davison says its habits are nearest *Turdinus macroductylus*.

PELLORNEUM TICKELLI, Blyth.

Pegu. Tenasserim.

P. minus, Hume.

Godwin-Austen, Lord Walden, and Hume are all at loggerheads about the correct synonym of this species; but so far as *Tickelli* is concerned, Hume's arguments for its retention are conclusive.

P. SUBOCHRACEUM, Swinhoe.

Pegu. Tenasserim.

P. ruficeps, Swains (apud Blyth).

P. minus, Hume (?).

A lively little bird, which hunts almost entirely on the ground. Its cry is like the words, "pretty dear, pretty dear."

POMATORHINUS PHAYREI, Blyth.

Arakan. Tavoy.

This would seem to be the Burmese race of *P. ferruginosus*, Blyth. Hume, it is true, has doubts if it occurs in Tenasserim, and equally doubts that *ferruginosus* came (as said) from Sikkim; it is not clear therefore whence these unhappy birds really could have come from!

P. ALBIGULARIS, Blyth.

Mooleyit. Tenasserim, at 5000 feet.

P. Mariae, Walden (fide Hume).

Hume rather unkindly remarks of this species *Mariae*, that if it differs from *albigularis*, the "points of difference have been most unfortunately omitted from the description." Score one for the commoner!

P. OCHRACEICEPS, Walden.

Mooleyit and Karen-ni, at 2500 feet.

P. SCHISTICEPS, Hodgs.

Sikkim. Pegu.

P. LEUCOGASTER, Gould.

Karen-ni at 3000. Northern Tenasserim.

Lord Walden considers these two species identical. Hume contends that *schisticeps* is the larger species from Sikkim and Pegu, and *leucogaster* the smaller race from the eastward and south. The probability seems to be that the two are well-differentiated races of the same species.

P. OLIVACEUS, Blyth.

Mooleyit. Central and Southern Tenasserim.

This species replaces the last to the south (S.F. vi. p. 283).

P. NUCHALIS, Tweeddale.

Karen-ni.

A variety Hume thinks of *leucogaster*.

P. ERYTHROGENYS, Vig.

Pahpoon and Thatone.

This species builds a domed nest so cleverly hidden with dead leaves as to almost defy detection. It lays three white eggs according to Hutton.

ORTHORHINUS HYPOLEUCUS, Blyth.

Cachar. Arakan.

O. Tickelli, Hume.

O. Inglisi, Hume.

Those who consider a little more or less colour here or there, or even slight difference of size, constitutes a species, can separate the above birds; but the more natural method is to regard each as a local race of one species, the first described, of course taking precedence.

The next birds are the laughing thrushes, which form so prominent a feature in the Burmese jungle. They are moderate-sized birds, of rather plain plumage, and gregarious, noisy and amusing.

GARRULAX LEUCOLOPHUS, Hardwicke. Arakan.
 G. BELANGERI, Lep. Pegu. Tenasserim.

Davison describes this species as going about in flocks of from 10 to 30, and almost always in company with *G. moniliger* and *Chinensis*, *Cissa speciosa* and sundry drongas, woodpeckers, etc. On the slightest alarm they all fly up into the trees and commence calling vociferously, one taking the lead and the others following in rapid succession. This continues for several minutes, then there is a pause, and absolute silence ensues. Then they start again, then pause, and so on. Once having disturbed them, or roused their suspicions as to one's character and intentions, it is difficult to get rid of them, as they follow one about through the forest, making a most hideous row all the time, and of course disturbing every living thing. Dogs especially seem to attract their notice, and they go on vituperating them from all the surrounding trees even more energetically than they do the sportsman. They have another queer habit. Small parties of them, 3, 4 or 5, will get on to an open space and begin to dance, spreading their tails, lowering their wings and threading in and out among themselves as though dancing a minuet, whilst all the rest of the flock watches the proceedings, with intense interest, from every branch and applauds in the jolliest and heartiest fashion. Their note is a loud laughing chuckle, which they delight in uttering spontaneously on the slightest provocation (S.F. vi. p. 287).

G. STREPTANS, Tickell. Tenasserim Hills and Mooleyit above 3500 feet.

This species resembles the last in voice and habits, but is very shy, and instead of following a stranger about, at once beats a rapid retreat. If the sportsman, however, sits quietly, and sends a dog forward, their curiosity and anger combined will tempt them back into shot range. They will follow the dog back, peering down at him from the trees and jeering at him in an uproarious fashion (Davison).

G. CHINENSIS, Scop. Martaban. Tenasserim.
 G. ALBOGULARIS, Gould. Tavoy, fide Blyth. (Hume never got it.)
 G. MONILIGER, Hodg. Arakan. Tenasserim.

This is common and very like the next species, but smaller and less robust.

G. PECTORALIS, Gould. Arakan. Karen-ni. Tenasserim.

Davison only shot one specimen, so it must be rare to the south. It was shot out of a mixed flock of *Belangeri* and *moniliger*, among which it was conspicuous for its size. Blyth remarks that in Arakan specimens, the pectoral band is sometimes wanting, and the ear coverts are darker. Mr. Hume draws attention to the curious fact that this is as it were a large edition of the last; yet the two races, as we might call them, occupy the same area to a great extent, and without any intermediate connecting links.

TROCHALOPTERON MELANOSTIGMA, Blyth. Karen-ni. Tenasserim Hills.
 Mooleyit, above 3000 feet.

ACTINODURA RAMSAYI, Walden. Karen-ni at 3000 feet.
 SIBIA MELANOLEUCA, Blyth. Mooleyit and Tenasserim Hills above 3000 feet.
 S. PICAOIDES, Hodg. Karen-ni and Tenasserim above 3000 feet.

The three next birds belong to a familiar group called by the natives 'seven brothers,' the family number, or by Europeans 'rat birds,' from their resemblance when running to a rat. Their plumage is untidy and dull-coloured, and their favourite mode of progression is by hopping. They build moderately neat nests and lay four blue eggs.

CRATEROPUS EARLII, Blyth.	Pegu.
C. GULARIS, Blyth.	Pegu.
C. CAUDATUS, Dumeril.	Arakan. Pegu.

The next species is a dweller in grass and reeds. The males have the alaudine trait of soaring and singing, but it is generally regarded as near the 'Chatterers.'

MEGALURUS PALUSTRIS, Horsf.	Pegu. Tenasserim.
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Family Brachypodiidæ.

The short-winged thrushes are made by Jerdon to include the *Pycnonotinæ* or Bulbuls; the *Phyllornithinæ*, or green bulbuls; the *Ireninæ*, or blue birds; and the *Oriolinæ* or Orioles.

PYCNONOTINÆ.

(Bulbuls).

HYPSIPETES PSAROIDES, Vig.	Arakan.
H. CONCOLOR, Blyth.	Northern Tenasserim.
<i>H. Yunnanensis</i> , Anderson.	

Blyth regards the following species as geographical races of this bird: *H. Gaudesa*, Sykes, of South India; *H. nigerrimus*, Gould, of Formosa; and *H. perniger*, Swinhoe, of Hainan. In *H. leucocephalus*, Gmel. (= *Turdus melaleucus*, Gray; *H. niveiceps*, Swinhoe), of China, however, we have the same type, with the coral-red bill, but the black cap replaced by pure white; a remarkable variation, which is repeated among the black-headed and white-headed cinnamon-coloured munia grosbeaks.

H. TICKELLI, Blyth.	Karen-ni. Kyouk-nyat. Pahpoo. Mooleyit, from 2500 to 4000 feet.
H. MACCLELLANDI, Horsf.	Arakan. South China.
H. MALACCENSIS, Blyth.	Tenasserim south of Mergui.
IOLE VIRIDESCENS, Blyth.	Arakan. Toung-ngoo. Tenasserim.
HEMIXUS FLAVULA, Hodg.	Arakan. Tenasserim. Pine Forests on the Salween.
<i>H. Hildebrandi</i> , Hume.	
<i>H. Davisoni</i> , Hume.	

Lord Walden regards this last as a representative race of *flavula*, and Blyth makes the same remark of *H. castaneinotus*, Swinhoe, from Hainan. Hume himself describes his two species as the "Northern and Southern allied races," and such they doubtless are (S.F. vi. p. 299).

ALCURUS STRIATUS, Blyth.	Mooleyit at 5000 and at like elevations elsewhere.
TRACHYCOMUS OCHROCEPHALUS, Gmel.	Southern Tenasserim.
CRINIGER FLAVEOLUS, Gould.	Arakan. Tenasserim.
- <i>C. griseiceps</i> , Hume.	

Hume's bird is a local race, distinguished by the feathers being washed with a cinereous tinge.

C. OCHRACEUS, Moore.	Tenasserim south of Mergui.
C. PILEOCEPHALUS, Hartl.	Tenasserim south of Mergui.
C. TRISTIS, Blyth.	Tenasserim south of Mergui.
TRICHOLESTES CRINIGER, Hay.	Tenasserim south of Mergui.

The next genus embraces the 'Bush bulbuls' of Jerdon.

IXOS FLAVESCENS, Blyth.	Khasi Hills. Arakan. Northern and Central Tenasserim up to 4500 feet.
I. FINLAYSONI, Stiegl.	Arakan. Tenasserim. Siam.
Pok-wā.	

"This," remarks Mason, "is a very common bird in Maulmain, and in the dry season its musical, though little varied notes, are often heard. It is rarely seen at Tavai."

T. BLANFORDI, Jerdon.	Karen Hills. Thayet-myo.
T. ANNECTANS, Walden.	Rangoon.
T. PLUMOSUS, Blyth.	Tenasserim south of Mergui.
T. BRUNNEUS, Blyth.	Tenasserim south of Tavoy.
T. PESILLUS, Salvad.	Tenasserim south of Mergui.
OTOCOMPSA ANALIS, Horsf.	Tenasserim south of Tavoy.
O. MONTICOLA, MacClell.	Khasi Hills. Pegu. Tenasserim.

Blyth remarks: "Probably *O. jocosa*, var. *sinensis*, J. Anderson, from Bhamo. Barely separable from *O. jocosa* of Bengal and Northern India, which again only differs from *O. fuscaudata*, Gould, of South India, by having white spots on its rectrices. Another instance of different local races or subspecies. Mason remarks that this is one of the most common birds in the neighbourhood of Tavoy."

O. EMERIA, L.	Pegu. Andamans. Nicobars, introduced.
The red-whiskered Bulbul.	
IOLE OLIVACEA, Blyth.	Tenasserim.
I. VIRIDESCENS, Blyth.	Toung-ngoo. Tenasserim.
RUBIGULA FLAVIVENTRIS, Tieckell.	Arakan. Pegu. Karen-ni. Tenasserim.

Davison describes this as a sprightly bird, but with very few feathers on the neck, so that it rarely makes a good specimen.

BRACHYPODIUS MELANOCEPHALUS, Gmel.	Arakan. Toung-ngoo. Karen-ni. Tenasserim.
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B. cinereiventris, Blyth.

Lord Walden remarks:—"I have great doubts whether this is a species distinct from *B. melanocephalus*. It seems to be rather a variety, the yellow of the nape and under surface being changed to grey. A Malaccan example in my collection is in a stage of transition from yellow to grey. Where not grey, these examples do not differ from *B. melanocephalus*. Mr. Blyth describes 'the tail-feathers as being less deeply tipped with yellow,' etc., but the rectrices in these two examples are identical with those of Malaccan and Burman specimens of *B. melanocephalus*. In Sumatran *Irus chalcoccephalus* all the yellow plumage of *B. melanocephalus* is changed to grey, the black and metallic parts only remaining the same in the two forms. Whether it be considered as a distinct species or not, *B. cinereiventris* is an interesting example of an 'incipient' species."

For remarks in support of this view, see Hume (S.F. vi. p. 319).

B. FUSCO-FLAVESCENS, Hume.	Andamans.
IXIDIA CYANIVENTRIS, Blyth.	Southern Tenasserim.

A rare straggler from the Malayan Peninsula.

PYCNONOTUS HEMORRHOUS, Gmel.	Arakan. Pegu. Toung-ngoo.
<i>P. pygæus</i> , Hodgs.	
<i>P. nigropileus</i> , Blyth.	
<i>P. intermedius</i> , Hay.	
<i>P. pusillus</i> , Blyth (Madras).	

Lord Walden remarks (B.B. p. 135), "Rangoon examples more properly fall under the *race* named *pygæus*, by Hodg. This appropriate title, which had been adopted by Jerdon, Blyth, and other *accurate* authors, was changed through misprint, or other error, in the Hand List No. 3957, to the inappropriate title of *pygmeus*," which is the larger of the two! Score one for my Lord!

M. ATRICAPILLUS, Vieill.	Karen-ni. Pahpoon. Tenasserim, north of N.L. 13°.
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PHYLLORNITHINÆ.

The plumage of the 'green Bulbuls' (*Hæct-seing*) is grass-green, varied with blue and yellow markings about the head. In some species the wings are blue,

Burma and the rule in Ceylon and peninsular India, whereas breeding males are rarely (as yet recorded) found in Ceylon and peninsular India in *I. typhia* plumage, is one that cannot be disposed of or accounted for by a mere dogmatic assertion that all belong to one species. Cf. Captain Coek (Hume, Nests and Eggs, p. 297)."

IRENINÆ.

I have followed Jerdon in ranking the "fairly Blue-birds" next to the *Orioles*, in place of next to the 'Drongos,' where Gray placed them, from peculiarities of the bill. They are however frugivorous, and their rich glistening blue colour and their full rich notes point to their closer relationship with *Phyllornis* and *Oriolus*.

IRENA PUELLA, Lath. Arakan. Pegu. Tenasserim. Andamans.
I. indica, Hay.

ORIOLINÆ.

ORIOIUS INDICUS, Jerdon. Arakan. Pegu. Tenasserim.
O. indicus, Brisson (*partim*).
O. chinensis, L. apud Hume, S.F. iii. p. 132.
O. diffusus, Sharpe (see S.F. *sup. cit.*).
O. MACROURUS, Blyth. Andamans.
O. FLAVIROSTRIS, Blyth. Arakan. Pegu. Karen-ni. Martaban.
Tenasserim.
O. MELANOCEPHALUS, L. Arakan. Pegu. Karen-ni. Martaban.
Tenasserim. Andamans.
O. XANTHONOTUS, Horsf. Southern Tenasserim.
A rare straggler from the Malayan Peninsula.
O. TRAILLI, Vig. Assam. Arakan. Tenasserim.
Head, neck and wings black, the rest of the plumage red.
O. ANDAMANENSIS, Tytler. Andamans.

The next family is that of the Warblers, comprising a number of small birds which are mainly insectivorous, a few only feeding on fruit.

Family Sylviidæ.

This family is divided by Jerdon into seven groups: *Saricolinæ*, Stone-chats and Wheatears; *Ruticillinæ*, Redstarts and Bush-chats; *Calamoherpinae*, Grass warblers; *Drymoicinae*, Wren warblers; *Phylloscopinae*, Tree warblers; *Sylviinae*, Grey warblers; and *Motacillinæ*, Wagtails and Pipits.

SAXICOLINÆ.

The *Saricolinæ* are solitary birds, with pied plumage, and some of them have an extremely fine song. They are very pugnacious, and nestle in holes of banks, trees or buildings, and lay four pale-bluish eggs with some dark spots.

COPSYCHUS SAULARIS, L. Arakan. Pegu. Tenasserim.
The Dayal of India so often caged both for its song and its fighting propensities. The Andaman race, Hume says, is intermediate between *saularis* and *Maidanensis*.
C. MUSICUS, Raffles. Southern Tenasserim.
CERCOTRICHUS MACRURA, Gmel. Arakan. Pegu. Tenasserim.

This fine songster, the Shāma of India, may be termed the Burmese nightingale, keeping up its song as it does, long after dark.

C. ALBIVENTRIS, Blyth. Andamans.
MYIOMELA LECTURA, Hodg. Mooleyit, above 3500 feet.
PRATICOLA CAPRATA, L. Arakan. Pegu. Tenasserim north of Tavoy.
P. INDICA, Blyth. Arakan. Pegu. Tenasserim. Andamans.

This may be a race of *P. rubicola*, L., but Hume shows "the two are really invariably distinguishable at a glance; the upper tail coverts and lower part of the rump in *Indica* are never *striated*. I have tested this fact in about two hundred specimens" (S.F. vi. p. 334).

P. LECURA, Blyth.

Pegu. Toung-ngoo. Palphoon.

P. FERREA, Hodg.

Arakan. Pegu. Tenasserim. Karen-ni.

RUTICILLINÆ.

RUTICILLA AUREORA, Pall.

Assam. Pegu. Siberia.

A winter visitant.

R. FULGINOSA, Vig.

Arakan. Pegu.

The plumbeous redstart frequents mountain torrents, and may often be seen on a wet slippery rock, just above a boiling rapid. It climbs up the wet rocks with great facility, and every now and then spreads its tail out, but without vibrating it, like some Redstarts. It is a pugnacious bird, and delights to engage and drive off the little *Enicurus Scouleri*, which frequents similar spots (Jerdon).

CHEMORRHORNIS LECOCEPHALA, Vig.

Sikkim. Arakan.

A winter visitant.

LARVIVORA CYANE, Pallas.

Martaban. Tenasserim.

OREICOLA JERDONI, Gould.

Bassein.

Rhodophila melanoleuca, Mull. apud Jerdon.

CALLIOPE KAMSCHATKENSIS, Gmel.

Arakan. Pegu. Karen-ni.

CYANECELA SUECICA, L.

Arakan. Pegu. Tenasserim. Andamans.

C. cærulecula, Pall.

CALAMOHERPINÆ.

ACROCEPHALUS ORIENTALIS, Tem. and Schl.

Southern Tenasserim.

A rare visitant.

A. STENTOREA, Hemp. and Ehren.

Arakan.

A. AGRICOLUS, Jerdon.

Tenasserim. (Kedai galay.)

A rare straggler from Bengal, which it quits to breed in the north.

A. BISTRIGICEPS, Swinhoe.

Tavoy (in a Nipa swamp).

A. DUMETORUM, Blyth.

Arakan.

ARUNDINAX ÆDON, Pall.

Arakan. Tenasserim. Andamans.

LOCUSTELLA LANCEOLATA.

Southern Tenasserim.

A winter visitant.

L. SUBSIGNATA, Hume.

Andamans (Aberdeen).

UROSPHENA SQUAMICEPS, Swinhoe.

Southern Tenasserim.

A winter visitant.

HOREITES PALLIDIPES, Blanford.

Sikkim. Palphoon. Northern Tenasserim.

H. SERICEA, Walden.

Karen-ni Hills.

DRYMOICINÆ.

The tailor birds, *Orthotomus*, are so called from stitching together two or more leaves with thread or fibre, within which shelter it makes a nest of wool or other soft materials, laying 3 or 4 white eggs, spotted with reddish-brown. It will also select the curling over end of a broad zinziberaceous leaf, weaving the ends together, and in this dependent state, the nest is entered from below the leaf, which completely shelters it from sight.

ORTHOTOMUS SUTORIUS, G. R. Forster.

Pegu. Karen-ni. Tenasserim. India.

O. longicaudatus, Gmel.

O. phyllorrhampheus, Swinhoe.

O. EDILA, Tem.

Tavoy. Siam. Java.

A barely distinguishable race from the last (*vide* Walden).

- O. FLAVI-VIRIDIS, Moore. Pegu. Pahpoon.
O. nitidus, Hume.
 O. CORONATUS, Jerdon and Blyth. Sikkim. Mooleyit. Tsankoo hills at 3000 feet.
 O. ATRIGULARIS, Tem. Tenasserim.
 O. RUFICEPS, Less. Southern Tenasserim.
 A rare straggler from the south.
 PRINIA FLAVIVENTRIS, Deless. Arakan. Pegu. Tenasserim.
 P. GRACILIS, Franklin. Pegu.
P. rufescens, Blyth (*vide* Walden). Arakan. Pegu.
 P. BEAVANI, Walden. Karen-ni. Pegu. Tenasserim.
 P. RUFULA, God.-Aust. Salween Valley.
 P. HODGSONI, Blyth. Pegu (*vide* Walden).
 Hume suggests if *rufula* has not been mistaken for this (S.F. vi. p. 348).
 CISTICOLA SCLENICLA, Bonap. Arakan. Pegu. South China. Nicobars.
 C. CURSITANS, Frank. Martaban. Tenasserim.
 SCYA CRINIGERA, Hodg. Pegu.
 S. ERYTHROPLEURA, Walden. Toung-ngoo.
 DRYMOICA BLANFORDI, Wald. Toung-ngoo.
 D. LONGICAUDA, Tickell. Arakan.

PHYLLOSCOPINÆ.

- NEORNIS FLAVOLIVACEA, Hodg. Pegu?
 N. ASSIMILIS, Hodg. Naga Hills. Karen ni.
 PHYLLOPNEUSTE FUSCATA, Blyth. Arakan. Martaban. China. Andamans.
 P. AFFINIS, Tickell. Toung-ngoo.
 P. INDICUS, Jerdon. Toung-ngoo (*vide* Hume).
P. griseolus, Blyth.
 P. BRUNNEUS, Blyth. Arakan.
 P. MAGNIROSTRIS, Blyth. Arakan. Toung-ngoo. China. Andamans.
P. Indicus, Blyth.
P. borealis, Blasius.
 P. VIRIDANUS, Blyth. Arakan. Pahpoon. Maulmain.
P. Schwartzi, Radde.
P. Seebohmi, Hume (?).
 P. LUGUBRIS, Blyth. Pahpoon. Andamans. Great Coco.
 P. BROOKSI, Hume. Pahpoon.
 P. TENELLIPES, Swinhoc. Tenasserim.
 A winter visitant.
 P. PLUMBEITARSUS, Swinhoc. Maulmain.
 REGULOIDES CORONATA, Tem. and Schl. Southern Tenasserim.
 K. TROCHILOIDES, Sund. Darjiling. Pegu. Tenasserim. Pahpoon.
R. viridipennis, Walden.
R. flavo-olivaceus, Hume.
 R. SUPERCHLORUS, Gmel. Arakan. Toung-ngoo. Tenasserim.
 R. PROREGULUS, Pallas. Arakan. Pahpoon.
 R. CROCIBROA, Hodg. Karen-ni at 3000 feet.
 CULICIPETA TEPHROCEPHALUS, Anderson. Upper Burma. Pegu. Tenasserim.

Differs from *C. Burki* in its smaller bill.

In the next genus (*Abornis*) there are two types of colouration, in one, the head is grey, in the other, chestnut.

- ABORNIS SUPERCILIARIS, Tickell. Sikkim. Pegu. Martaban. Karen-ni.
A. flaviventris, Jerdon. Tenasserim.

For an emended description of this bird see S.F. vi. p. 140.

- A. CHRYSÆA, Walden. Karen Hills.

The author of this species is doubtful if it may not be identical with *Reguloides fulviventris*, God.-Aust., founded on a carbolized example in which the green and yellow have been discharged or turned grey. Hume gives a caution on this point in S.F. vi. p. 319: "It is a curious fact, that you can manufacture *cinereiventris* (*Brachypodius*) or the Sumatran *chalcocephalus* or any intermediate form to any extent by the use of a little carbohc acid. When the colour is pure yellow, as at the tips of the tail, the feathers come out *white*, as in these parts in *chalcocephalus*; but wherever the peculiar olivaceous green prevails, there the feathers remain of the exact ash grey, that we find in *cinereiventris* and *chalcocephalus*. The curious yellow green of *melanocephalus* is in fact a combination of ash grey and pure yellow, and whether species or local races, all that has happened in *cinereiventris* and *chalcocephalus* seems to be that, for some reason, the skin has in places (*cinereiventris*) or wholly (*chalcocephalus*) ceased to secrete the yellow pigment."

A. XANTHOSCHISTUS, Hodg.

Nipal. Sikkim. Arakan.

SYLVIIINÆ.

Few of this group of warblers occur in India, and none have as yet been recorded from Burma.

MOTACILLINÆ.

Jerdon divides them into Hill Wagtails, with rounded wings and the tertials not lengthened, the true Wagtails with lengthened tertials and unstreaked plumage, and the Titlarks, with streaked plumage.

Hill Wagtails.

HENICURUS LESCHENAULTI, Vieill.

Lord Walden remarks:—This Javan and Foochow bird is stated by Mr. Hume to have been obtained in the neighbourhood of Pahpoo and at Meeta Myo. If the identification is correct, an interesting fact. It may perhaps be *H. frontalis*.

H. FRONTALIS, Blyth.

Tenasserim south of Mergui.

H. IMMACULATUS, Hodg.

Khasi. Arakan. Pegu. Tenasserim.

Hume doubts if this species ranges so far south as Tenasserim, but it is improbable that Blyth assigned a habitat without cause.

H. SCHISTACEUS, Hodg.

Arakan. Tenasserim. China.

It is less common in Arakan than the last species.

H. GUTTATUS, Gould.

Khasi Hills. Arakan.

H. RUFICAPILLUS, Tem.

Southern Tenasserim.

A straggler from the south, and the rarest species there.

Henicurus is an aberrant group, with affinities to *Hydrobata*. Their plumage is black and white, and they have pale fleshy-white legs.

True Wagtails.

MOTACILLA LUZONENSIS, Scop.

Arakan. Pegu. Tenasserim. Andamans (?).

[Toung-ngoo (*W. R.*). The black-backed, white-faced species, is referred to under the above title. But strictly Sonnerat described the grey backed bird. While Scopoli in his diagnosis, taken from Sonnerat, misquoted the description, and converted the word "grey" into "black." The members of this section of the genus which inhabit Luzon have not hitherto been examined, and it therefore remains quite uncertain from what species Sonnerat described. It is not improbable that he did so from an Indian example of *M. dukhunensis*.]

M. DUKHUNENSIS, Sykes.

Martaban. Karen-ni.

Both the last two species are cold weather visitants only.

M. MELANOPE, Pallas.

Arakan. Pegu. Tenasserim. Andamans.

M. boarula, Tem.

Lord Walden remarks, "Whether or not specifically distinct from *M. sulphurea* of Europe, this bird must take the title of *melanope*, Pallas."

CORYDALLA RICHARDI, Vieill.	Arakan. Karen-ni. Tenasserim.
C. RUFULA, Vieill.	Arakan. Pegu. Tenasserim.
C. MALAYENSIS, Eyton.	Southern Tenasserim.
A rare straggler from the south.	
C. STRIOLATA, Blyth.	Southern Tenasserim.
A rare straggler from the south.	
BUDYTES VIRIDIS, Gmel.	Europe. Asia. Africa. America.
<i>B. cinereocephala</i> , Savi.	
<i>B. neglecta</i> , Jerdon.	
<i>B. flava</i> , Jerdon.	
<i>B. melanocephala</i> , Sykes.	
<i>B. dubius</i> , Hodg.	
<i>B. fulviventris</i> , Hodg.	
<i>B. schisticeps</i> , Hodg.	

So widely spread a species is bound to exhibit numerous geographical variations (races), and we accordingly have (*vide* Brooke) *B. flava* over all the Old World and the northern half of the New. *B. cinereocephala* and *B. melanocephala* over Eastern Europe, India and China.

Hodgson's species are of course Himalayan.

B. CALCARATUS, Hodg.	Pahpoo.
LIMONIDROMUS INDICUS.	Arakan. Pegu. Tenasserim. China. Andamans.

Pipits.

PIPASTES MACULATUS, Hodg.	Arakan. Karen-ni up to 5000 feet. Tenasserim.
P. AGILIS, Sykes.	Pegu.
P. PLUMATUS, Müll.	Pegu.

Lord Walden remarks: "Some eminent ornithologists decline to admit the specific distinction of *A. agilis*, *A. maculatus*, and the common European Tree Pipit. In the II. List, No. 3640, L. S. Müller's title of *plumatus* is adopted for the European bird. But as Linnæus published the twelfth edition of the *Systema* ten years before L. S. Müller bestowed the title cited, it is more in accordance with accepted practice to prefer the Linnæan title."

CORYDALLA RICHARDI, Vieill.	Andamans (Port Blair).
ANTHUS CERVINUS, Pall.	Tenasserim. Andamans. Nicobars.

Family Ampelidæ.

"In this, the last Denti-rostral family, we have an assemblage of birds, considerably varied in their structure and colouration; but as a general rule of brighter and richer plumage than the majority of denti-rostral birds."—Jerdon.

Sub-family LEIOTRICHINÆ.

This sub-family embraces the Blue Thrush-tits (*Cochoinæ*), the Hill-tits (*Leiotrichinæ*), and the Flower-peckers (*Leulinæ*).

COCHOA PURPUREA, Hodg.	Sikkim, 8000. Mooleyit over 5000.
PTERUTHIUS LERALATUS, Tickell.	Mooleyit, Karen-ni at 4000 feet.
P. MELANOTIS, Hodg.	Toung-ngoo (<i>vide</i> Blyth).
P. INTERMEDIUS, Hume.	Mooleyit.

Hume questions if Blyth discriminated *melanotis* from *intermedius*, which is not impossible, if the one is (as is most probable) a mere local race of the other.

In describing *P. (Allotrius) intermedius*, Hume remarks: "I am afraid a great

many of my readers will abuse me heartily for making such a number of new species, differing only in small particulars from already well-known ones. . . . It is a most remarkable fact that the Avifauna of the Central Tenasserim Hills is specialized to a high degree. The question has not been half worked out yet, and still see what a list we already have of Tenasserim local representative forms."

HIMALAYAN.

PALEORNIS SCHISTICEPS.
 PICUS MACEL.
 YUNGIPICUS PYGMEUS.
 GECINUS STRIOLATUS.
 GECINUS GRANTIA.
 MEGALAIMA ASIATICA.
 M. FRANKLINI.
 ARACHNOTHERA MAGNA.
 ÆTHOPYGA SCHERLE (miles).
 Æ. SATURATA.
 SITTA CINNAMOMEIVENTRIS.
 ANTHIPES MONILIGER.
 MYIOPHONUS TEMMINCKI.
 HYDRORNIS NIPALENSIS.
 ALCIPE NIPALENSIS.
 STACHYRIS RUFICEPS.
 S. CHRYSÆA.
 PELLORNEUM NIPALENSIS (Mandellii).
 POMATORHINUS LEUCOGASTER.
 GARRULUS LEUCOLOPHUS.
 TROCHALOPTERON CHRYSOPTERON.
 ACTINODURA EGERTONI.
 SIBIA CAPISTRATA.
 HYPsipETES PSAROIDES.
 H. MACCLELLANDI.
 HEMIXUS FLAVULA.
 CRINIGER FLAVEOLUS.
 ORIOLES INDICUS.
 CRYPTOLOPHIA BURKIL.
 PTERUTHIUS ERYTHROPTERUS.
 ALLOTRIUS MELANOTIS.
 LEOPTILA ANNECTANS.
 SIVA STRIGULA.
 S. CYANUROPTERA.
 MERULA RUFUGULARIS.
 IXULUS RUFIGENIS, Hume.
 GARRULUS BISPECTULARIS.
 UROCISSA OCCIPITALIS.
 CARPOPIAGA INSIGNIS.

TENASSERIM.

P. FINSCI, Hume.
 P. ATRATUS, Blyth.
 Y. CANICAPILLUS, Blyth.
 G. VITTATUS, Vieill.
 G. VIRIDIS, Blyth.
 M. DAVISONI, Hume.
 M. RAMSAYI, Walden.
 A. AURATA, Blyth.
 Æ. CARA, Hume.
 Æ. SANGUINEPECTUS, Walden.
 S. NEGLECTA, Walden.
 A. SUBMONILIGER, Hume.
 M. EUGENI, Hume.
 H. OATESI, Hume.
 A. PHAYREI, Blyth.
 S. RUFIFRONS, Hume.
 S. ASSIMILIS, Walden.
 P. MINOR, Hume.
 P. OLIVACEUS, Blyth.
 G. BELANGERI, Less.
 T. MELANOSTIGMA, Tickell.
 A. RAMSAYI, Walden.
 S. MELANOLEUCA, Tickell.
 H. SUBNIGER, Hume.
 H. TICKELLI, Blyth.
 { H. HILDEBRANDI, Hume.
 { H. DAVISONI, Hume.
 C. GRISEICEPS, Hume.
 O. TENUIROSTRIS, Blyth.
 C. TEPHROCEPHALA, Anderson.
 P. ÆRALATUS, Tickell.
 A. INTERMEDIUS, Hume.
 L. DAVISONI, Hume.
 S. CASTANICAUDA, Hume.
 S. SORDIDA, Hume.
 M. DUBIUS, Hume.
 { I. STRIATUS, Blyth.
 { I. HUMILIS, Hume.
 G. LEUCOTIS, Hume.
 U. MAGNIROSTRIS, Blyth.
 C. GRISEICAPILLA, Walden.

These which now follow are all Himalayan birds, and their Burmese representative races.

HIMALAYAN FORMS.

ASTUR RADIUS.
 CARINE BRAHMA.
 THRIPOXON HODGSONI.
 PITTA CERULEA.
 STURNOPASTOR CONTRA.
 CORVUS IMPUDICUS, Hodg.
 FRANCOLINUS CHINENSIS.

BURMESE RACES.

A. POLIOPSIS, Hume.
 C. PULCHRA, Hume.
 I. CRAUFURDI, J. S. Gray.
 P. DAVISONI, Hume.
 S. SUPERCILIARIS, Blyth.
 C. INSOLENS, Hume.
 F. PHAYREI, Blyth.

- CETIA NIPALENSIS, Hodg. Karen-ni at 6000 feet.
 SCIOPTILA ANNECTANS, Blyth.
L. saturata, Walden.
L. Davisoni, Hume.

Separated by Walden and Hume for its darker colouration, but a mere local race, no doubt of *L. annectans*, Blyth. Davison describes it as climbing about the trees and branches like a 'Nut-hatch' (*Sitta*).

- LEIOTHRIX ARGENTAUROS, Hodg. Khasi Hills. Tenasserim. Karen-ni,
 1500 to 4000 feet.
 L. LUTEA, Scop. Khasi Hills. Arakan. S.W. China.
 SIVA STRIGULA, Hodg. Toung-ngoo (*vide* Walden).
 L. CASTANEICAUDA, Hume. Mooleyit.

Hume supposes that *strigula* has been erroneously determined in place of the present, which is probable, for reasons given with regard to *Pteruthius intermedius*.

- S. CYANUROPTERA, Hodg. Khasi Hills. Tenasserim.
 S. SORDIDA, Hume. Mooleyit.

The above remarks apply, *mutatis mutandis*, to these two species also. A local race is pretty sure to figure as a new species in Mr. Hume's hands.

- MERULA CASTANEICEPS, Hodg. Karen-ni. Mooleyit above 2000 feet.
 M. DUBIA, Hume. Pine forests of Palpoon.
Proparus dubius, Hume.
 M. MANDELLI, God.-Aust. Shillong. Assam.

Godwin-Austen regards these as representative races. Hume dissents. Probability leans to the former view, but "non nostrum tantas."

IXULINÆ.

- IXULUS STRIATUS, Blyth. 10 miles from Mooleyit at 3000.

This species, Hume remarks, was not rediscovered, but Davison obtained a "nearly allied" form.

- I. HUMILIS, Hume (!). Mooleyit, at 6000 feet.

As the type of *striatus* is 'unique,' it is uncertain how far these 'allied' species may be really distinct.

- YUHINA GULARIS, Hodg. Arakan.
 ERPORNIS XANTHOLEUCA, Hodg. Khasi Hills. Arakan. Pegu. Tenasserim.
E. xanthochlora, Hodg. (S.F. iii. p. 142).

This is an aberrant form, which Bonaparte places in the *Pycnonotinæ*. In colouration and bill it is related to *Zosterops*, by its head feathers to *Myzornis*, and it has also some affinity to *Iora* (Jerdon).

- ZOSTEROPS PALPEBROSUS, Tem. Arakan. Pegu. Tenasserim. Nicobars.
 Z. SIAMENSIS, Blyth. Martaban. Mooleyit.
 Z. AUSTENI, Walden. Karen-ni at 2500.
 Z. NICOBARIENSIS, Blyth. Andamans. Nicobars.

Sub-family PARINÆ.

This sub-family embraces the Titmice, a strongly-marked group of small non-migratory birds, some of which exhibit an affinity to the Coriostres in their thick muscular stomach, etc. Their colours are pleasingly blended with blue, green and yellow, and many are crested. They are arboreal and omnivorous, very bold, and will even destroy young or sickly birds. They build in holes of trees or in walls, and a few make pendulous nests. The eggs are white, with red spots.

- ÆGITHALISCEUS ERYTHROCEPHALUS, Vig. Karen-ni, at 3000 feet.
 MACLOPHIUS SPILONOTUS, Blyth. Karen-ni, at 3500.
 M. SUBVIRIDIS, Tickell. Tenasserim, at 3500.

Lord Walden remarks: "This must still continue a doubtful species. It was founded on a single example, shot at an elevation of 3500 feet in the Tenasserim Hills by Col. Tickell. A second individual (much injured) from Tenasserim was identified with it by Mr. Blyth four years later. Both appear to have been examples of *M. spilnotus* in immature plumage."

PARTUS CÆSIUS, Tickell.	Pegu.
A rare straggler in Burma.	
P. COMMIXTUS, Swinhoe.	Karen-ni, at 3000 feet.
MELANOCHLORA SULTANEA, Hodg.	Arakan. Martabau. Tenasserim.
<i>H. flavicristata</i> , Lafresn.	

Family Dicruridæ.

The drongo shrikes or King-crows are birds of black plumage and ten tail feathers only. They are capable of rapid but not sustained flight, and are wholly insectivorous. They build a loose nest, and lay white eggs, spotted with dark red.

DICRURINÆ.

BUCHANGA ATRA, Herm.	Arakan. Pegu. Tenasserim.
B. ANNECTANS, Hodg.	Nipal. Pegu. Tenasserim.
B. BALICASSIUS, L.	Burma. Nicobars.
B. LONGICAUDATA, Hay.	Nipal. Bengal. Pegu. Tenasserim.
<i>B. pyrrhops</i> , Hodg.	
<i>B. intermedia</i> , Blyth (apud Hume nec Sharpe).	
<i>B. Waldeni</i> , Beavan.	
<i>B. himalayensis</i> , Tytler (S.F. vi. 213-215).	
B. LEUCOPHEA, Vieill.	Pegu. Tenasserim. Andamans.
<i>B. Mouhoti</i> , Walden (monente auctore, B.B. p. 130).	
<i>B. intermedia</i> , Blyth (apud Walden nec Hume).	
B. MACROCERCUS, Vieill.	Pegu.
<i>D. Indicus</i> , Hodg.	
<i>D. albirictus</i> , Hodg.	

Hume gives this species from Pegu (S.F. iii. p. 101), but it does not appear in Blyth's list (B.B.).

B. LEUCOGENYS, Wald.	South Tenasserim.
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The King-crow may often be seen hawking for insects of an evening, and generally returning to the same perch after capturing one, and in common with many other birds, hawks, kites, crows, mainahs, etc., they will assemble from all parts, as soon as aware of a swarm of white ants being on the wing. In the forest these insects often rise in winged swarms like a column of smoke; but as soon as they clear the tree tops, the column is broken and disintegrated by the ceaseless dash of birds at the luscious prey, and when too dark for them, their place is taken by bats. They are called King-crows from attacking crows or other birds which approach their nest. Jerdon describes the cry as harsh, but cheerful, and as often maintained during the greater part of a moonlight night, and the earliest harbinger of the coming dawn.

CHAPTIA ÆNEA, Vieill.	Arakan. Tenasserim north of Mergui.
C. MALAYENSIS, Blyth.	Tenasserim south of Tavoy.

From Hume's observations (S.F. vi. p. 218) it would seem that these are respectively Northern and Southern races of one species which meet about Tavoy, where intermediate forms are common.

The genus *Bhringa* is characterized by the base of the bill being shaded by recurved feathers and the outer tail feathers being elongated during the breeding season, with the tip barbed on both sides for over 3 inches, forming a racket-tail. Tail nearly even.

BHRINGA REMIFER, Tem.	Arakan. Pegu. Tenasserim.
B. TECTIROSTRIS, Hodgs.	Sikkim. Pegu.

In *Dissemurus* the frontal plumes curve back over the forehead, forming a fine crest, and the 'racket' feathers of the tail have the inner web narrower than the outer.

DISSEMIURUS PARADISEUS, L.

Arakan. Pegu. Tenasserim.

D. Rangoonensis, Gould.

D. MALABAROIDES, Hodg.

Nipal. Arakan. Pegu.

Oates describes this bird as having a magnificent voice and a song very rich and powerful. Blyth's remarks on this species may here be quoted:

"I provisionally bring together the various races of *Bhimráj* (as they are designated in Bengal), because it appears to me that their differentiation is not yet sufficiently understood; but specimens from different localities differ much in size and in the development of the frontal crest. In some the latter is rudimentary, if it exist at all; while in others it attains a length of $2\frac{1}{2}$ in., the frontal plumes flowing over and beyond the occiput. The ordinary length in Burmese specimens is about $1\frac{1}{2}$ in. In one specimen in the Calcutta Museum, which is believed to have been procured by Helfer, the frontal crest is rudimentary, whilst the racket tail-feathers attain very unusual length, the unwebbed portion of them being much more spirated than I have seen in any other. Again, there is one race, found especially in Tippera, with the frontal crest $2\frac{1}{2}$ in. long, and the closed wing $6\frac{3}{4}$ in. But, with the exception perhaps of this Tippera bird, there would seem to be all possible gradations in different localities, especially as regards the development of the frontal crest. The longest crested (or Tippera form) is styled *Chibia malabaroides* by Mr. Hodgson, and the *Edolius grandis*, Gould, is described to have the crest $1\frac{1}{2}$ in. in length. *E. paradiseus* (*Cuculus paradiseus*, L.) is based on Brisson's *Cuculus cristatus siamensis*, founded on a drawing by Poivre of a Siamese specimen, and should therefore denote the ordinary Tenasserim bird, which is identical with the *Bhimráj* of the Calcutta bird-dealers. As observed in captivity, this species has astonishing powers of mimicry. I had one which imitated the fine song of the Sháma (*Cittocincla macroura*) to perfection; also the crowing of cocks, and every other sound produced by domestic poultry, the cawing of crows, the notes of various other wild birds, the bleating of calves, the cry of a dog being whipped, mewing of cats, etc.; but I do not remember to have heard one sing in the wild state. Mason, however, mentions its loud, flute-like notes, and remarks of one that used to come at sunset every evening, and perch on a bough near his dwelling in Dong-yan; 'there it would sit and pour forth an incessant strain of melody for half an hour at a time.' As seen alive, it presents a very different appearance from the stuffed specimens exhibited in museums, the hackled feathers of the neck showing to advantage. When tamed it is very fearless and familiar, and may be suffered to have its liberty in country places. It preys with avidity on small birds and other animals. But with all its extraordinary faculty of imitating sounds, the *Bhimráj* never attempts to articulate human speech, in which some examples of the hill maina (*Eulabes*) succeed so admirably."

D. AFFINIS, Tytler.

Andamans. Nicobars.

The next genus differs from *Dissemurus* in wanting a crest, and in the outer tail feathers being only slightly lengthened and no portion of the shaft bare.

DISSEMUROIDES DICURIFORMIS, Hume.

Great Coco and Turtle Island.

D. ANDAMANENSIS, Tytler.

Andamans.

In the next genus a crest of hairs rises from the forehead, and falls down over the neck. The tail is forked and the outer tail feathers slightly lengthened and turned up into a sort of scoop.

CHIBIA NOTTENTOTA, L.

Arakan. Pegu. Tenasserim.

This bird goes about in small parties, frequenting cotton trees in blossom for the insects which shelter in the larger calices. Jerdon describes its voice as "changeable and in constant exertion, from a beautiful song, to whistling chattering, and like a rusty wheel, at times resembling the higher strains of the organ, both striking and plaintive."

ARTAMINÆ.

A single species only of the swallow shrikes occurs in Hindostan, though they are more numerous in Australia. Some of the Australian species, says Jerdon, have a remarkable habit of clustering like bees.

ARTAMUS FUSCUS, Vieill. Arakan. Pegu. Tenasserim.

This species, remarks Hume, is a rare straggler in Tenasserim.

A. LEUCORHYNCHUS, L. Andamans.

Family Laniidæ.

The typical shrikes are birds of moderate size, feeding mainly on insects, and even small birds and mammals, which they sometimes impale on thorns.

LANIUS TEPHRONOTUS, Vigors. Arakan. Pegu.

A rare straggler in Pegu and Tenasserim.

L. NIGRICEPS, Frank. Arakan. Toung-ngoo. Pahpoon.

L. CRISTATUS, L. Arakan. Pegu. Tenasserim. Andamans.

L. COLLEROIDES, Less. Pegu. Martaban. Tenasserim.

A cold weather visitant.

L. MAGNIROSTRIS, Less. Southern Tenasserim.

A rare straggler in Tenasserim from the Malayan Peninsula, where it is plentiful.

L. HYPOLEUCOS, Blyth. Pegu.

This, says Oates, is the only common shrike in Pegu.

L. LUCIONENSIS, L. Southern Tenasserim. Andamans.

A rare straggler in Tenasserim, common at Port Blair.

TEPHRODORNIS PELVICA, Hodg. Arakan. Pegu. Tenasserim.

T. PONTICERIANA, Gmel. Pegu.

LALAGE TERAT, Bodd. Nicobars.

HYLOTERPE GRISOLA, Blyth. Andamans.

Hyloterpe philomela, Boie.

Hylocharis occipitalis, Hume.

H. CYANEA, Hume. Tavoy. Mectan.

A rare straggler into Southern Tenasserim, probably from Siam.

HEMIPUS PICATUS, Sykes. Pegu. Toung-ngoo. Pahpoon.

H. CAPITALIS, MacClell. Assam. Naga Hills. Darjiling.

This species is separated by Blyth and Walden, but Hume suggests if it is anything else than the last, of which the males sometimes retain the brown back of *capitalis* in place of the normal black one.

H. OBSCURUS, Horsf. Mergui (where very rare).

CAMPEPHAGINÆ.

VOLVOCIVORA AVENSIS, Blyth. Pegu. Tenasserim.

V. INTERMEDIA, Hume. Tenasserim north of Mergui.

V. NEGLECTA, Hume. Tenasserim south of Mergui.

These two species are the local representatives of each other.

V. SYKESI, Strickland. Upper Pegu.

V. MELANOSCHISTUS, Hodg. Martaban. Tenasserim.

GRAUCALUS MACCI, Less. Arakan. Pegu. Tenasserim.

G. DOBSONI, Ball. Andamans.

The next species to be named are the Red shrikes or *Minivets*. They are lively birds, moving about in small parties, and usually keeping up a continual chirping.

PERICROTES SPECIOSUS, Lath.	Arakan. Tenasserim.
Huet-men-thā ♂. Huet-men-thamie ♀.	
P. BREVIROSTRIS, Vig.	Karen-ni at 3000. Palpooon.
P. ROSIUS, Vieill.	Arakan. Pegu. Palpooon.
P. PEREGRINUS, L.	Arakan. Pegu. Tenasserim. Andamans.
P. ALBIFRONS, Jerdon.	Pegu. Toung-ngoo.
P. ELEGANS, MacClell.	Martaban. Karen-ni. Tenasserim.
P. ANDAMANENSIS, Tytler.	Andamans.
P. IGNEUS, Blyth.	Pakehan. Southern Tenasserim.
P. NEGLECTUS, Hume.	Mooleyit.
P. FLAMMIFER, Hume.	Pakehan.
P. SOLARIS, Blyth.	Mooleyit and Thatone.
P. CINERETS.	Southern Tenasserim.

Family **Muscicapidæ.**

The flycatchers are a group of insectivorous birds of small size, with a wide gape and usually strong rictal bristles, which enable them the more readily to retain winged insects, on which they mainly feed. Their wings are not adapted for long flight, but they can make rapid and powerful sallies after their insect prey.

MYIAGRINÆ.

MUSCIPETA PARADISI, L.	Arakan. Pegu. Tenasserim.
<i>M. affinis</i> , A. Hay.	Andamans. Nicobars.
The paradise Flycatcher.	

The changes of colour in this bird are very striking. In the second year the prevailing line of the body is chestnut, but the nuptial plumage in the third year is white. The head in either case is black. The adult females resemble the males, but want the elongated tail feathers. It is restless and wandering in its habits, and the undulatory movement of its long tail in flying is very peculiar.

The Burmese race is regarded as distinct by Jerdon and Blyth, but Hume, with fuller materials, arrives at an opposite conclusion. The point is, not that extreme examples of either race would not be justly held to constitute distinct species did no intermediate links occur, but that in the presence of numerous intermediate forms, they cannot be held to do so. These intermediate forms not clearly referable to either species, but having relations to both, constitute the umbilical cord which binds a *race* to a *species*. Let natural causes sever this cord, and a new species is thereby produced (S.F. iii. p. 102). Subsequently (S.F. vi. p. 223) Mr. Hume accepts *affinis* as the Burmese species, but adds nothing to detract from the force of the reasons which he previously gave for an opposite conclusion. It of course matters little whether a distinction is treated as specific, or sub-specific (*i.e.* racial), but it is clearly desirable, when we can do so, to restrict the swarms of shadowy species with which zoological literature is afflicted.

PHILENTOMA PYRRHOPTERUM, Tem.	Southern Tenasserim.
P. VELATUM, Tem.	Martaban. Tenasserim.
HYPOTHYMIS AZUREA, Bodd.	Arakan. Pegu. Tenasserim. Nicobars.

Common throughout the country. It is solitary in its habits, and spreads out its tail in a fan, like the species of *Leucocerca* or 'Fantails.' This species is replaced at the Andamans by the next, which is however merely a local race.

<i>H. Tytleri</i> , Beavan.	Andamans.
LEUCOCERCA ALBICOLLIS, Vieill.	Tenasserim Hills, from 2000 to 6000 feet.
L. ALBIFRONTATA, Frank.	Pegu. Tenasserim.
<i>L. aureola</i> , Less.	
L. JAVANICA, Sparrm.	Tenasserim south of Tavoy.
<i>L. infumata</i> , Hume.	

This species affects the maritime region, and is especially fond of *Mangrove* and *Nipa* swamps (Davison).

The 'fantails' are active little birds ever on the move, from branch to branch, snapping up small insects, and rapidly opening and closing the tail, like a fan, and trailing the wings. They make a neat cup-shaped nest in a fork of bamboo, and lay white eggs, spotted with reddish-brown.

CHELIDORHYNX HYPOXANTHA, Blyth.	Nipal. Sikkin. Young-ngoo.
CULICICAPA CEYLONENSIS, Swains.	Pegu. Tenasserim.
<i>Cryptolopha cinerocapilla</i> , Vieill.	

MUSCICAPINÆ.

The birds of this division show a tendency towards the *Saxicolina*, in the spotted plumage of their young, but their habits are more those of *Flycatchers* than *Stonechats*, who rarely capture insects except on the ground.

HEMICHELIDON SIBIRICUS, Gmel.	Arakan. Pegu. Tenasserim.
<i>H. fuliginosa</i> , Hodg.	

There is some doubt as to the correct synonymy of this species, but the Pegu bird is the same as that figured as *fuliginosa* by Hume (Lahore to Yarkand, pl. 4). S.F. ii. p. 220; iii. p. 104; vi. p. 226.

ALBONAX LATIROSTRIS, Rafll.	Arakan. Pegu. Tenasserim. Andamans.
A. FERRUGINEUS, Hodg.	Sikkim. Pegu. South China.
<i>Buteo rufescens</i> , Jerdon.	
STOPAROLA MELANOPS, Vig.	Arakan. Pegu. Tenasserim. Karen-ni, to 5000.

A cold weather visitant in Burma, disappearing after February (Davison).

CYORNIS RUBECULOIDES, Vig.	Arakan. Pegu. Tenasserim.
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This is a species which appears to run into and merge in *C. elegans*, Tem., from Sumatra. Certainly, according to Hume, Tenasserim birds differ slightly in colouration from India, and approach the Sumatra race, and the present seems one of those instances where an increase of our knowledge leads to the union more or less complete of species from widely-separated localities.

C. OLIVACEA, Hume.	Southern Tenasserim.
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Separated from its allies by the proportions of its bill, and the similarity in colouring of the sexes (S.F. v. p. 338).

C. MAGNIROSTRIS, Blyth.	Southern Tenasserim.
C. VIVIDA, Swinh.	Mooleyit.
C. BANYAMAS, Horsf.	Karen-ni.
<i>C. Tickellie</i> , Blyth, <i>apud</i> Walden.	

Lord Walden in B. B. quotes the above Nos. of Jerdon, 305, 306, giving both name and reference incorrectly. I presume, however, it is his opinion that these two species should be united, in which case, of course Blyth's species must give way. Hume includes neither species among Tenasserim birds, and considers the identification of the Karen-ni bird to involve some error. Hume also gives the name incorrectly (*Tickelli*). S.F. vi. p. 229.

NILTAVA SUNDARA, Hodg.	Arakan and Tenasserim.
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Both Blyth and Lord Walden record this bird from Burma, but Hume ventures a suggestion if *Cyornis vivida* was not mistaken for it. The suggestion is improbable, but may be noted.

N. MACGRIGORIE, Barton.	Martaban. Karen-ni at 3000.
N. GRANDIS, Blyth.	Mooleyit.
A. MONILIGER, Hodg.	Arakan. Tenasserim. Karen-ni at 5000.
<i>A. sub-moniliger</i> , Hume.	

The Burmese race has been separated by Hume (S.F. v. p. 105), but its author

describes the one as the representative of the other, and such representative races are best kept united as such without actual specific rank.

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| SIPHIA STROPHIATA, Hodg. | Arakan. Tenasserim. |
| S. ERYTHACA, Blyth and Jerdon. | Pabpoon pine forests. Karen-ni at 4000 feet. |
| ERYTHROSTERNA ALBICILLA, Pall. | Sikkim. Pegu. Martaban. Tenasserim. |
| <i>E. leucura</i> , Gmel. | |
| E. ACORNANS, Hodg. | Martaban and Karen-ni at 2500. |

Blyth and Walden both give this bird a habitation in Burma, while Hume and Brooks (S.F. v. p. 471) seem to question its existence as a separate species.

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|------------------------------|--|
| E. MACCLATA, Tickell. | Mooleyit at 5000. Karen-ni at 3000 feet. |
| <i>E. pusilla</i> , Blyth ♀. | |

CONIROSTRES.

Bill short, stout, conical. Mostly small-sized granivorous birds. Some of them are very sweet singers.

Family **Fringillidæ**.

The finches are divided by Jerdon into the following sub-families: *Ploceinæ* or Weaver birds; *Estreldinæ* or Amadavats or Avadavats (a barbarous attempt to convey the name of the mart, Ahmedabad, whence they were originally imported to Europe); *Passerineæ* or Sparrows; *Emberizinaæ* or Buntings; *Fringillinaæ* or Finches; and *Alaudinaæ* or Larks.

PLOCEINÆ.

- | | |
|-----------------------------|----------------------------|
| PLOCEUS JAVANENSIS, Less. | Pegu. Siam. |
| P. MANYAR, Hopf. | |
| <i>P. striatus</i> , Blyth. | Arakan. Pegu. Siam. |
| P. BENGALENSIS, L. | Pegu. Ava. |
| P. BAYA, Blyth. | Arakan. Pegu. Philippines. |
| P. HYPOXANTHUS, Daud. | Pegu. |

The nest of the *bayas* is a compact retort-shaped structure of interwoven strips of grass, fixed pendant to the fronds of some tall palm or other trees (I can't help it if people will see a pun),¹ or sometimes, as at Rangoon, to the eaves of houses. It is too well known to need description, but one curious point connected with the little dabs of clay fixed on either side of the perch, is the extravagantly foolish reasons which have been assigned by able naturalists to account for their presence. Layard suggests that the birds may clean their bills on them. Burgess that they strengthen the nest, which, considering the nest is so firm a structure as to tax a strong man to rend it asunder, is little less than preposterous; and Jerdon, that it helps to balance the nest, and prevent its being blown about, which seems to me no less extravagant. I would suggest its being the survival of some trait of a remote ancestor, when the habit, indulged in to a greater degree, may have possessed a function and use which the present dab of clay now no longer fulfils. For a full account of the interesting habits of this clever and docile bird reference may be made to Jerdon's 'Birds,' vol. ii. p. 343.

ESTRELDINÆ.

- | | |
|-------------------------|---------------------------|
| MUNIA RUBRINIGRA, Hodg. | Arakan. Pegu. Tenasserim. |
|-------------------------|---------------------------|

Lord Walden remarks: "Bornean specimens are similar to Indian and Burmese, having the black of the abdominal region and lower tail-coverts well developed; but this black is much reduced in quantity, and sometimes nearly obsolete, in examples from Malacca and Sumatra. In the race inhabiting Celebes (*M. brunneiceps*, Walden), the black beneath is well developed, while that on the head and neck is much embrowned. The race with white underparts, having the black abdominal patch and lower tail-coverts (Edwards, pl. 355), has never been observed eastward of the Bay of Bengal, but occurs rarely in Lower Bengal, and prevalently (if not wholly)

¹ The *Borassus* is the 'Tāl' palm of Bengal.

in South India and Ceylon. *M. formosana*, Swinhoe, is yet another of these very slightly differing races, for which names are barely admissible."

- M. PUNCTULATA*, L. Arakan. Pegu. Tenasserim.
M. punctularia, Pearson.
M. subundulata, God.-Aust.
M. superstriata, Hume.

Mr. Blyth, speaking of this Pegu bird, says: "The true Indian race, as distinguished from the kindred *M. niseria*, Tem., which inhabits the Malayan peninsula, and has ash-coloured upper tail coverts," and Mr. Blyth's opinion has some weight. The bird, however, falls into Mr. Hume's clutches and at once receives a name, and if we may credit Lord Wadden, another as well from Godwin-Austin. To this Hume rejoins that *his* bird is smaller, and so the efforts to create species out of local races goes merrily on.

- M. STRIATA*, L. Andamans. Nicobars.
M. non-striata, Hume.
M. semistriata, Hume.

Mr. Hume (S.F. ii. p. 275) at the top of the page (l.c.) says, "I do not separate specifically the Andaman and Nicobar Munias;" but before he gets to the bottom of it, the flesh is too powerful for the spirit, and the above names are proposed for the races inhabiting the Andamans and Nicobars respectively!

- M. ATRICAPILLA* Vieill. Pegu (*vide* Oates).
M. AUCTICAUDA, Hodg. Arakan. Pegu. Tenasserim. Siam.

The white-rumped or common Munia of Tenasserim.

- M. LECOGASTRA*, Blyth. Southern Tenasserim.
M. LUCONOTA, Tem. Arakan.
ESTRELLA AMANDAVA, L. All India. Assam and Burma.
E. FLAVIVENTRIS, Wallace. Karen-ni and between the Salween
and Sittoung Rivers.
E. Burmanica, Hume. Southern Tenasserim.

A winter visitant from the south.

Birds of these last two sub-families have the first primary minute, and lay white eggs. The members of the next sub-family lay spotted eggs, and construct clumsy bulky nests in trees and holes.

PASSERINÆ.

- PASSER INDICUS*, Jerd. and Selb. Akyab and Thayet-myo.
P. FLAVEOLUS, Blyth. Karen-ni. Upper Pegu.
P. assimilis, Wadden. Toung-ngoo.

Hume is inclined to refer this to the last, of which it is probably a race. (S.F. vi. p. 407).

- P. MONTANUS*, L.

The common house Sparrow everywhere to the eastward of the Bay of Bengal, its range extending southward to the Malay countries, and eastward to China and Japan, Formosa, and the Philippines (Blyth).

EMBERIZINÆ.

The Buntings form a considerable group of birds distributed in all parts of the world save Australia. They are terrestrial in their habits, and construct neat cup-shaped nests on the ground or in low bushes, and lay coloured eggs, peculiarly lined and spotted. They are poorly represented in India.

- EMBERIZA FUCATA*, Pall. Toung-ngoo. Thayet-myo.

A winter visitant only.

- E. PUSILLA, Pall. Karen-ni at 5500 feet. Mooleyit.
 E. RUTILA, Pall. Sikkim. Bassein in Pegu. Young-ngoo.
 Karen-ni. Pahpoon.
 A winter visitant only.
 EUSPIZA AUREOLA, Pall. Arakan. Pegu. Tenasserim. Nicobars.
E. flavogularis, Blyth.
Mirafra flavicollis, MacClell. ♀ (*vide* Walden).
 MELOPHUS MELANICTERUS, Gmel. Karen-ni. Martaban.

FRINGILLINÆ.

In the finches the males are usually far more brightly coloured than the females. Their food is chiefly seeds. They build neat nests in trees and bushes, and lay white or coloured eggs spotted, but never 'lined,' like the buntings. They are birds of temperate climes.

- CARPODACUS ERYTHRINUS, Pall. Arakan. Young-ngoo.

ALAUDINÆ.

The larks are birds of robust form and terrestrial habits, but with broad wings fitted to enable them to soar, as is the custom of many species. They feed on grain and insects, dust themselves with sand, like the *Gallinacea*, and lay their eggs on the ground, the eggs being of a dusky or greenish hue, profusely speckled.

The 'Ortolan,' as it is called in India, *Calandrella brachydactyla*, Tem., belongs to this subfamily and visits India in immense flocks, and is then very fat, and Jerdon records bagging (besides those that escaped) twelve dozen birds at Kampte by a right and left shot.

- MIRAFRA AFFINIS, JERDON. Pegu.
M. microptera, Hume.

Considering that Jerdon describes finding this his own species abundantly at Thayet-myo, it seems highly unnecessary to have a second name bestowed on the same bird.

- M. ASSAMICA, MacClell. Arakan.
 ALAUDULA RAYTAL, Blyth. Pegu.
 ALAUDA GULGULA, Franklin. Martaban. Arakan.

This is the 'Sky-lark' of India, and its voice and mode of singing closely resemble that of the European bird.

Family **Sturnidæ.**

This family embraces the Starlings and Mynahs. Some breed in holes of trees or buildings, or in banks, others make large nests in trees, and all lay spotless eggs of a bluish-green, either pale or deep in tint.

STURNINÆ.

- STURNOPASTOR CONTRA, L. Pegu. Tenasserim north of Mergui.
S. superciliaris, Blyth (monente auctore).
 S. NIGRICOLLIS, Paykull. Bhamo. Lower Siam.
 ACRIDOTHERES TRISTIS, L. Arakan. Pegu. Tenasserim.
 A. GINGINIANUS, Lath. Tenasserim.
 A. FUSCUS, Wagl. Arakan. Pegu. Tenasserim.
A. griseus, apud Blyth.

According to Davison, the irides are yellow, whilst the closely affined *A. Mah-rattensis*, Sykes, has them pale blue.

- A. SIAMENSIS, Swinhoe. Karen-ni at 3000.
 Irides pale chocolate.

PASTOR ROSEUS, L.	Andamans.
An occasional visitant (<i>vide</i> Tytler).	
STURNIA MALABARICA.	Arakan. Pegu. Tenasserim.
S. NEMORICOLA, Jerdon.	Pegu. Toung-ngoo.
<i>Tenuchus leucopterus</i> , Hume.	
<i>S. Blythii</i> , Jerdon.	
This species, according to Walden, replaces the last in Upper Pegu.	
S. PAGODARUM, Gmel.	Arakan (rare).
S. ANDAMANENSIS, Tytler.	Andamans. Nicobars.
S. ERYTHROPYGIA, Blyth.	Car Nicobar.
S. BURMANICA, Jerdon.	Toung-ngoo. Karen-ni.
S. STERNINA, Pall.	Martaban. Tenasserim. Andamans. Nicobars.
<i>Pastor dauricus</i> , Gmel.	
A rare cold weather visitant.	
S. SINENSIS, Gmel.	(Said to winter in Pegu.)
SARAGLOSSA SPILOPTERA, Vig.	Toung-ngoo. Karen Hills at 2000 ft.
CALORNIS AFFINIS, Hay.	Tippera. Arakan. Nicobars.
C. CHALYBEUS, Horsf.	Tenasserim.
C. TYTLERI, Hume.	Andamans. Nicobars.

EULABINÆ.

EULABES JAVANENSIS, Osbeck.	Sikkim. Pegu. Tenasserim. Java.
<i>E. intermedia</i> , Hay.	Andamans. Nicobars.
<i>E. Andamanensis</i> , Tytler.	

According to Lord Walden, there are two species or races of Enlabet in Sumatra, specimens from the south-east of the island being identical with those from East Java, whilst specimens from the north-west of Sumatra agree with those from Singapore and Malacca. Hume adds, "But I have reason for supposing that possibly a break in the fauna occurs across Sumatra, just as it does across Tenasserim, between Tavoy and Mergui, and that while many species remain unchanged, throughout the whole length of the island, of others two distinct forms occur, the one to the west and the other to the east, the westward one is such cases being identical with that of the Malayan Peninsula, and the eastern with those of Java and Borneo." Hume describes this species as gradually decreasing in size as you recede from the Straits to Sikkim throughout the length of Tenasserim, Pegu and Arakan, and the decrease in size continues if you double back south across the continental area to Sumbalpur and the tributary Mehals. This remark refers to the birds as a whole, and individual cases excepted. In no other respect do the birds differ save in size, and the dwindling of this Malayan form in the uncongenial area of continental India is a curious and significant fact in the distribution of animals, and testifies to the potency of those unseen and inappreciable laws which regulate the origin and spread of species. The Andaman and Nicobar races are differentiated by trifling but fairly constant proportions of the bill as contrasted with Malayan and Indian examples (S.F. vi. p. 396).

AMPELICEPS CORONATUS, Blyth.	Toung-ngoo. Tenasserim. Cochin-China.
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Family Corvidæ.

Bill strong, entire, rarely notched. Nostrils thickly shaded by stiff incumbent bristles. Feet strong. Birds mostly of large size. Omnivorous.

DENDROCITTINÆ.

DENDROCITTA RUFÆ, Scop.	Arakan. Pegu. Tenasserim north of Mergui.
The common Indian magpie.	

D. HIMALAYENSIS, Blyth. Palphoon. Karen-ni.

D. assimilis, Hume (monente auctore, S.F. vi. p. 386).

D. BAYLEI, Tytler. Andamans.

This handsome magpie is intermediate between *Dendrocitta* and *Crypsirina* (S.F. vi. p. 245).

CRYPsirINA VARIANS, Lath. Pegu. Tenasserim. Java.

C. CUCULLATA, Jerdon. Pegu and Upper Burma.

PLATYSMURUS LEUCOPTERUS, Tem. Tenasserim south of Mergui.

GARRULINÆ.

CISSA SPECTIOSA, Shaw. Assam. Arakan. Pegu. Tenasserim

C. Sinensis, Brisson. north of Mergui.

Blyth describes this species as tame, fearless, and amusing, highly carnivorous, and possessing the shrike-like habit of placing a bit of food between the bars of their cage. Buchanan Hamilton says it can be trained to kill small birds, like a hawk.

C. MAGNIROSTRIS, Blyth. Arakan. Pegu. Tenasserim.

It is questionable if this is more than a local race of the preceding bird, or even if it is distinguished, save by peculiarities which are those of individuals rather than a race.

GARRULUS LEUCOTIS, Hume. Toung-ngoo and Northern Tenasserim.

CORVINÆ.

PLATYLOPHUS ARDESIACUS, Cab. Tenasserim.

CORVUS SPLENDENS, Vieill. Arakan. Pegu and Tenasserim north of Mergui.

C. impudicus, Hodg.

C. insolens, Hume.

The dark or melanoid race, with the grey of the neck replaced by black. The habits of the Indian crow are too well known to require description. Jerdon gives a good description of this bird, and says he has been struck on the head by it for carrying off a young bird which had fallen from the nest. The very same thing happened to myself in Calcutta. I had gone to the assistance of a young bird which had fallen from its nest, but my motives being mistaken, I was attacked by the parents, severely pecked and clawed on my bare head, and, worst of all, served by them as Gulliver was served under the tree by the Yahoos. Fact! After that I abandoned the young bird to its natural guardians, whilst I retired to clean myself.

C. VAILLANTI, Less. Arakan. Pegu. Tenasserim. Andamans.

The Indian raven.

Order COLUMBÆ.

This order is extremely well defined, and a pigeon or dove is seen to be such at a glance. To this order, however, belonged the extinct dodo, which as an aberrant form, and by no means like our ordinary conception of a pigeon, incapable as it was of flight. Pigeons are monogamous and pair for life. They lay two white eggs (*Calenas* one only), and either form a loose nest of sticks in trees, through which the eggs may sometimes be seen, or lay in holes of rocks and buildings.

Family **Treronidæ.**

This family is divided into three sub-families: *Treroninæ*, green pigeons; *Carpophagine*, imperial pigeons; and *Ptilopodinæ*, green doves.

TRERONINÆ.

TRERON NIPALENSIS, Hodg. Arakan. Pegu. Tenasserim.

CROCOPUS PHÆNICOPTERUS, Latham. Pegu. Tenasserim.

C. viridifrons, Blyth.

Blyth remarks that this race is barely separable from *phanicopterus*, save that its colours are purer and more contrasted.

OSMOTRERON PHAYREI, Blyth.	Arakan. Pegu. Tenasserim.
O. BICINCTA, Jerdon.	Arakan. Pegu. Tenasserim.
O. VERNANS, L.	Southern Tenasserim.
O. CHLOROPTERA, Blyth.	Andamans. Nicobars.
O. FULVICOLLIS, Wagl.	Southern Tenasserim.

Hume gives a key to the different species of *Osmotreron*, in S.F. iii. p. 162, and S.F. vi. p. 414, and remarks that the males of the different species differ far more among themselves than the females do.

SPHENOCERCUS SPHENOCERUS, Vig.	Toung-ngoo. Martaban. Palphoon.
S. AMICAUDUS, Hodg.	Toung-ngoo. Palphoon.

CARPOPHAGINÆ.

CARPOPHAGA LENEÆ, L.	Arakan. Pegu. Tenasserim. Andamans.
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The imperial pigeon feeds largely on the wild nutmeg, the envelope of which or 'mace' is digested, and the 'nutmeg' then rejected. The bird always selects the finest and ripest fruit, and the seeds it has swallowed are consequently sought for and used for sowing. The same happens with coffee berries which have been eaten by jackals, and which, after passing through their bowels, are collected, and exported to Europe, where they help to make the 'finest Mocha' (*vide* S.F. ii. p. 261).

C. INSULARIS, Blyth.	Nicobars.
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This is the imperial pigeon of the Nicobars. It is a larger bird than the last, and the green of its plumage is darker and bluer. This *Carpophaga* lays a single egg only, as a rule, and *bicolor* likewise.

C. PALUMBROIDES, Hume.	Andamans. Nicobars.
C. INSIGNIS, Hodg.	Arakan.
C. GRISEICAPILLA, Wald.	Mooleyit and Northern Tenasserim.
C. BICOLOR, Scop.	Mergui Archipelago. Andamans. Nicobars.

Family Columbidae.

This family comprises the Doves and Pigeons. It may be divided into *Palumbinae*, or wood pigeons; *Columbinae*, rock pigeons; *Macropygiinae*, or long-tailed doves; and *Turturinae*, or true doves.

PALUMBINÆ.

ALSOCOMUS PUNICEUS, Tickell.	Arakan. Toung-ngoo. Tenasserim.
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COLUMBINÆ.

COLUMBA LIVIA.	
var. INTERMEDIA, Strickland.	

Blyth describes it as widely distributed in Burma as in India, but Hume doubts its occurring there. It is included by Mason, but he gives no locality.

MACROPYGINÆ.

MACROPYGIA TUSALIA, Hodg.	Mooleyit and Karen-ni.
M. RUFICEPS, Tem.	Mergui (<i>vide</i> Blyth).
M. ASSIMILIS, Hume.	Karen Hills at 3000.
M. RUFIPENNIS, Blyth.	Andamans. Nicobars.

TURTURINÆ.

TURTUR MENA.	Arakan. Tenasserim.
Gyo-peing-tu-mā.	

T. CAMBAIENSIS, Gmel.	Pegu.
T. SURATENSIS, Gmel.	
<i>T. tigrina</i> , Tem.	Arakan. Pegu. Tenasserim. Nicobars.
<i>T. tigrinus</i> , according to Blyth, is hardly more than a race of <i>suratensis</i> .	
T. HUMILIS, Tem.	Toung-ngoo. Tenasserim. Andamans.
<i>T. humilior</i> , Hume.	
T. RISORIUS, L.	Pegu (not common).
T. TRANQUEBARICUS, Hermann.	Arakan.
This species would seem to be replaced to the south by <i>humilis</i> .	
T. STRIATA, L.	Pakchan and Southern Tenasserim.

Family Gouridæ.

The Burmese members of the family of ground doves may be divided into *Phapinæ* or ground doves, and *Calaninæ* or Nicobar ground pigeons.

PHAPINÆ.

CHALCOPHAPS INDICA, L. Arakan. Pegu. Tenasserim. Andamans. Nicobars.

CALENINÆ.

CALENAS NICOBARICUS, L. Andamans. Cocos, and the Mergui Archipelago.

This bird breeds in thousands on Batty Malve, for a description of which, its only known breeding station, see S.F. ii. p. 94.

Order GALLINÆ.

The order of gallinaceous birds embraces not only many showy and eminently beautiful birds, but the most useful to man of the whole class. Two families only are represented within our limits, the *Phasianidæ* and the *Megapodiidæ*.

Family Phasianidæ.

This family embraces the sub-families *Pavoninæ* or Pea-fowl; *Arginæ* or Argus pheasants; *Phasianinæ* or Pheasants; and *Gallinæ* or Poultry.

PAVONINÆ.

PAVO MUTICUS, L. Chittagong. Arakan. Tenasserim.
Oo-doung.

Blyth says this species is replaced in Silhet and Assam by *P. cristatus*, L., and that it is darker coloured and less vividly coloured in Burma than in Java.

Dr. Mason says that the Burmese consider that where there are peacocks, there are tigers, and this I believe is equally believed in India. Doubtless the country adapted for peacocks suits tigers as well. The peacock is also believed to be particularly affected by the presence of a tiger, perhaps from sometimes falling a victim to it, and in some parts of India the method of drawing them within shot, and inducing them to quit their cover, is by having a cardboard representation of a tiger, and coloured like that animal, drawn by a native on wheels through the jungle which peacocks are known to be sheltered in. The cry of the peacock is thought to herald rain, and also when heard at other times is supposed to indicate that a tiger is on foot in the neighbourhood. Lord Walden remarks: "The occurrence of this species in Burma offers a notable instance of the fact that Javan forms, unknown in the Malay peninsula south of Pinang, and in Sumatra and Borneo, reappear in Burma."

ARGINÆ.

ARGUS GIGANTEUS, Tem. Pakchan. Bankasun, and perhaps
as far north as Mergui.

Davison gives an interesting account of these birds in S.F. vi. p. 427. They are solitary birds, even the sexes living usually apart. A remarkable trait in the male is the care he bestows in clearing a patch of ground some six or eight yards square of every leaf or stick, and which serves him as a space wherein to rest during the day, or as a sort of quarter-deck wherein to take exercise, and where the hen occasionally condescends to visit him. The males too are described as not being pugnacious, and as answering each other's calls in a friendly spirit. They are extremely wary birds, and it is next to impossible to approach them so as to get a shot without being discovered; but they are easily trapped, advantage being taken of the bird's care to remove all untidy objects from his hymeneal rink. The hen lays seven or eight eggs, spotted something like those of a turkey.

POLYPLECTRON CHINQUIS, Tem. Silhet. Assam. Tenasserim. Mooleyit.

P. tibetanus, L.

P. lineatum, Hard. ♀.

Doung-kulā.

Confined in Tenasserim, according to Hume, to the easternmost hills, or perhaps their eastern slopes.

P. BICALCARATUM, L.

Mergui (?).

Hume suggests doubts if the skins formerly sent from Mergui, may not have been really brought from the Straits.

PHASIANINÆ.

EUPLOCAMUS LINEATUS, Lath.

Pegu. Martaban. Tenasserim.

Of the species of *Euplocamus* found in Arakan, Blyth remarks that it is *hybrid* between *E. lineatus* and *E. Horsfieldi*, Elliot, of Tippera and Sylhet; but as these are geographically separated from the home of *lineatus*, I suppose the word *hybrid* is used simply to signify an intermediate race, uniting the two dissimilar races to the North and South respectively.

E. ANDERSONI, Elliot.

Yunan.

This species would seem to be, according to Blyth, an interrelated race (hybrid so to speak) between *lineatus* and the well-known silver pheasant, *E. argentatus*, Swainson.

E. CRAWFURDI, Gray.

Northern Tenasserim.

E. VIEILLOTI, Gray.

Malewōn. Bankasun. The Tenasserim Valley.

E. ignitus, Lath. (*fide* Hume).

THAUMALEA AMHERSTIÆ, Gould.

Yunan.

GALLINÆ.

GALLUS FERRUGINEUS, Gmel.

Arakan. Pegu. Tenasserim.

Jungle fowl. 'Tor-kyet.'

The Malayan Peninsula.

Very numerous throughout Burma, but does not ascend the higher ranges. Mr. Davison once counted near Pahnpoon a covey of thirty birds all seated on one enormous bent bamboo.

ROLLULINÆ.

ROLLULUS ROLLULUS, Scop.

Tenasserim. Siam. Malayan

R. cristatus, Gmel.

Peninsula. Sumatra. Borneo.

The crowned partridge of Malacca, which extends to Mergui, is (says Jerdon) remarkable for wanting the claw of the hind toe. The crest is similar to that of the crowned pigeon (*Goura*), and its affinities are rather with the *Gallinæ* than the *Perdicinæ*.

Family **Tetraonidæ.**

This family embraces the *Tetraonine*, Grouse (of which there are no representatives in India or Burma); *Perdicine* or Partridges; and *Coturnicine* or Quails.

PERDICINE.

FRANCOLINUS CHINENSIS, Osb. Pegu.
F. Phayrei, Blyth.

F. Phayrei is the Burmese race of *F. Chinensis*, differing only in being less robust.

ARBORICOLA RUFUGULARIS, Blyth. Mooleyit.
 A. INTERMEDIA, Blyth. Arakan.
 A. BRUNNEO-PECTUS, Tickell. Toung-ngoo and Karen Hills over 3000 feet.
 A. CHLOROPUS, Tickell. Pegu. Tenasserim.
 A. CHARLTONI, Blyth. Southern Tenasserim.

This is a Pinang species, and Hume doubts its occurrence in Tenasserim, but mentions its having been recorded there.

CALOPERDIX OCULEA, Tem. Mergui. Prov. Wellesley.
C. ocellata, Raffles.
 BAMBUSICOLA FYTCHII, J. Anderson. Pensee, at 3000 feet.

COTURNICINE.

COTURNIX COMMUNIS, Bonaterre. Arakan. Martaban. Karen-ii.
 C. COROMANDELICUS. Upper Burma.
 EXALFACTORIA CHINENSIS, Bonaparte. Arakan. Tenasserim.

Family **Tinamidæ.**

TURNICINE.

TURNIX MACULOSA, Tem. Tippera. Pegu. Tenasserim.
T. Blanfordi, Blyth.

T. Blanfordi is probably a sufficiently marked local race, but neither Hume nor Walden (doubtless with more copious materials than Blyth possessed) recognize it as a distinct species. It is the same thing over and over again. A typical specimen of a local race of some species comes to hand, and at once receives a specific name on the strength of the racial or geographical variation it presents. Fuller knowledge shows that the so-called *species* is indissolubly linked to some older species, though diverging in some particulars, and covering, so to say, its non-appropriate area. "Natura non facit saltum."

T. PLUMBIPES, Hodg. Nipal. Assam. Arakan. Pegu. Tenasserim.
 The Malayan Peninsula.

Hume remarks, "There appear to be two distinguishable species of the *pugnax* type of Bustard quail occurring within the limits of the British Indian Empire. The one inhabiting the Malay Peninsula, Burma, Eastern Bengal and the Himalayas as far West as any rate as Nipal, and the other inhabiting the rest of India proper.

"The former is clearly *plumbipes* of Hodgson, the other *taigoor* of Sykes. The exact limits are as yet to a certain extent undefined. I have received both species from Cachar, and both from the dry upper portions of Burma and Thayet-myo." S.F. vi. p. 451.

T. PUGNAX, Tem. Pegu.

Hume unites *taigoor*, Sykes, with this species; but Jerdon keeps them apart. Doubtless they are representative races.

T. JOUDERA, Hodg. Andamans. Nicobars (Camorta).
T. albiventris, Hume.

CHARADRIIDÆ.

SQUATAROLA HELVETICA. Arakan. Amherst. Toung-ngoo. Andamans.
A rare straggler.

CHARADRIUS FULVUS, Gmel. Arakan. Pegu. Tenasserim.
C. longipes, Tem. Andamans. Nicobars.
C. virginicus, apud Blyth.
C. pluvialis, apud Sykes.
C. orientalis, Schl.

EUDROMIAS VEREDUS, Gould. Andamans.

A single specimen only was obtained by Dr. Dobson in 1872. A description is given in S.F. i. p. 84.

ÆGIALITIS GEOFFROYI, Wagl. Thatone Creek. Amherst. Andamans. Nicobars.

A rare winter visitant.

Æ. MONGOLICA, Pall. Arakan. Pegu. Tenasserim.

Æ. EURONICUS, Gmel. Pegu.

Æ. Philippensis, Scop.

Æ. ALEXANDRINA, L. Arakan. Toung-ngoo.

Æ. CANTIANA, Lath. Tenasserim.

A winter visitant.

Æ. FLUVIATILIS, Beek. Andamans.

Æ. MINUTA, Pall. Pegu. Tenasserim.

Æ. FLACIDA, Gray. Pegu (?).

Æ. DUBIA, Scop.

Smaller than the European *Æ. euronicus*, but otherwise similar, and of common occurrence.

Lord Walden remarks, "*Æ. philippensis*, apud Jerd., No. 849, and which is the number in Mr. Blyth's MS., is = *C. euronicus*, Gm. But perhaps the species actually intended by Mr. Blyth is *Æ. minuta* (Pallas), apud Jerdon, No. 850, and of which Lieutenant W. Ramsay obtained specimens at Tonghoo. The title *C. philippensis*, Lath., was founded on the same plate as that of *C. dubius*, Scopoli. Until the species which inhabits the island of Luzon has been studied, the correct titles for the two species cannot be determined. The synonymy is very simple, but the correct application of the various titles cannot be made until the Philippine type has been compared."

VANELLINÆ.

The Lapwings are a well-marked subfamily. Some are crested. A few have the wings 'spurred,' and some have wattles of skin at the base of the bill.

CHETTUSIA CINEREA, Blyth. Pegu. Toung-ngoo. Tenasserim.

C. inornata, Schl.

LOBIVANELLUS GOENSIS, Gmel. Arakan. Pegu. Tenasserim.

L. atronuchalis, Blyth.

The Burmese race has been separated as *atronuchalis*.

HOPLOPTERUS VENTRALIS, Cuv. Pegu. Arakan. Tenasserim.

The wing is armed with a horny spur. There is no hind toe.

SARCIOPHORUS MALABARICUS, Bodd. Pegu.

S. bilobus, Gmel.

Family Hæmatopodiidæ.

The sea plovers embrace three subfamilies. Turnstones, oyster eaters, and crab-plovers. They all frequent the sea-shore, and feed on *crustacea* and shell-fish.

STREPSILINÆ.

STREPSILAS INTERPRES, L. Arakan. Prepara. Coeos. Andamans.
Nicobars.

This species has been found by Jerdon in the Dekkan, 200 miles from the sea, frequenting a large tank.

HEMATOPODINÆ.

HEMATOPUS OSTRALEGUS, L. Arakan.

DROMADINÆ.

DROMAS ARDEOLA, Paykull. Arakan. Andamans.

This bird, strange to say (since its apparent affinities are with *Ædicnemus*), lays one large white egg at the end of a burrow from two to four feet in length (S.F. viii. p. 381), after the fashion of the Puffin. This remarkable fact was first discovered by Von Hueglin, and subsequently corroborated by Capt. E. A. Butler. The egg measures 2.54×1.77 inches. The bird weighs only one pound, whilst *Æsacus magnirostris*, which weighs 2 lbs. 4oz., lays an egg of precisely the same size.

Family Gruidæ.

The Cranes are more nearly allied to the Plovers than to Herons and Storks. They feed much on grain, lay two spotted eggs on the ground, and have a fine trumpet-like call. Many are migratory and highly gregarious.

GRUS ANTIGONE. Arakan. Pegu and Martaban.

Kyo-gyā.

G. LONGIROSTRIS, Tem.

The common crane is recorded by Mason, and was observed by Mr. Swinhoe in Hainan (Blyth).

The last species is resident; the present a rare straggler.

Family Scolopacidæ.

The snipes and sandpipers, says Jerdon, "form a continued series graduating into each other, with various modifications of the bill as to length, strength, hardness, and form." The bill is short in the Stints (*Tringina*), curved in the Curlews (*Numeniina*), upturned in the Godwits (*Limosina*), soft in the Snipes (*Scolopacina*), and moderately hard in the Sandpipers (*Totantina*). They all lay four greenish or brownish eggs, brown or black spotted. The most typical of the family are the Snipes.

SCOLOPACINÆ.

GALLINAGO NEMORICOLA, Hodg. Southern Tenasserim.

A single specimen was flushed by Davison near Malewōn.

G. STENURA, Kuhl. Arakan. Pegu. Tenasserim. Andamans.
G. *Horsfieldii*, Gray. Nicobars.

The most common snipe of the Indo-Chinese and Malayan countries (Blyth). Hume says the majority migrate, but a few remain the whole year.

G. GALINULA, L. Pegu, where rare.

G. SCOLOPACINA, Bonap. Upper Burma. Pegu. Toung-ngoo.
Andamans.

SCOLOPAX RUSTICOLA, L. Pegu Tenasserim, where rare.

RHYNCHLEA BENGALENSIS, L. Arakan. Pegu. Tenasserim.

The painted snipe has been obtained near Rangoon, but it is rare.

NUMENINÆ.

The Curlews have long curved bills and are wary birds. They are good eating, especially the 'whimbrel.'

NUMENIUS ARQUATA, L. Arakan. Pegu.
The 'curlew.'

N. LINEATUS, Cuv. Common along the coast. Andamans.
N. PILEOPUS, L. Arakan. Pegu. Tenasserim. Andamans. Nicobars.
The 'whimbrel.'

N. tenuirostris is stated by Jerdon also to occur in Burma.

LIMOSINÆ.

LIMOSA LEOCEPHALA, L. Arakan. Maulmain.
A rare straggler.

TEREKIA CINEREA, Guld. Arakan. Pegu. Tenasserim. Andamans.
The Avocet sandpiper, so called from its recurved bill.

TRINGINÆ.

TRINGA DAMACENSIS, Horsf. Arakan. Pegu. Tenasserim.
T. MINUTA, Leisler. Arakan. Pegu. Tenasserim.
T. damacensis, apud Blyth. Andamans. Nicobars.

These two species would seem to have been confounded together. Hume says, "The two main points of distinction are these. In *minuta* the shafts of the primaries are mostly white, in *damacensis*, as in *Temminckii*, with the exception of that of the first primary, the rest of the shafts are brown. The second distinction consists in the much greater length of the middle toe." This remark holds good even with the larger race of *minuta* var. *altescens*, though on the whole *damacensis* Mr. Hume regards as somewhat the smaller bird (S.F. i. p. 884).

T. TEMMINCKII, Leisler. Arakan. Pegu. Tenasserim.
T. RUFICOLLIS, Pallas. Tenasserim.
T. subminuta, Midd.
T. SUBARQUATA, Guld. Arakan. Tenasserim. Andamans. Nicobars.
T. PLATYRHYNCHIA, Tem. Arakan. Andamans (rare).
EURYNORHYNCHUS PYGMÆUS, L. Arakan and Tenasserim, in
E. griseus, apud Jerdon. estuaries and mud banks left
by the tide.
MACHÆTES PUGNAX, L. Arakan. Pegu.

TOTANINÆ.

ACTITIS GLAREOLA, L. Arakan. Pegu. Tenasserim. Andamans.
A. OCHROPUS, L. Arakan. Pegu. Tenasserim.
A. HYPOLEUCUS, L. Arakan. Pegu. Tenasserim.
Andamans. Nicobars.

A few of these must remain in the country, as Oates has shot one on August 14th.

TOTANUS GLOTIS, L. Arakan. Pegu. Tenasserim.

This 'greenshank' is excellent eating. It arrives in September and leaves in April.

T. STAGNATILIS, Bechs. Arakan. Pegu. Tenasserim.
T. HAUGHTONI, Armstrong. Amherst.
T. CANESCENS, Gmel. Pegu (*vide* Oates). Nicobars.

A rare straggler.
The next two species have red legs.

T. CALIBRIS, L. Arakan. Pegu. Tenasserim. Andamans.
T. FUSCUS, L. Arakan. Pegu. Tenasserim.

Family Himantopodidæ.

The 'Stiltshanks' differ from the Snipes in their slender bills, very long legs, and mode of colouring. They fly with a peculiar tern-like call, and are said to swim well. The hind toe wanting.

HIMANTOPUS CANDIDUS, Bonaterre. Arakan. Pegu. Tenasserim.
H. intermedius, Blyth.

It is rather doubtful if there is really more than one species throughout Europe and Asia.

Family Parridæ.

Feet enormous, claws long. Females larger than the males, a fact which militates against their association with the plovers.

PARRA INDICA, Lath. Arakan. Pegu. Tenasserim.

Oates describes this bird as stupidly tame, and making itself a nuisance by getting in the way of the duck shooter. It lays several olive-brown eggs, very handsomely lined with black.

HYDROPHASIANUS CHIRURGUS, Scop. Arakan, and rarely in Pegu and Tenasserim.

The eggs of this handsome bird are pyriform and of a spotless bronze-brown or green.

Family Rallidæ.

Bill unciform. Legs stout, feet large. Tail short or wanting.

GALLINULINÆ.

The 'water-hens' have the base of the bill prolonged into a thick horny casque covering the forehead. Many of them are extremely finely coloured. They all lay spotted eggs.

PORPHYRIO POLIOCEPHALUS, Lath. Arakan. Pegu. Tenasserim.
 PODICA PERSONATA, Gray. Cachar. Pegu. Tenasserim.

"These very rare birds in Tenasserim," remarks Col. Tickell, "are met with in shady deep narrow streams in forests, whether in the tideway or remotely inland. They swim rapidly, but seldom dive; and although eminently aquatic in conformation, resort, strange to say, for safety to land. Scrambling up the steep banks when shot at, and running with unexpected rapidity into dense thickets, its flight is like that of the Coot, or Water-hen, squatting along the surface of the water."

GALLICREX CINERFUS, Gmel. Arakan. Tenasserim. Andamans.
G. cristatus, Lath.
 FULICA ATRA, L. Arakan.
 GALLINULA CHLOROPUS, L. Arakan. Pegu.
 G. PILENICURA, Pennant. Arakan. Pegu. Tenasserim. Andamans. Nicobars.

RALLINÆ.

The Rails are smaller than the Gallinules and less social, and keep much to swamps and dense herbage, through which their narrow compressed body enables them to thread their way. They swim well, but fly badly.

PORZANA MARUETTA, Brisson. Arakan.
 P. PYGMEA, Naumann. Arakan. Andamans.
 P. FUSCA, L. Pegu.

Hume says this must be rare in Tenasserim.

- P. BAILLONI, Vieill. Tavoy.
 P. CEYLONICA, Gmel. Pegu.
P. amauroptera, Blyth ♀.
 EURYZONA CANNINGI, Tytler. 'Bamboo flat,' Mt. Harriet, Andamans.
 Very rare, or so shy, that only some four specimens have been shot.
 RALLUS STRIATUS, L. Arakan. Pegu. Tenasserim.
 R. INDICTS, Blyth. Arakan.
 RALLINA FASCIATA, Raffl. Pegu. Tenasserim (where rare).
 HYPOTENIDIA STRIATA, L. Pegu. Tenasserim. Andamans.
 The Andaman race is darker coloured and larger than the Indian.

Family Ciconiidæ.

The Storks have the bill large and stout. They are large birds, more bulky than the Herons, and have a web between the inner and middle toes. Some species are migratory and gregarious, and they all lay two to four white eggs without spots.

- LEPTOPTILOUS ARGALA, L. Arakan. Pegu. Tenasserim.

The adjutant quits Bengal in the cold weather for Burma, where it breeds; the scarped and almost inaccessible limestone rocks near Maulmain being one of its favourite haunts. The gular pouch, which is so prominent a feature in this bird, is a mere vascular sac, and has no connexion with the oesophagus. At the same time it will swallow very large morsels, and what more natural than for the non-scientific observer to *suppose* these go into its pouch. I have myself a strong impression that I once saw one swallow a small dead cat, and I think Col. Tickell told me that one he once shot disgorged in his presence the head of a child, which, like the cat, may have been a small one!

- I. JAVANICA, Horsfield. Arakan. Pegu. Tenasserim.
 MYCTERIA ASIATICA, Lath. Arakan. Pegu. Tenasserim.

Hume says the black-necked stork is confined in Tenasserim to the extreme north.

- CICONIA EPISCOPUS, Bodd. Arakan. Pegu. Tenasserim.

A winter visitant.

- C. ALBA, Belon (recorded by Mason from Burma).

Family Ardeidæ.

Bill sharp and deeply cleft. Outer toe only joined by a web to the middle one. The middle toe with the inner edge of the nail dilated and pectinated. Their food is wholly animal and mainly fish. The herons are mostly solitary birds when feeding, but roost in company, and multitudes assemble and construct their nests in company on the same tree or trees, forming what are called heronries. They all lay five or six pale green eggs.

- ARDEA CINERA, L. Arakan. Pegu. Tenasserim.
 A. SUMATRANA, Raffles. Arakan. Tenasserim.
A. typhon, Tem.
 A. PURPUREA. Arakan. Pegu. Tenasserim. Andamans. Nicobars.
 HERODIAS ALBA, L. Arakan.

Great confusion has arisen from writers (Bonaparte, Schlegel, etc.) ignoring the fact that the colour of the bill is seasonal, the adult in the breeding season having it black, and at other times yellow.

- H. INTERMEDIA, Wagler. Pegu. Blamo. Andamans.
 H. GARZETTA, L. Pegu. Andamans. Nicobars.
 H. EULOPHOTES, Swinhoc. Pegu. Tenasserim.
 H. CONCOLOR, Blyth. Arakan. Andamans. Nicobars.
 H. MELANOPUS, Wagler. Thayet-myo.

Capt. Fielden thus identified a heron which bred abundantly in Thayet-myo. Hume says it is certainly not *garzetta*, and is perhaps neither *melanopus* nor *coromandus* (S.F. iii. p. 190).

DEMIGRETTA SACRA, Gmel. Tenasserim Coast. Andamans. Nicobars.
BUPHUS COROMANDUS, Bodd. Arakan. Andamans.

The 'cattle heron,' is so called from being frequently seen in attendance on cattle, following them to pick up grasshoppers or insects disturbed by them in grazing.

ARDEOLA GRAYI, Sykes. Arakan. Pegu. Tenasserim. Andamans.
A. leucoptera, Bodd.

The common paddy bird, the tamest and most familiar bird of its family.

A. PRASINOCELIS, Swinhoe. Southern Tenasserim.
BUTORIDES JAVANICA, Horsf. Arakan. Pegu. Tenasserim. Andamans.
Nicobars.

ARDELLA FLAVICOLLIS, Lath. Arakan. Pegu. Tenasserim.
A. CINNAMOMEA, Gmel. Arakan. Pegu. Tenasserim. Nicobars.
A. SINENSIS, Gmel. Arakan. Pegu. Tenasserim.
Andamans. Nicobars.

GORSUCHIUS MELANOLOPHUS, Raffles. Ramri. Malewōn. Nicobars.
NYCTICORAX GRISEUS, L. Arakan. Pegu. Tenasserim. Nicobars.

Family Tantalidæ.

This family is divided into *Tantalina* or Wood Ibises; *Platalvina* or Spoonbills; *Anastomatina* or Shell-eaters; and *Ibisina* or Ibises.

TANTALINÆ.

The Wood Ibises are largish birds, with shorter legs than the herons and longer and more obtuse bills. They build in trees, often in communities, and lay white eggs usually spotted or blotched with red or brown.

TANTALUS LEUCOCEPHALUS, Gmel. Pegu. Tenasserim.

ANASTOMINÆ.

Bill thick and solid, gaping in the middle. This space between the upper and lower jaws exists in the young, and is not the result of attrition by the shells the bird devours, as might be supposed. It must be viewed as the survival of an ancestral character, doubtless of use to some remote progenitor, but which has ceased to be so amidst modern surroundings.

ANASTOMUS OSCITANS, Lath. Pegu. Tenasserim.
Khe-u-tsok.

IBISINÆ.

IBIS MELANOCEPHALUS, L. Arakan. Tenasserim.

Kalā gouk. The white Ibis.

GERONTICUS PAPILLOSUS, Tem. Arakan.
GRAPTOCEPHALUS DAVISONI, Hume. Southern Tenasserim.
FALCINELLUS IGNEUS, Gmel. Arakan. Pegu (world wide).

This Ibis was sacred in Egypt, and on its death was embalmed.

Platalca leucorodia, L., is included in the list of birds in the earlier edition of Dr. Mason's work, but neither Blyth, Hume, nor other collectors have met with it.

Order ANSERES.

This order embraces all the *Anatidæ* or Lamellirotres, together with the Loons, Grebes, Gulls, Petrels, Cormorants and Pelicans, together with the Auks and Penguins of high latitudes. The order is subdivided into those birds whose young feed themselves (*Autotrophous*), and those whose young require to be fed by their parents (*Heterotrophous*).

a. *Young autotrophous.*

Family **Anseridæ.**

The birds of this family all lay unspotted eggs of some shade of green or pale brown.

PLECTROPTERINÆ.

The spurred geese are so called from being usually provided with one or more spurs on the shoulder, and a bill with a boss or protuberance at its base. The legs are usually long, but the Muscovy duck is an aberrant form with unusually short legs.

SARKIDIORNIS MELANOTIS, Pennant. Arakan. Pegu.
Tor-wôn-bai.

NETTAPODINÆ.

NETTAPUS COROMANDELIANUS, Gmel. Arakan. Pegu. Tenasserim.

The 'cotton teal' is remarkable for its habit of breeding in trees, often at some distance from water, and there seems no doubt that the newly-hatched young are conveyed by the parent birds in their mouth to the nearest water. Tiekell mentions this bird as making its nest on a palm tree. The 'golden eye' (*Fuligula cristata*) is another teal which also breeds in trees, strange as such a habit seems in such a bird.

TADORNINÆ.

The shieldrakes and whistling teal are, according to Jerdon, intermediate between the geese and ducks. They have the wing spot of the latter, but the voice and the plumage alike in both sexes, as the former.

DENDROCYGNA AUREÆ, Sykes. Arakan. Pegu. Tenasserim. Nicobars.

This species breeds on the ground, but occasionally in trees like the last, according to Jerdon.

D. FULVA, Gmel. Pegu.
D. major, Jerdon.

CASARCA RUTILA, Pallas. Arakan. Pegu. Tenasserim.

The ruddy shieldrake or Braminy duck.
This is a winter visitant, which breeds in Thibet.

C. LEUCOPTERA, Blyth. Rare in Tenasserim, according to Hume.

Inhabits the valleys of the great rivers, from the Megna, at least to the Tenasserim. The *Anas scutulata*, S. Müller, seems to be a domesticated, if not hybrid, variety of this species, and the examples of it in the British and Leyden Museums have much intermixture of white in the plumage.

Family **Anatidæ.**

The Ducks differ from the Geese by having a broader and more depressed bill, and with the laminae more developed. The sexes too differ greatly in colour, the male being conspicuously handsomer. There are two subfamilies, the Ducks and the Pochards.

ANATINÆ.

ANAS PÆCILORHYNCHA, Pennant. Arakan. Bhamo. Tenasserim.

Hume did not procure this bird, and on that ground doubts its occurrence. As Blyth records it from Tenasserim, he was probably more fortunate. A positive record of a male like Blyth is not to be set aside simply because another man has not personally been able to verify it.

A. CARYOPHYLLACEA, Lath. Arakan. Bhamo.
A. STREPERA, L. Arakan.

The Gadwall is one of the best ducks for the table.

DAFILA ACUTA, L.	Arakan.
The Pintail is also excellent eating.	
QUERQUEDULA CRIECA L.	Arakan. Bhamo.
Q. CIRCA, L.	Arakan. Pegu. Toung-ngoo. Tenasserim.
The blue-winged Teal has been known to breed near Maulmain (Blyth).	
MARECA PENELOPE, L.	Arakan.
M. GIBBERIFRONS, S. Müll.	Andamans.
<i>Quer. Andamanensis</i> , Tytler.	
<i>M. albobularis</i> , Hume (<i>vide</i> Walden).	

FULIGULINÆ.

The Pochards are of a stout heavy form, with close thick plumage, and are excellent divers. Their flesh is indifferent and fishy.

ATHYRA RUFINA, Pallas.	Bhamo.
The red-crested Pochard.	
A. NYROCA, Guld.	Arakan.
The white-eyed Duck.	

Family **Podicipidæ**.

All the Grebes lay rather pointed oval eggs of spotless white, which soon however, become stained brown by the materials of the nest. They swim and dive well, using their wings under water as well as their feet. Their plumage is dense, soft, and the underparts silky.

PODICEPS MINOR, L.	Arakan. Pegu. Tenasserim.
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Family **Procellariidæ**.

Of the Petrels of the Burmese coast, less is known than of almost any other birds. One species only seems to have been obtained by Hume, *Oceanites oceanica*, Banks, which was pretty numerous off the Moseows, a group of islands near the coast.

Family **Laridæ**.

This family is divided into three subfamilies. *Lestridinæ* or Skua Gulls, *Larinæ* or Gulls and *Sterninæ* or Terns.

LESTRIDINÆ.

STERCORARIUS POMARINUS, Tem.	Maulmain.
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Tickell procured an adult skua, which was referred to the above species, and Jerdon comments on the singularity of a bird of high latitudes being found there. Hume, however, suggests (S.F. i. p. 268) if Tickell's bird did not *really* belong to a species which is common on the coast of Sind and in the Gulf of Oman, and which he refers, with doubt, to *S. parasiticus*, L., or more probably he thinks to a new species, which he terms *S. asiaticus*. It remains of course to decide if *S. asiaticus*, Hume, really occurs in Burma.

LARINÆ.

The Gulls are a well-marked group of birds, which walk pretty well, but swim and fly with remarkable ease and buoyancy. They breed on the ground or on rocks, and lay from two to four greenish eggs, richly blotched with dark brown.

NEMA BRUNNEICEPHALA, Jerdon.	Arakan Coast.
N. RIDIBUNDA, L.	Arakan Coast.
LARUS ICHTHYAËTUS, Pallas.	Ramri (Blyth).

STERNINÆ.

Terns may be said to be gulls, of a more delicate make, with straighter and more slender bills, and with longer wings and shorter legs. They seek their food mainly on the wing, sometimes plunging into the water for it. Their flight is moderately rapid, but wavering and unsteady, and they breed in countless numbers on sand or mud banks, laying three or four spotted eggs of similar colouration as the gulls.

GELOCHELIDON ANGLICA, Montagu.	Arakan and Tenasserim.
HYDROCHELIDON INDICA, Stephens.	Arakan and Tenasserim.
<i>Gelochelidon innotata</i> , Beavan (juv.).	
H. HYBRIDA, Pallas.	Martaban.
<i>H. javanica</i> , Horsf. (<i>vide</i> Hume).	
SEENA AURANTIA, Gray.	Arakan and Tenasserim.
SEENA MELANOGASTER, Tem.	Arakan. Tenasserim.
<i>S. Jerdoni</i> , Beavan (juv.).	
S. DOUGALLI, Mont.	
S. PARADISEA, Brünnh.	Andamans.
S. MINUTA, L.	Young-ngoo.
S. BERGII, Licht.	South of Mergui.
S. BENGALENSIS, Less.	Kamorta.
S. MEDIA, Horsf.	Arakan. Tenasserim.
S. SUMATRANA, Raffl.	Moscows and Mergui Archipelago.
ONYCHOPRION MELANAUCHEN, Tem.	Nicobars. Andamans.
O. ANOSTHILETUS, Scop.	Andamans.
ANOUS STOLIDUS, L.	Mergui Archipelago. Andamans.
The Noddy.	
A. SENEX, Leach.	Andamans.
RUYNCHOPS ALBICOLLIS, Swainson.	Pegu. Tenasserim.

This remarkable bird, the 'Skimmer,' has the upper bill much shorter than the lower. The bill is fine and compressed at the point and flexible. It associates in flocks, and flies close to the water, skimming over its surface, and occasionally dipping in its lower bill. What it feeds on is unknown, as Jerdon never found anything in the stomach but a little oily fluid.

Family **Phaëtonidæ.**

PHAËTON INDICUS, Hume.	Arakan Coast.
P. RUBRICAUDA, Bodd.	Nicobars.
P. ÆTHEREUS, L.	Andamans. Cocos. Nicobars.
P. FLAVIROSTRIS, Brandt.	Andamans.

The Boatswain birds are oceanic in their habits, but perch and build on trees. Jerdon regards them as related to Gannets and Terns.

Family **Sulidæ.**

SULA AUSTRALIS, Steph.	Ranges north to the Mergui Archipelago.
The southern Booby.	
SULA FIBER, L. (?)	Preparis and Cocos.
A pair of birds was seen, which Hume refers to this species.	

Family **Pelecanidæ.**

Bill enormous, with a large mandibular pouch.	
PELECANUS JAVANICUS, Horsf.	Pegu. Tenasserim.
P. PHILIPPENSIS, Gmel.	Pegu. Tenasserim.

Family Graculidæ.

GRACULINÆ.

The cormorants swim and dive with facility, but on rising from the water, flap it with their wings before getting well under weigh. In pursuit of fish they commonly enter the baskets set by fishermen and are of course drowned. They are social birds and breed in communities, laying three or four greenish white eggs of an elongated oval form.

GRACULUS CARBO, L.	Upper Burma, Tenasserim.
G. FUSCICOLLIS, Brandt.	Bhamo. Martaban.
G. PYGMEUS, Pallas.	Arakan. Pegu. Tenasserim.

PLOTINÆ.

The Darters or snake-birds have a very elongated neck, and swim so low, that often the head and neck only are seen above the water like a snake. Jerdon likens them to cormorants with the head and neck of a heron, a very apt simile.

PLOTUS MELANOGASTER, Gmel.	Arakan. Pegu. Tenasserim.
<i>P. novahollandia</i> , Gould.	

Order RAPTORES.

Family Vulturidæ.

These useful birds, observes Mr. Oates, "are nowhere very numerous in Burma, except on the occasion of any dead animal being exposed to view. As the Burmese are in the habit of eating animals which die of disease, not much food is available for vultures, and it is only in the immediate neighbourhood of large villages that flocks of these birds are found." There is, however, another fact which in my opinion has quite as much to do with the scarcity of vultures in so many parts of Burma as the necrophagous habits of the inhabitants. A large portion of Burma is well wooded, and vultures, which find their food by sight rather than smell, do not in consequence occupy such tracts. All ornithologists will remember the controversy of old, regarding the greater use of sight or scent by vultures, and how Waterton, from his personal experience, upheld the cause of eyes *versus* nose. I myself have in India verified his observations by noticing on more than one occasion the body of a dog shot under an umbrageous tree remaining unperceived by vultures, simply from its being hidden from their vision, though abundantly obvious to the human nose! Jerdon, too, takes the same view. The matter lies in a nutshell, and vultures simply cannot make a living in a wooded country where the carcase of an animal is screened from their circling gaze by thick vegetation. They all, therefore, affect open country and the neighbourhood of towns.

OTOGYPS CALVUS, Scop.	Pegu. Martaban and Tenasserim.
GYPS INDICUS, Scop.	Pegu. Tenasserim.
G. BENGALENSIS, Gmel.	Pegu. Tenasserim.

The Pali name of the Vulture is *gieza*, probably of common origin with the English word *gier*. The Burmese call all the Vultures *lenta* (Mason).

Vultures build bulky nests of sticks in large trees and lay a single white egg.

Family Falconidæ.

The Burmese generic name for the Falcon tribe is *theing*, from the verb *theing* "to strike with a motion towards one's self, to gather in." Hence the name signifies very much like "Birds of prey" (Mason).

FALCONINÆ.

FALCO PEREGRINUS, Gmel.	Promé. Amherst. Thatōn (rare).
<i>F. communis</i> , Briss.	Preparis Island.
<i>F. calidus</i> , Latham (the Indian race).	

The Peregrine Falcon, or 'Bhyri' of Indian falconers, is a bold bird, which in its wild state will kill snipe, teal and duck, but which when trained will fly at large birds like herons and cranes. It is not supposed by Jerdon to breed in the country, but adults are caught, mostly along the coast. It is so daring that it will often seize and carry off ducks or other birds which have been just wounded by the sportsman. In striking its prey the claws are alone employed, not the beak, as artists often depict. The Peregrine leaves India in April and returns in October.

F. PELEGRINATOR, Gmel.

Toung-ngoo (rare).

This bird is the 'Shahin' or 'Royal' of Indian falconers. It breeds in March and April and the young are taken in May. This and other falcons are also captured in the following manner: A thin strip of cane, about the length of the expanse of wing of the bird it is proposed to capture, is smeared with birdlime at either end, and in the centre a live pigeon or dove is fastened. The eyes of the bird are sewn up, to cause it to soar, and on a falcon being found, the pigeon is cast up. Should the falcon swoop at it, the limed strip of cane hampers its wings and it is easily captured. The 'Shahin,' according to Jerdon, is not slipped from the hand at the quarry, but made to circle in the air above the falconer and his party. If a partridge or floriken is flushed at some distance, the 'Shahin' makes two or three onward plunges in the direction and then darts down obliquely on the quarry, with half-closed wings and more than an arrow's velocity.

HYPOTRIORCHIS SEVERUS, Horsf.

Tenasserim.

TINNUNCULUS ALAUDARIUS, L.

Pegu (common).

Jio-theing. 'Dove-hawk.'

Common in Karen-ni, rare in Tenasserim.

T. saturatus, Blyth, is the dark Tenasserim race, remarkable for the great development of the black markings.

T. AMURENSIS, Radde.

ERYTHROPUS VESPERTINUS, L. (?)

Thayet-myo.

A young bird seemed to belong to this species. Food *Blatta*.

POLIOHIERAX INSIGNIS, Walden.

Upper Pegu.

Lithofalco Fieldeni, Hume.

Hume's name would seem to claim precedency by right, Lord Walden's by courtesy.

"The habits of these birds somewhat resemble those of Magpies. They perch exactly like a falcon; but if they wish to move along a branch, they hop sideways, or, if the branch is pretty upright, walk up it foot over foot, if I may use the expression, in the same manner as a magpie. When at all alarmed, they jerk their tail, and when much excited by the approach of any one, lower their heads exactly in the same way as some of the Owlets. Altogether, when moving about the branches of a tree, they might, at a short distance, be mistaken for a magpie, except for the shape of the head. The flight is also peculiar, a few tolerably rapid strokes, ending, if I remember rightly, in a slightly upward jerk, then a short sail through the air, and then a few more strokes, and so on" (Fielding, S.F. iii. p. 21).

HIERAX CÆRULESCENS, L.

Arakan. Pegu. Tenasserim.

H. eutolmos, Hodg.

Doung-u-hnouk.

Named by the Burmese 'Peacock-brains,' from the persuasion that it feeds on the brains of the peacock.

H. FRINGILLARIUS, Drapiez.

M. cærulescens, Vieillot.

Tenasserim. Borneo.

H. MELANOLEUCUS, Blyth.

Kachar, probably ranging into Arakan.

The pigmy falcons are the Liliputians of their family. Godwin-Austen remarks, "Their habits are shrike-like; they sit on isolated dead trees in the forest clearings, and sally off from time to time to seize some insect."

The eggs of *Hierax* are laid early in April, are four in number, oval, dead white

and without gloss, size 1·2 × 0·86. They are laid in holes of trees on a pad mainly composed of the wings of Neuroptera and Lepidoptera, mixed with rotten wood.

ACCIPITRINÆ.

ASTUR RUFITINCTUS, MacClell.	Pahpun. Bankasun (rare).
A. BADIUS, Gmel.	
Recorded from Tenasserim, but the next species probably meant.	
A. POLIOPSIS, Hume.	Tenasserim (common).
Thcin-kyet-mā. The hen hawk.	
A. SOLOENSIS, Horsf.	Malewōn (rare). The Nicobars.
A. TRIVIRGATUS, Tem.	Arakan. Tenasserim.
ACCIPITER NISUS, L.	Thayet-myo. Mooleyit (very rare).
A. VIRGATUS, Reinw.	Thayet-myo. Tenasserim (rare). Andamans.

The 'Besra' of Indian falconers. This species, says Jerdon, and other short-winged hawks and some falcons, are often taken by a net called 'Do gaz.' This net is 5 feet high and 3 feet broad, stained of a dark colour and fixed to two pieces of bamboo stuck lightly into the ground. In front of it a bird is fixed at the distance of a foot, and the hawk swooping at the bird is carried by the impetus into the net, which collapses and secures it.

AQUILINÆ.

AQUILA MORGANII, Gmel.	Pegu. Martaban. Tavoy (rare).
A. CLANGA, Pall.	Pegu. Tenasserim (<i>sic</i> Tickell, rare).
A. BIFASCIATA, Hard. and Gray.	Arakan.
Wōn-lō.	
A. HASTATUS, Less.	Arakan.
A. PENNATA, Gmel.	Pegu. Maulmain. Thayet-myo.
A. NEVIA (?).	
<i>A. orientalis</i> (Gurney).	Arakan.

The generic name for the Eagle in Burmese is *wōn-lō*, from *wōn*, a bear, and *lō*, like; the Eagle being like a bear among birds. Occasionally an eagle is called *shwe-len-lā*, "The golden Vulture" (Mason).

S. MINIMUS, Hume.	Andamans.
Resembles <i>cheela</i> , but is paler. The throat and chest entirely unbarred. Wings from 11·0 to 11·75 inches. It is the smallest of the genus.	
S. RUTHERFORDI, Swinhoe.	Rangoon and Amherst.
PANDION HALIAËTUS, L.	Arakan. Tenasserim.
Wōn-let.	
POLIAËTUS ICHTHYAËTUS, Horsf.	Pegu. Tenasserim.
P. HUMILIS, S. Müll.	Tenasserim.
<i>Ich. nanus</i> , Blyth.	
HALIAËTUS LEUCORYPHUS, Pall.	Martaban.
H. LEUCOGASTER, Gmel.	Pegu. Tenasserim. Andamans.

Hume thus writes of this species: "The white-bellied sea eagle is very voracious, and during the morning I watched them incessantly returning to one or other of the big trees bearing sea snakes, 5 or 6 feet in length, in their claws, which they devoured at their ease. It is a fine sight to see these eagles striking one after another in rapid succession. Soaring far far above the highest tree in the island, often, I should judge, to a height of at least 1000 feet, they come down with nearly closed wings, and with a rushing roar like that of a cannon ball, in a perfectly direct line, making an angle of about 60° with the water, which they scarcely seem to reach, before they are again mounting with heavy flaps, and with a yard or two of snake hanging dead in their talons" (S.F. iv. p. 423).

NEOPUS MALAIENSIS, Reinw. Tenasserim.
 LIMNAËTUS CALIGATUS, Raffles. Pegu.

Fielden describes this bird as very wild and wary. It is fond of washing, instinctively it would seem; for a young nestling, to whom a sardine tin of water was given, went through the pretence of washing in it, though hardly fledged and of course unable to get into so small a vessel (S.F. iii. p. 27).

SPIZÆTUS LIMNÆTUS, Horsf. Pegu. Tenasserim.
 S. ANDAMANENSIS, Tytler. Andamans.
 S. ALBONIGER, Blyth. Mergui. Malacca. Borneo.
 LOPHOTRIORCHIS KIENERII, Gerv. Tenasserim (?).
 SPILORNIS CHEELA, Lath. Pegu. Toung-ngoo (*vide* Ransay).

Doung-tswōn (generic).
 S. RUTHERFORDI, Swinhoe. Pegu. Tenasserim.
 S. BACHA, Daud.
F. bido, Horsfield.
 S. SPILOGASTER, Blyth. Ceylon (Burma?).
 S. ELGINI, Tytler. The Andamans.
 S. DAVISONI, Hume. Andamans.

Near *S. pallidus*, Wald., but has a very long crest, measuring from the forehead 5·2 inches backwards. Wings from 14 to 15·5 inches.

S. MINIMUS, Hume. Andamans.

BUTEONINÆ.

BUTEO PLUMIPES, Hodg. Thatōn.
 B. PYRRHOGENYS, Sch. Tenasserim.
B. pygmaus, Blyth (*monente auctore*).
 B. JAPONICUS, Schl. Thayet-myo.
 BUTASTUR TRESA, Frank. Pegu. Martaban.
 B. INDICUS, Gmel. Tenasserim.
 B. LIVENTER, Tem. Pegu. Toung-ngoo. Amherst (rare in Tenasserim).
 CIRCUS PYGÆGUS, L. Doubtfully recorded from Karen-ni and Tenasserim.
 C. MELANOLEUCUS, Forst. Martaban. Pegu (rare in Tenasserim).
 Thaïng-kyā or Theng-kyā.
 C. ÆRUGINOSUS, L. Pegu. Martaban. Tenasserim. Andamans.
 C. SWAINSONI, A. Smith. Arakan. Pegu (*vide* Blyth).

MILVINÆ.

HALIASTUR INDUS, Bodd. Pegu. Tenasserim, ranging as far south as Pinang.
 Swōn-goung-hpyu.
 MILVUS AFFINIS, Gould. Pegu and Tenasserim.
 Tswōn-bōk (generic).
 M. GOVINDA, Sykes. Pegu and Tenasserim. Andamans.
 PERNIS Ptilorhynchus, Tem. Martaban (rare).
P. brachypterus, Blyth (*monente auctore*).

The Indian 'Honey buzzard,' like its European congener, feeds by preference on honey-comb, or the larvæ of bees and wasps, and in default of them will eat other insects or reptiles, eggs and young birds. Jerdon was an eye-witness to this bird's attacking a comb, which it did without any particular ceremony or precaution, though it is difficult to understand how it escapes being severely stung on such occasions.

MACLEBRAMPIUS ALCINUS, Westernm. Malcwōn (very rare).
 BAZA LOPHOTES, Cuv. Arakan. Tenasserim (rare).
 B. SUMATRENSIS, Leisr. South Tenasserim (very rare).
B. Jerdoni, Blyth (?).
 ELANUS MELANOPIERUS, Daud. Arakan. Pegu. Tenasserim.
E. caeruleus, Desf.

The eggs of this bird are rather blunt ovals, and normally very richly coloured, resembling miniature *Neophron* eggs, or those of the more highly coloured eggs of true Falcons. They are sometimes, however, less profusely spotted or perhaps even white.

Family Strigidæ.

The nocturnal 'Raptors' form a very natural family, every member of which is easily cognizable at a glance, from the specialized adaptation of its organization to its mode of life, or as Jerdon clearly puts it, "The large head and eye, the facial disk, the forward sitting of the eye, the soft plumage, and the beautifully blended unobtrusive colours, at once distinguish an owl." As is commonly the case with raptorial birds, the female exceeds the male in size, but does not otherwise differ. Most owls are arboreal, roosting during the day in some umbrageous tree. Others frequent rocks, or holes in river banks, and all lay obtusely oval white eggs.

STRIGINÆ (Screech Owls).

STRIX JAVANICA, Gmel. The whole of Burma, but rare in
Hnet-soh. Tenasserim, according to Hume.

A very widely-spread species, if Mr. Sharpe is correct in uniting, as Hume says, almost all the 'barn-owls' of the world under one name. In support of this Mr. Hume declares he can detect no difference between Indian and Javan birds.

S. CANDIDA, Tickell. Toung-ngoo. India. Australia, etc.

This owl is a favourite object of pursuit with falcons in the Punjab, giving a long chase and fine sport.

PRODILUS BADIUS, Horsf. Arakan. Tenasserim. Borneo, etc.

SYRNIIUM INDRANEE, Sykes. Pegu. Tenasserim. Ceylon. Malacca.

S. ochrogenys, Hume.

S. SELUPUTO, Horsf. Pegu. Tenasserim. Nicobars.

ASIONINÆ (Horned Owls).

BRACHYOTUS ACCIPITRINUS, Pall. Toung-ngoo. Arakan.

Otus brachyotus, Gmel.

BUBONINÆ (Eagle Owls).

URRUA BENGALENSIS, Franklin. Arakan.

U. COROMANDA, Latham. Arakan.

Mr. A. Anderson describes some *spotted* eggs of this species taken by himself from the deserted nest of a *Mycteria australis*, shooting one of the parent birds off the nest. "The markings consist of indistinct lilac blotches, showing through the shell, as it were, on of course a pure white ground; and they are both *profusely* though *minutely spotted*, especially at the obtuse end, with brown and lilac spots (or rather specks) of various shades" (Proc. Zool. Soc. Lond. 1876, p. 316).

BUBO NIPALENSIS, Hodg. Toung-ngoo (Ramsay).

Ptiloskelos Amherstii, Tickell.

Hume considers this species, based by Tickell on a young bird from Mooleyit, as a synonym of *B. orientalis*.

B. ORIENTALIS, Horsf. Tenasserim (rare).

A hill and forest species.

KETUPA CEYLONENSIS, Gmel. Arakan. Tenasserim. Palestine.

Di-dök.

This is a fishing owl, eating both fish and crabs.

K. JAVANENSIS, Less. Arakan. Pegu. Tenasserim. Malacca.

The lesser-eared Owls.

SCOPS PENNATUS, Hodg. Pegu. Martaban. Camorta (rare).
S. sunia.

Zi-kwet (gen.).

At Pahpoon and Mooleyit this species seems far from rare, but Davison says it is seldom seen.

S. BALLI, Hume. Andamans.
S. SAGITTATUS, Cass. Mooleyit and Malewōn (rare).
S. LEMPIGI, Horsf. Pegu. Pahpoon. Tenasserim.
S. lettia, Hodgs. Arakan. Tenasserim.

Lord Walden refers the supposed Burmese examples of *S. Lempigi* to this species. Hodgson's species is of course the *Himalayan* race, and Horsfield's the *Javanese*; but as both species run into each other, Hume is no doubt justified in his proposal to unite them (S.F. vi. p. 36). Some continental naturalists have, however, it would seem (*l.c.*), applied Horsfield's name to a very different bird, *S. magicus*, from Java and Celebes.

SURNINÆ (Twilight Owls).

These Owls have no 'horns' or 'ear tufts,' and are more diurnal in their habits than the other members of this family. Some of them Jerdon remarks are a near approach in appearance to the diurnal Raptores, and Kaup describes their skulls as round and brain large, with small pneumaticity.

GLAUCIDIUM RADIATUM, Tickell. Tenasserim (*vide* Tickell).
G. CASTANOPTERUM, Horsf. Tenasserim (*vide* Helfer).

Hume strongly doubts the occurrence of the Javanese species in Burma, and quotes Temminck's text (S.F. vi. p. 37) to help towards its recognition.

"This little owl is well characterized and easily recognizable by the fine purplish chestnut colour of the back, wings, and tail; the entire head, nape, the sides and front of the neck and breast, are regularly and narrowly banded transversely with brown and dull yellow; the sides and flanks are coloured like the back, and purplish spots occur on the thighs; the whole of the rest of the lower parts is pure white; large white spots occupy the outer webs of the scapulars and some of the coverts near the fold of the wing; reddish yellow bands occur on the quills, and there are five narrow bands of this colour on each of the tail feathers, which are also tipped with it.

"Total length 7.67 to 8.2 inches." Temminck, pl. col. 98, text.

G. FULCHRUM, Hume. Pegu.
G. Brahma, Tem. (auctorum from Burma).

Hume has separated the Burmese race, from its much smaller size and other differences (S.F. i. p. 469).

Mr. Oates describes it as "the noisiest of all the small screech owls. They are continually quarrelling with each other at night, and even in the daytime a pair will commonly come out of some hole in a tree and screech away for a quarter of an hour."

This little owl is made use of to catch other birds with. A live one is fixed near a bush which is well smeared with birdlime. Directly its presence is perceived, it is immediately surrounded by whatever birds may be near, all animated with rage towards the captive, and many alighting on the limed bush are easily taken. Jerdon says this plan is pursued in Italy and the South of Europe as well as India.

G. EUCLOIDES, Vigors. The Himalayas. Arakan and
G. Whitleyi, Blyth. Tenasserim (rare south of Tavoy).

Zi-kwet.

Hume, with a very large series of both Indian and Burmese birds before him, unites these two species.

G. BRODIER, Burton. Tavoy. Mooleyit.

Davison shot one of these birds with a fledgling *Megalaima* in its claws, being attracted by the outcry raised by the parent of the sufferer.

NINOX HIRSIUTUS, Tem.	Nicobars.
<i>N. scutellatus</i> , Raffl.	Arakan (Tenasserim).
Khin-bōk.	
N. AFFINIS, Tytler.	Andamans. Nicobars.
Nearly affined to <i>scutellatus</i> , Raffl., according to Hume.	
N. BURMANICA, Hume.	

Under the last-named species, *N. scutellatus*, Blyth would seem to have ranged the Tenasserim race, which has been since separated by Hume. If Hume's species is rightly separated, it is probable that both meet in Arakan.

N. OBSCURUS, Hume.	Andamans. Nicobars.
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Order PSITTACI.

The Parrots have the upper jaw articulated with the frontal bones by a complete hinge-joint. In the foetal parakeet the margins of the bill are beset with tubercles, under each of which is a gelatinous pulp like that of a tooth (Pascoc). This is a remarkable indication of relationship to those extinct orders of birds whose bills were furnished with teeth. The bill is used as a prehensile organ in climbing, and the feet as hands for grasping and conveying anything to the mouth. Parrots are monogamous, and breed in holes of trees and banks, laying several white blunt eggs. The order embraces one family only.

Family Psittacidæ.

This family is subdivided into *Psittacinæ*, or true Parrots; *Loriinæ*, or Lories; *Palaorninæ*, or Parrakeets; *Platyercinæ*, or Australian Parrakeets; *Arainæ*, or Macaws; *Cacatuinæ* and *Nestorinæ*, the Cockatoos and Dusky Cockatoos of Australia; and the *Strigopinæ*, represented by a single species, the New Zealand *Strigops*, an owl-like bird of nocturnal habits.

PALEORNINÆ.

PALEORNIS EUPATORIUS, L.	Pegu. Tenasserim. Andamans.
<i>P. magnirostris</i> , Ball.	

The Andaman bird has been separated by Mr. Ball for the largeness of its bill, and Mr. Hume considers the Tenasserim race as identical, though not quite the size of typical *magnirostris*. Blyth remarks that this species in Burma is confined to the higher hills, but this seems doubtful.

P. ERYTHROGENYS, Blyth.	Andamans. Nicobars.
<i>P. Nicobaricus</i> , Gould.	
<i>P. caniceps</i> , Blyth (monente auctore).	
<i>P. affinis</i> , Tytler.	
<i>P. Tytleri</i> , Hume.	

Davison observes: "It is curious that the bills of all the young of these two species (*P. erythrognys* and *P. affinis*) that I examined were quite red, both upper and lower mandibles. The adult females always have the bills black. I must have seen during my stay at the Andamans and Nicobars at least thirty young birds of these species, of all sizes, in their nests, with convicts, or in Nicobarese huts, and yet I never saw a young one, that could not fly, that had a black upper or lower mandible" (S.F. ii. p. 184).

P. TORQUATUS, Bodd.	Pegu. Tenasserim.
A bird of the open country.	
P. CYANOCEPHALUS, L.	Pegu. Tenasserim.
A forest species, replacing in Burma <i>P. rosa</i> , Bodd., of India and Ceylon (Blyth),	

or whatever the species may be called, as Lord Walden says *P. rosa* strictly applies to the Bengal race.

P. CANICEPS, Blyth.

Great Nicobar. Montschall. Kondul.

P. SCHISTICEPS, Hodg.

Arakan. Young-ngoo.

P. FINSCHI, Hume.

The Young-ngoo race has of course received a name from Hume, though neither Walden nor Blyth differentiate it specifically.

P. VIBRISSA, Bodd. apud Blyth,

P. LATHAMI, Finsch ♂ (red bill).

P. MELANORHYNCHUS, Wagler. ♀

Arakan. Pegu. Tenasserim.

Blyth says: "An exceedingly common species in the forests of British Burma, and Mason remarks of it (in partienlar) that 'immense flocks of Parrakeets may be seen simultaneously descending on the rice-fields, where persons have to be in constant attendance to drive them away during the season of harvest;' while of *P. torquatus* he notices that it is 'often seen in the rice-fields, but in smaller companies, which have not the habit of simultaneous descent.' Westward, the present species is common in the Terai region of the E. Himalaya, but its range does not extend further into India, whence its synonym of *ponticriuanus* is a misnomer. Great numbers of the very young are brought every season to Calcutta from Chittagong, and it is remarkable that from the earliest age the males only have the upper mandible coral-red. In a presumed male¹ which I possessed in captivity, the upper mandible changed from black to coral-red when the bird was about eighteen months old; and I have seen numerous specimens which had been killed when the change was in progress. I have also shot red-billed and black-billed specimens out of the same flock, and therefore cannot admit the *P. nigrirostris*, Hodgson, as a distinct species, differing only in the colour of the upper mandible. Moreover, the same sexual diversity in the colouring of the bill, whether permanently or otherwise, occurs in several kindred species. Rarely, the lower mandible is also red in Burmese specimens, almost constantly so in Javanese examples; but I have been unable to detect the slightest difference of plumage on comparison of skins from Nipál, Arakan, and Java."

Hume asserts on the contrary that the entire bill in the young of both sexes is black, which may probably be accepted as the rule, but not without such exceptions as have warranted Mr. Blyth in a contrary assertion, though Mr. Hume's superior advantages of observation must give his assertion the greater weight. In *Stray Feathers*, ii. p. 1, Mr. Hume administers an admirable castigation to Dr. Finsch for his flippant and conceited rejection of the testimony of such naturalists as Blyth and Jerdon and others regarding various species of Indian Parrots. On the strength it would seem of a wrongly sexed bird, or perhaps an old female which has assumed the colouration of the male, Dr. Finsch proceeds to show how all Indian zoologists who have asserted that the females have black beaks, must be wrong. Mr. Hume is no doubt severe, but no men are convicted of error by a personal appeal to them to only be kind enough to see it themselves. Mr. Hume says (*l.c.* p. 21), "In the youngest birds that I have seen taken, when just able to fly from the nest-hole, while two birds, one a specimen of *Lathami* (which I *erroneously conceived* to be the father), with a red copper mandible, and the other a specimen of *melanorhynchus* (which I *erroneously conceived* to be the mother), shrieked round us, which two specimens curiously enough on dissection did prove (unless I *erroneously conceived* the fact) to be respectively male and female, I say these young birds (*hybrids doubtless!*) had both mandibles blackish."

PSITTINUS INCERTUS, Shaw.

Tenasserim south of Mergui.

P. MALACCENSIS, Lath.

LORINE.

In the Lorines the tongue is furnished with a protrusile tuft of elongated papillæ, enabling them to extract the nectar of flowers, which, with soft fruits, constitutes their food.

¹ "Female" in text, errore Diaboli?

LORICULUS VERNALIS, Sparrm.

Kyai-tha-dā.

Arakan. Pegu. Tenasserim.

This is a forest species of general distribution.

[From the total number of birds known to inhabit Burma, the following may have to be deducted. Namely :

1. *Pellorneum minor* = *P. Tickelli*.

The next seven species may have been confounded with species also enumerated :

2. *Caprimulgus indicus* with *C. jotaka*.

3. *Cypselus batassiensis* with *C. infumatus*.

4. *Sturnia malabarica* with *S. nemoricola*.

5. *Brachyurus megarhynchus* with *B. moluccensis*.

6. *Cryptolopha Burki* with *C. tephrocephalus*.

7. *Orthotomus edela* with *O. flavi-iridis*.

8. *Macropygia ruficeps* with *M. assimilis*.

And the total may have to be still further reduced by three more species, namely :

9. *Sturnia sinensis*, its occurrence not resting on good evidence.

10. *Machlolophus subviridis*, apparently *M. spilnotus*, juv.

11. *Brachypodius cinereiventris*, perhaps a variety only of *B. melanocephalus*.

The following four species, not separately enumerated, may have to be added :

1. *Megalæma virens*, in addition to *M. Marshallorum*.

2. *Hemixus Hildebrandi*, in addition to *H. flavala*.

3. *Criniger griseiceps*, in addition to *C. flavocolus*.

4. *Osmotreron vernans*.

Further investigations will doubtless make known a great many more forms belonging to either Himalayan or Malayan genera.]—*Walden*.

There are some grounds for supposing that under favourable circumstances Parrots are among the most long-lived of birds. Humboldt records as a fact (Views of Nature, Bohm's Scientific Library, p. 172) that an old Parrot lived in Maypures, which understood words of the extinct tribe of the Atures, by whom he had been reared as a nestling, which curious fact (if it be one) is prettily preserved in the following verses by Professor Ernest Curtius, tutor of Prince Frederick Wilhelm of Prussia, now the present venerable Emperor of United Germany.

Where, through deserts wild and dreary
Orinoco dashes on,
Sits a Parrot old and weary,
Like a sculptured thing of stone.

Through its rocky barriers flowing,
Onward rolls the foaming stream ;
Waving palms on high are glowing
In the sun's meridian beam.

Ceaselessly the waves are heaving,
Sparkling up in antic play ;
While the sunny rays are weaving
Rainbows in the feathery spray.

Where yon billows wild are breaking
Sleeps a tribe for evermore,
Who, their native land forsaking,
Refuge sought on this lone shore.

As they lived, free, dauntless ever,
So the brave Aturians died ;
And the green banks of the river
All their mortal relies hide.

Yet the Parrot, ne'er forgetting
Those who loved him, mourns them still ;
On the stone his sharp beak whetting,
While the air, his wailings fill.

Where are now the youths who bred him,
To pronounce their mother tongue ;
Where the gentle maids who fed him
And who built his nest when young ?

All, alas ! are lifeless lying,
Stretched upon their grassy bed ;
Nor can all his mournful crying
E'er awake the slumbering dead.

Still he calls with voice imploring
To a world that heeds him not ;
Nought replies but waters roaring ;
No kind soul bewails his lot.

Swift the savage turns his rudder,
When his eyes the bird behold ;
None e'er saw without a shudder
That Aturian Parrot old !

MAMMALIA.

THE following brief remarks are prefatory to Dr. Mason's Chapter on Mammalia, and give a good idea of his popular style of writing:

"Few are aware of the great difficulty that exists in ascertaining the species, and occasionally the genera, of animals in an unexplored country, as this was a quarter of a century ago. At that time the 'rusa' deer was according to some authorities a 'wild cow,' and according to others an 'elk.' The 'paradoxure' a 'raccoon.' The Bamboo-rat, a *mole*. The 'wild hog,' a *barbyrussa*. The *gymnura*, an *opossum*. The 'wild dog,' a *wolf*. The leopard, a *cheetah*. A deer, the *nylghau*. The goat-antelope, a *wild sheep*, and we had a goat with one horn resembling the celebrated unicorn. . . . In those days the jungle traveller was entertained at evening by the natives around the bush-fire with wonderful descriptions of the extraordinary animals that peopled the surrounding forests. One was found exactly like an elephant, but never had tusks, and was banded across the body with white. This proved to be the tapir. Another had a skin like a cow, a mane like a horse, and horns like a goat—the goat-antelope. The third was half a dog and half a hog—the sand-badger. A fourth was represented as in a transition state towards a monkey, just such an animal as would certainly become a monkey in the next transmigration. This was the loris. And a fifth had the breasts of a woman, the head of a quadruped, the tail of a fish, and uttered, when captured, plaintive human cries, quite a new variety of the mermaid, which turns out to be the dugong. After Mr. Blyth became the Curator of the Museum of the Asiatic Society of Bengal, by far the greater proportion of the Mammalia of the country fell under his eye, and to him we were indebted for much of our knowledge of species."

Class MAMMALIA.

Warm-blooded vertebrata, more or less covered with hair, breathing by lungs, viviparous, and the young nourished by a lacteal secretion furnished by the mother. The skull is articulated by double condyles.

A.—LISSENCEPHALA.

Cerebral hemispheres with a few folds, and not covering the cerebellum and olfactory lobes.

Order BRUTA.

Teeth in many species entirely wanting. Molar teeth when present not displaced by a second series, and without enamel or complex roots. Claws large.

Family *Manidæ*.

No teeth. Body covered with horny inubricate plates. Tail long. Tongue cylindrical and highly exsertile. Food insects, chiefly ants.

MANIS, *Linnaeus*.

The scaly ant-eater or Pangolin. Then-khwac-ghyat (generic).

M. aurita, Hodg.

15 to 18 longitudinal rows of scales on the trunk, and 16 to 20 plates on the mesial line on the tail. The middle fore claw nearly twice as long as the corresponding hind claw. Colour very dark brown.

Ranges from the Himalayas to Bhamo and Eastern China.

M. javanica, Desmarest.

M. leptura and *leucura*, Blyth.

Body and tail longer and more attenuated than in its allies. 19 longitudinal rows on the trunk and 30 along the tail. Fore claws not much longer than the hind. Colour dark olive-brown.

Ranges from Arakan to Mergui, and from Silhet to Bhamo, and the lower spurs of the Kakhien Hills, not ranging so high as *M. aurita*.

Dr. Mason remarks that another species is not rare in the south, which is not characterized by a whitish tail, and this may be, as Blyth suggests, *P. aurita*, Hodgson. Another doubtful species is recorded by Mason. "The Bghais describe a second species, small and thin, which they call Yo-be-hpyu, or small thin pangolin. It is very desirable these species should be correctly ascertained. They lap water freely, and one that was sent to Mr. Blyth alive, ate heartily of a mess of chopped meat and egg and boiled rice. The Burmans believe that this creature has the power of calling persons by name, from the jungle. If the person so called answers, he will die within the year."

Order RODENTIA.

The rodents are chiefly characterized by their teeth. The incisor teeth or rodentia tusks (really homologous with the canine teeth of other animals), have a thin layer of enamel in front, often coloured yellow or brownish, supported by a thicker layer of dentine, softest anteriorly, so that the tooth is always kept with a sharp chisel edge, by the wearing away of part behind. They are prolific animals, and construct nests, like birds, for the reception and security of their progeny, which attain maturity in a year or less.

Family **Sciuridæ**.

Habits arboreal. Tail bushy and long. Clavicles perfect.

SCIURUS, *Linnaeus*.

I. ♀; R.T. $\frac{2}{3}$; P.M. $\frac{1}{2}$; M. $\frac{1}{6}$.

S. giganteus, MacClelland.

S. macruroides, Hodg.

The large black squirrel. Lē-hyuk.

Colour above, black or blackish-brown. Beneath, and inside the limbs, fulvous white. A black cheekband. Cheeks fulvous grey, with a large triangular patch. A rusty red spot between the ears, which are sometimes densely tufted.

Head and body 15 inches; tail 16.

There is, remarks Blyth, a local race in Tenasserim with a broad pale band across the loins forming a kind of cineture.

Ranges from Sikkim into Burma as far south as Tenasserim.

S. ferrugineus, F. Cuv.

S. Finlaysoni, Horsf.

S. Keraudreni, Reynaud.

S. Germani, A. M. Edw.

S. Bocourti, A. M. Edw.

S. leucogaster, A. M. Edw.

S. splendidus, Gray.
S. cinnamomeus, Tem.
S. Scamensis, Gray.
S. splendens, Gray.

The above are the synonyms of the diverse-coloured squirrel, according to Dr. Anderson. The colours vary from deep maroon-chestnut to red, and from grey-grizzled to intense black and pure white, and white spotted or piebald. *S. Germani* is black. *S. Finlaysoni* is white. *S. Bocourti* is piebald. All the others are rich red squirrels. *S. leucogaster* and *S. Siamensis* are young animals. *S. Kraudreni* has a white tail tip. "The appearance of the white," remarks Dr. Anderson, "on this portion of the tail, would seem to indicate that there is an inherent tendency to the production of that colour, probably explicable on the theory of reversion, because the young of many squirrels, when born, have their tails white. This colour disappearing with age."

Ranges from Assam throughout Burma and Siam.

S. LOKRIOIDES, Hodg.
S. Assamensis, MacClell.
S. Blythii, Tytler.
S. similis, Gray.

Colour rufous olive-brown. The base of the hairs greyish-black, and their remainder banded yellow, black and yellow, and brown or blackish-tipped. Throat and belly greyish or sullied white, tinged more or less with rufous, but never with bright orange, as in *S. lokriah*. Tail similar to the back, but the hairs more coarsely annulated.

This species ranges into Arakan and Preparis Island, and stretches from Nipal to Western Yunnan.

S. LOKRIAH, Hodg.

Colour deep ferruginous olive-brown. Belly rich orange. The bands on the hair are orange, not yellow as in *S. lokrioides*, and the terminal black tip to the tail is broad, but tipped with orange or white. A white tuft behind the ear.

From Nipal to Assam, ranging into Arakan.

S. ATRODORSALIS, Gray.

Colouration of two types. In the paler type, the back and the feet are yellowish rufous, the top of the head orange red, and the under surface and the inside of the limbs chestnut. Tail ringed orange and black, the former colour being terminal. In the other type the back is black, with generally, but not always, white whiskers. Head and body 8·9; tail 10·25=19·15 inches.

Mr. Blandford remarks, "I have only seen *S. atrodorsalis* from the northern portion of the Tenasserim provinces, the species has not yet, so far as I am aware, been recorded from Mergui or Tavoy, nor is it known to occur west of the Salween River. It abounds around Maulmain and Amherst, and in the valleys of the Hougdarau and Attaran Rivers."¹

S. RUFIGENIS, W. Bl.

This squirrel is nearly the same size as *S. caniceps* and *S. atrodorsalis*, but the tail is much shorter, its length, without counting the hairs at the end, being always considerably less than that of the head and body; it is distinctly distichous below. Fur soft throughout.

Upper parts dark olive, frizzled, cheeks ferruginous, a small white spot behind the ear, lower parts white, tail hoary, black with white rings and tips above, chestnut below.

The colour of the back and sides resembles that of specimens of *S. caniceps* in which there is no yellow or rufous tinge, being a fine mixture of black and pale

¹ "Error is proverbially immortal, and consequently, attention cannot be too frequently called to the circumstance that the localities assigned to this species and to many other Asiatic squirrels in Dr. Gray's lists are incorrect."

yellow, the sides rather paler. The fur on the back, as in several allied species of squirrel, is of two kinds, the finer and shorter hairs being dark leaden colour at the base, pale yellowish grey at the tips, and about a quarter of an inch long in the middle of the back, the longer hairs are coarser, about half an inch long, and black with a pale yellow ring near the end, the tips being black. As usual the longer hairs are most abundant near the middle of the back, less so on the sides. Forehead rufous mixed with black, the sides of the head are dark ferruginous above, paler below, shading off gradually into the colour of the face and throat. Ears rounded, covered thinly inside and out with short hairs; a little patch of silky white hair behind each ear is concealed by the ear cone when the ears are laid back. Whiskers black. The hairs of the lower parts are dark grey at the base, white at the ends, there is a tinge of rufous on the fore neck and throat in some specimens. Fore limbs yellowish olive outside, like the sides, whitish inside, hind limbs also whitish within, but more rufous outside. Tail clad above with black hairs, having a white ring near, but not at their base, and white tips, so as to produce a very beautiful hoary appearance, lower surface of the tail chestnut, the longer hairs on the sides with black and white tips.

None of the other Burmese or Himalayan squirrels resemble the present form, nor am I acquainted with any Malay species with similar colouration. The nearest approach is perhaps made by *S. Pernyi*, found at Sechuen in China. This species has a yellow spot behind the ear, the lower surface of the tail is ferruginous, and the belly white, but it wants the ferruginous cheeks, it has no white tips to the hairs in the upper surface of the tail, and it is more rufous above, the latter character being, however, of little or no importance.

The Himalayan *Sciurus lokriah* also possesses, I find, the small whitish tuft behind the ear, though less developed than in *S. rufigenis*; the colouring of the lower parts and tail are, however, conspicuously distinct in the two forms. The presence of the white spot in *S. lokriah* affords an excellent character for distinguishing this species from *S. lokrioides*.

S. PYGERYTHRUS, Is. Geoffr. St.-Hilaire.

Back and basal third of tail dark olive-grey. The rest of the tail ringed yellowish and black, and black-tipped. The under parts yellowish. The feet either yellowish or like the upper parts. The hairs of the back are banded dark and yellow.

Pegu and Upper Burma, where the colouration is paler than in the Southern form.

S. PHAYREI, Blyth.

S. hyperythrus, Blyth.

Resembles *S. pygerythrus* above, but lower parts are rich orange red, which extends beneath the tail. Mr. Blanford remarks: "This species, as noticed by Blyth, is only known to occur west of the Salween. It is not, so far as I am aware, found west of the Sittoung; in the Irrawaddy Valley in Pegu, it appears to be replaced by *S. pygerythrus*, whilst further north, around Ava, it is represented by the closely allied *S. Blanfordi*, into which it doubtless passes. *S. Phayrei*, Mr. Davison tells me, is found north as far as Pah-Khyoung at the southern extremity of Karen-ni (the country of the Red Karens).

"The following are dimensions of a female from Thatôn :

"Length—head and body 9·6; tail 11·2=20·8 inches."

S. BLANFORDI, Blyth.

Fur above grey, finely punctulated with black and grey. Tail grey, black-tipped. Hands and feet yellow. Below pale orange-yellow.

Toung-ngoo and Upper Burma.

S. GORDONI, And.

Upper surface and a narrow line along the sides grizzled olive-brown or greyish. The chin and sides of throat paler. The chest, belly, and inside of limbs are either pale yellow or orange-yellow. The ears are faintly pencilled. End of tail blackish with yellow tip.

Head and body 9 inches; tail 7 inches.

Upper Burma.

S. SLADENI, And.

Closely allied and of the same size as *S. Gordoni*, but having its feet and head orange-red, and a bright brick-red tail tip.

Thigyain in Upper Burma.

S. CANICEPS, Gray.

S. chrysonotus, Blyth.

S. concolor, Blyth.

Above grey or fulvous. Tail grey, grizzled with an abrupt black tip. Inner side of limbs greyish, sometimes tinged with yellow. Sometimes the nape, shoulders, and back are bright ferruginous. Whiskers long and black. Ears with whitish pencils.

Tavoy and Tenasserim.

S. BERDMOREI, Blyth.

S. Mouhotii, Gray.

Colour brownish, rufous on the back. Head, sides, and outside of the limbs punctulated with yellow. An obscure black vertebral line behind the shoulders, half down the trunk. A yellow line from the shoulder to the groin bordered above with dusky and below with a broad black band, and below it, a pale yellow linear area. Under parts white, washed here and there. Tail bushy, the hairs annulated with four alternate orange and black bands.

Head and body 7·75 inches; tail 5.

Mr. Blanford seems not quite satisfied as to the union of these species.

“Several skins were procured by Mr. Davison, and a specimen in spirit was collected by Mr. Limborg, of a species of striped squirrel differing somewhat from the Museum specimens of *S. Berdmorei*, but agreeing very well with Gray’s description of *S. Mouhotii* from Camboja. The Museum specimens of *S. Berdmorei*, said by Blyth to have been collected by himself in Martaban, have three broad black stripes along the back, whereas in the specimens before me there are no black stripes and no distinct darker band in the middle of the back, although there is a slight indication of darkening in one specimen. In the original description of *S. Berdmorei*, it was said to have an obscure pale central dorsal streak, flanked by a blackish band, but in a subsequent description of an example sent from Maulmain the three black bands of the back were especially noticed. Subsequently *S. Mouhotii* was described by Gray and then identified by the describer with *S. Berdmorei*, an identification adopted by Blyth. It is possible that the two forms pass into each other, but they look very different, and for the present I prefer retaining Gray’s name for the variety before me, of which the following is a description.

“The upper surface is yellowish-brown, punctulated, the hairs being black with two buff rings. The fine woolly under-fur is dark slate-coloured at the base with buff tips. On each side of the back there are two longitudinal pale lines extending from the shoulder to the thigh, the upper narrow and well defined, the lower broader and less marked. Between the two and above the upper pale line, the fur is darker in some specimens, but apparently this is not constant. The sides below the lower pale lateral bands are greyish-brown punctulated. The lower parts throughout are white, sometimes tinged with buff. The tail hairs are light brown at the base, then black, then brown again, then black to near the tips, which are whitish. Whiskers black. The ears are rounded with very short hairs outside.

“The bare planta on the hind feet extends further towards the heel than in the more typically arboreal squirrels, *S. caniceps*, *S. atrodorsalis*, and *S. Phayrei*, in which the bare portion ends about $\frac{1}{2}$ to $\frac{2}{3}$ of an inch from the proximal extremity of the tarsus, whereas in *S. Mouhotii* it extends to the joint. The claws too in *S. Mouhotii* are rather less curved, and the pads on the feet appear more raised.”

Length of adult female—head and body 7·3; tail 5·8; total 13·1 inches.

Martaban and Tenasserim (where rare).

S. MACCLELLANDII, Horsfield.

S. Pembertonii, Blyth.

S. Barbei, Blyth.

Olive-brown, each hair having a dark-brown or blackish tip, a subapical yellow band and a slaty base. A pale yellow band from the nose to the tail, which involves the orbit. This band is marginal above, with a dusky line. A narrow black vertebral line from the shoulders to the tail. Ears end in a distinct white pencil. Under parts dusky yellowish-white, or greyish, washed with yellow.

Ranges from Nipal to Tenasserim and Siam, and is found at Pensee, in Yunnan, at 3500 feet elevation.

S. QUINQUESTRIATUS, And.

Above olive brownish-grey, grizzled and with a rufous tint, deepest on the back. A rufous grizzled blackish brown band along the median line of the belly, and on either side of it a broad pure white band. A broad black band from the axilla along the sides of the belly. Inside of limbs blackish. Tail concolorous with the body (but the annulations coarser) and black tipped.

Head and body 9.50; tail 7.10 inches.

Inhabits the Kakhyen Hills, at 3000 feet, and seems to have a limited distribution.

S. PREVOSTII, Desmarest.

S. Rafflesii, Vigors and Horsfield.

S. piceus, Peters.

S. rufogularis, Gray.

S. rufonigra, Gray.

S. erythromelas, Temm.

S. atricapillus, Schl.

S. Borneoensis, Gray.

Macrozus Sarawakensis, Gray.

M. Pluto, Gray.

Upper parts black. Tail black with red tip. Below rich maroon red. Sides of the face, neck and shoulders greyish. A broad yellowish white line runs from the axilla along the side and over the outside of the thigh to the heel.

Head and body 10.50; tail 10.30; total 20.80 inches.

Sumatra, Borneo, Banka, The Celebes and Tenasserim.

The various local races have received many distinctive names; but Anderson unites all under one species.

PTEROMYS, *Cuvier*.

Skin of the sides lax, and capable of extension to form a parachute. Dentition as in *Sciurus*. Tail usually round, like a bottle brush; in some species distichous (*Sciuropterus*).

P. CINERACEUS, Blyth.

Fur pale-greyish, mixed with brown, with many white-tipped hairs, which impart a hoary appearance to the surface. Tail whitish, with a black tip. The upper surface of the parachute is reddish-brown, ungrizzled. The under parts are white.

Ranges from Arakan to Tenasserim, where it replaces *P. oral*.

P. YUNANENSIS, And.

Colour a rich dark maroon chestnut above, freckled with white, and posteriorly rather hoary. The terminal portion of the tail is glossy black. Under surface yellowish white, sometimes mesially tinged with chestnut.

Body 24; tail 24 inches.

Inhabits Teng-yue-chow in Yunnan.

P. ALBONIGER, Hodg.

Back and tail pale brownish-grey. Parachute externally rich brown. Fur slaty at its base, then brown, and terminally yellow, with an occasional brown tip.

From Nipal to Burma and Western Yunnan.

P. HORSFIELDII, Waterhouse.

P. aurantiacus, Wagner.

P. Phayrei, Blyth.

Upper parts and tail rich uniform rufous brown. Tail below bright rusty, bushy and distichous. Sides of the face and margin of the parachute reddish yellow; dorsal surface of parachute dark brown. Below yellowish white, the hairs without a dark base. The hairs of the upper parts with a grey basal portion.

Body 9.00; tail 8.25 inches.

Ranges from the Malayan Peninsula into Tenasserim.

P. SPADICEUS, Blyth.

Above bright rusty bay, below white, with the parachute, limbs and tail dusky. The terminal third of the tail pale rufous.

Body 5.0; tail 4.25 inches.

Inhabits Arakan.

Family *Muridæ*.

Much, very much has yet to be done before any clear notion of the number of species of these perplexing animals can be arrived at. Flat and dried skins are next to useless for discriminating between allied species, and the animals should be preserved in spirits for the examination and comparison of a large series.

Under the heading of "White-bellied Rat," Mason remarks that "the Rats are scarcely second to the Termites for the mischief they perpetrate. They burrow in the gardens and destroy the sweet potatoes; they make their nests in the roofs by day and visit our houses and larders by night. They will eat into teak drawers, boxes, and book-cases, and can go up and down anything but glass. In the province of Young-ngoo they sometimes appear in immense numbers before harvest and devour the paddy like locusts. In both 1857 and 1858 the Karens on the mountains west of the city lost all their crops from this pest; and it is said that they are equally destructive occasionally in the eastern districts, but have not appeared for several years. The natives say it is the same Rat as the one that frequents houses."

Again, he remarks that Mr. Cross, when on the Tenasserim river a few months ago (in 1858), wrote—"The people, in common with all who grow the hill paddy, over an extent of country more than fifty miles square, are suffering a famine of rice. This is occasioned by swarms of Rats, which devoured the paddy, or rather cut down the stalks, just as the ears began to fill. The Rats twice visited some parts of this territory during the season, so that scarcely a stalk of rice escaped them. I met with two of these animals, swimming the Tenasserim where it is more than a quarter of a mile wide, and succeeded in capturing one. The animal is about five inches from the nose to the end" (base?) "of the tail, of a slim and nimble appearance, the belly white, and the rest a mouse colour. During the rains, when the river is much wider and more rapid, these Rats crossed in columns, as the people say, so abundantly that a boat, in passing through, caught bushels of them. They only make their appearance at long intervals, like the locusts of other places. It is said to be from twenty to thirty years since they visited the country before, to any great extent."

It would be out of place to attempt in a work like the present any account of the synonymy of the Burmese species of *Mus*, but some of the principal ones are extracted from a copy of Blyth's memoir of the rats and mice of India, in my possession, corrected by the author, and six new species added, collected by Anderson in Yunnan.

Mus, *Linnaeus*.

M. (*NEOKIA*) *INDICA*, Geoffroy.

Arvicola indica, Gray (Hardw. Ill. Ind. Zool.).

Mus (*Neotoma*) *providens*, Elliot (Mad. Jour. Lit. Soc. 1839, p. 209).

Mus *Kek*, Gray (Mag. Nat. Hist. 1837, p. 585).

Mus *Hardwickii*, Gray (*idem*).

Mus *pyctoris*, Hodgson.

Nesokia Griffithi, Horsfield (Moore's India House Cat. Mamm.).

This is the type of Gray's genus *Neokia*, whose chief claim to separation would seem to be based on its somewhat more powerful incisors and a fancied resemblance

in aspect and habits to *Rhizomys*, which Blyth, who has studied both animals during life, declares his inability to see. It is not certain if this animal ranges into Burma, though Blyth remarked on the probability of its occurrence in the dry region of the Upper Irrawaddy, and I referred to it a pair taken beneath my house at Toung-ngoo, which measured—Male, head and body 9·75; tail 7·25; total 17 inches. Female, 8·5 and 6; total 14·5. Blyth remarks he has never seen the tail more than 5·5 inches, but as the animals were large and old ones, they could not have been ‘Bandicoots,’ and there is no other species which it resembles. The female above noted had besides 16 mammæ.

M. BANDICOOTA, Bechstein.

M. giganteus, Hardwicke.

M. perchal (Pennant), Shaw.

M. malabaricus, (Pennant), Shaw.

M. nemorivagus, Hodgson (Ann. Mag. N. H. 1845, p. 206).

M. (Neotoma) giganteus, Elliot (Mad. Jour. Lit. Soc. 1839, p. 209).

M. setifer, Horsf. (nec apud Cantor).

The ‘bandicoot’ or pig-rat. Myae-kywet.

The occurrence of this rat in Burma rests on Mason’s authority, who gives the above vernacular name for it, but no details, and as it occurs in Siam and the Malayan Peninsula, it may not improbably occur in Burma likewise. Hardwicke describes a female as measuring—Head and body 13·5; tail 13·0; total 26·5 inches, and weight 2lbs. 11½oz. and the males attain 3lbs.

Good Burmese specimens of both the above species are wanted to establish correctly their range and distribution.

M. DECUMANUS, Pallas.

M. Norvegicus, Baffon.

M. decumanoides, Hodg. apud Gray (nec Waterhouse, nec Horsfield).

M. brunneus, Hodg. Gray (nec Blyth).

The common brown rat.

Colour above dusky, cinereous brown with a yellow tinge. The short hairs slaty at base with yellow tips, the longer hairs blackish. Below dirty pale ash.

Head and body 10·5 inches; tail 8·25; total 18·75.

Introduced at the ports by ships, whence it has spread into the interior.

M. ANDAMANENSIS, Blyth (J. A. S. B. xxix. p. 103).

M. Nicobaricus, Scherzer? (Zool. Novara Exp.).

M. setifer, Horsf. (apud Cantor).

Colour and ears much as in *M. decumanus*, but the fur darker on the back and paler on the sides; the long piles being flattened and spinous.

Head and body 8 inches; tail 8; total 16 inches.

The indigenous rat of the Andaman Islands.

M. CAUDATIOR, Hodgson.

M. cinnamomeus, Blyth.

Colour bright cinnamon, with inconspicuous black tips, and below white, the two colours abruptly divided.

Length—head and body 6; tail 7·75; total 13·75 inches.

Inhabits the Sittoung Valley. (Shwe-gyeen.)

M. ROBUSTULUS, Blyth (Jour. As. Soc. B. xxviii. p. 294).

M. rufescens (Auctorum, of Burma).

M. Bordinorei, Blyth? (Jour. As. Soc. B. xx. p. 173).

Colour dark grey, scarcely rusty, with much black intermixed. Fur coarse and hispid. Feet and belly white. Rodentia tusks yellow. Tail thinly clad. Mammæ 12. Inhabits Pegu and Tenasserim.

A large male from Rangoon measured—

Head and body 7·20; tail 7·20; total 14·40 inches.

M. BOWERSII, And.

Uniformly grizzled blackish-brown above, paler on the sides. Feet, tail tip, and belly pale yellow; the pale and dark colouration distinctly defined. Feet strong. Claws short and strong. Pads well developed. Ears ovate. The last molar consists of a broad anterior fold and a small one behind it.

Head and body (female) 9·00; tail 10·26=19·26 inches.

Hotha at 4500 feet.

M. SLADENI, And.

Reddish-brown, many of the hairs with broad yellow tips. Cheeks greyish-rufous. Throat and chest white. Belly and under parts yellowish-white. Feet and pads well developed. Ears large and rounded. Claws somewhat long and sharp.

Head and body (female) 6·30; tail 7·20=13·50 inches.

Burma and the Kakhyen Hills at 3500 feet.

This species is closely allied to *M. nitidus*, Hodg., but has a less elongated skull, shorter nasals, and a more abrupt frontal contraction.

M. RUBRICOSA, And.

Above dark rusty brown, paler on the head and shoulders. Sides tinged with grey. All the under parts silvery white verging to grey, with a faint yellowish hue. Ears small and pointed. Hind feet long and narrow. Claws sharp. The skull is distinguished from that of *M. Sladeni* by its elongated nasals, which reach back to behind the posterior border of the supraorbital foramen, while in *M. Sladeni* the nasals barely project behind its anterior border.

Head and body (male) 5·70; tail 5·15=10·85 inches.

Inhabits houses at Poosee and Hotha.

M. YUNANENSIS, And.

Above dark rich brown, with intermixed pale hairs with broad brown tips. All the under parts yellowish, marked with rufous. Ears large and rounded. Claws compressed, curved, strong and sharp.

Head and body (female) 5·45; tail 6·15=11·60 inches.

Inhabits Poosee and Hotha.

This is the common house rat of the country. Its skull resembles that of *M. Sladeni*, but has a shorter muzzle.

M. CONCOLOR, Blyth.

Common small thatch rat.

Colour rusty brown above, paler below.

Inhabits Pegu and Tenasserim.

"This species conducts from the long-tailed arboreal rats to the ordinary house mice" (Blyth).

M. BANIUS, Blyth.

Colour above rufous chestnut, below white.

Resembles *M. oleraceus* of India, "but the eye fully twice as large, and black whiskers" (Blyth).

A female from Schway-gyeen measured—head and body 3; tail 4½ inches.

M. PEGUENSIS, Blyth.

Colour pale fulvescent olive-brown above, slightly yellowish-white below. Fur full and dense. Tail well clad. A field mouse.

Head and body 3½; tail 3½; total 7 inches.

"A particularly well distinguished species, of which there is an unmistakable specimen marked from the Philippines, in the Derby Museum, Liverpool" (Blyth).

M. URBANUS, Hodg. (Ann. Mag. N. H. 1845, p. 269).

M. dubius, Hodg.

M. musculus, apud Elliot and Kelaart.

M. Manei, Gray (undescribed).

The common house mouse of India.

Colour above embrowned, ruddy luteous, below luteous, more or less rufescent. Head and body $2\frac{3}{4}$; tail $2\frac{3}{4}$; total $5\frac{1}{2}$ inches. Resembles the English mouse (*M. musculus*), but has smaller ears, larger eyes, narrower paws and the tail one-fourth longer, measuring 3 inches in *M. musculus* and 4 in *M. urbanus*. Has been received from Port Blair, where doubtless introduced.

M. NITIDCLUS, Blyth.

Colour as in *M. decumanus*, with the under parts subdued white, tolerably well defined. Rodentia tusks conspicuously larger than in *M. musculus* or *M. urbanus*.

Head and body 3.25; tail 3.25; total 6.50 inches.

Type from Schway-gyeen.

M. KAKHYENSIS, And.

Fur long, dense, and soft, reddish-brown above, with a speckled appearance due to the stronger hairs having brown tips. Under parts silvery greyish white. Ears brown. Tail brown, paler below. Ear large and rounded. Claws compressed, curved, and sharp.

Head and body (female) 2.90; tail 3.36=6.26 inches.

Ponsee, in the fields.

This species differs from *M. urbanus* by its relatively shorter tail and larger ears. The nasals too are more elongate, and carried farther back than in *M. urbanus* or *M. homurus*.

M. VICILORUM, And.

Fur short, soft and dense, dull dark-brown, tending to blackish on the back, and passing into pale dusky brownish below. Ears and tail brown. Toes with shining greyish yellow hairs. Ears somewhat large, rounded. Claws compressed, moderately long and sharp.

Head and body (female) 2.90; tail 3.14=6.04 inches.

Inhabits Ponsee and houses of the Kakhyens.

M. OLERACEUS, Bennett.

Rich rufous or chestnut red, paling to brown on the ears and muzzle. The cheeks and under parts white, with a yellowish tinge. Eye rather large. Ear rather large and rounded. Claws short.

Head and body (female) 2.41; tail 3.65=6.06 inches.

From Nipal to Burma.

Anderson describes his specimens as having no "true claw," but only a "flattened nail," on the first and fifth digits, the unguis cushions on which are moreover full and rounded and not compressed as on "clawed digits." Three well-distinguished species of mice from the Khasi Hills have also been described: *M. cuneularis*, Blyth; *M. erythrotis*, Blyth, and *M. glyroides*, Blyth (J.A.S.B. xxiv. p. 721).

According to Mason, "There is a water rat throughout the country which burrows in the banks of streams, and takes to the water, when pursued."

HAPALOMYS, Blyth.

Limbs short, toes remarkably corrugated beneath, the balls of the unguis phalanges greatly developed, and protruding beyond the minute claws of the fore feet, and equally with the more developed claws of the hind feet. Tail very long, the terminal fourth being remarkably flattened, and furnished with hair more developed than perhaps in any other truly *marine* form. Dentition as in *Mus*, but rodentia tusks broader and flatter.

H. LONGICAUDATUS, Blyth.

Fur long and soft, above brown, white below. The hair of the upper parts is for its basal two-thirds slaty, then glistening brown, with black tip. Whiskers long, fine and black. A tuft of fine black hair anterior to the ears.

Head and body (male) 5.75; tail 7.25=13.00 inches.

Inhabits the valley of the Sittoung (Schwagheen).

Family Spalacidae.

RHIZOMYS, Gray.

Head large, with large rodential tusks. Body massive. Eye small. Ears naked. Feet short, strong. Tail short, thick, naked. Molar teeth rooted at all ages, "even before they have appeared externally" (Anderson). Burrowers and nocturnal.

R. CINEREUS, MacClelland.

R. Sumatrensis, Raffles.

R. dekan, Temm.

The large bamboo rat. Pwai.

The original name *Sumatrensis* is inapplicable, as the animal has not been found in Sumatra. The native name *dekan* substituted by Temminck is equally objectionable, as, according to Anderson, it has led to the absurd idea of the animal occurring in India ("the Dekkan"), so that MacClelland's name would seem to claim recognition.

This species possesses always the white head spot, and in the young the head is particularly rufous, suggesting, says Anderson, a "general resemblance to that of the nearly allied form *Siphneus*." It grows to about 2 feet in length, of which the tail measures a fourth. This species inhabits the Malayan Peninsula and Siam, and perhaps ranges into Tenasserim.

R. ERYTHROGENYS, And.

Allied to *R. Sumatrensis*, but distinguished by its "light red cheeks" and by the "absence of white spots on the forehead." Upper parts dark iron grey, becoming almost black on the top of the head, where it abruptly ceases in a point between the eyes. Lower parts white, more or less tinged with grey, and reddish.

Head and body (female) 14.75; tail 5.35 = 20.10 inches.

Inhabits Martaban and Tenasserim.

This species is based on a living female from the Salween Valley and a specimen from Tenasserim.

R. PRUINOSUS, Blyth.

Above brown, grizzled with white. The hairs at their base slaty and many of them white tipped. Under parts similar to the upper, but less grizzled. Ears, nose and feet dusky carmineous.

Head and body (male) 13.00; tail 4.00 = 17.00 inches. Females are smaller.

Ranges from the Cherra plateau to the Kakhyen Hills and to Cambodia.

The skull of this species, says Anderson, is not only larger than that of *R. badius*, but more expanded and flattened in the frontal region. In the present species also the premaxillaries do not extend behind the nasals, which they do in *R. badius*, and almost embrace their hinder extremities.

R. BADIUS, Hodg.

R. castaneus, Blyth.

Fur fine, the hair for its basal two-thirds grey, and its terminal third some shade of chestnut, brightest on the head, and dullest on the rump. Muzzle and chin greyish-brown.

Head and body 7.00; tail 2.45 = 9.45 inches.

Ranges from Nipal into Arakan and to the Kakhyen Hills.

R. MINOR, Gray.

Allied to the two preceding species, but of a dusky-brown colour, with white muzzle and around the eye, and pale naked feet. Blyth observes: "I obtained a living specimen of this animal when in Upper Martaban, but the skin of it got spoiled; and I at once recognized the same species in two drawings of it as obtained in Siam by Capt. Finlayson. It has likewise been obtained at Yanangeen, on the Irrawaddy. It is even included, together with *R. sinensis*, Gray, in Mr. H. Walker's 'Catalogue of the Mammalia of Assam' (*ibid.* iii. p. 267); but both species are there in need of verification. Mason remarks that 'this animal, which burrows under old

bamboo roots, resembles,' to some extent, 'a Marmot more than a Rat, yet it has much of the Rat in its habits. I one night caught a specimen gnawing a coco-nut, while camping out in the jungles.' According to Mason the Bghais call the Bamboo Rat *Khat*, and they say that there is the Bamboo Khai, the Reed Khai, the Maranta Khai, and the *Hie*, a very small species of the same tribe." In *R. Sumatrensis* the fur is thin and bristly. The other three here given are smaller animals, with shorter tail and the fur soft and dense.

The Bamboo Rats are inoffensive animals, seldom seen out of their burrows. Dr. Anderson remarks: "The young are quiet and inoffensive, but the ferine adults, more especially the males, are very fierce, and at once show fight, without thinking of retreating, emitting a peculiar hissing grunt as they charge. The female also, when in company of the young, becomes greatly excited when captured, and I have seen one in these circumstances, when her own young were placed beside her, rapidly kill them off, one after another, as they fondled her and searched for her teats to suck, but on the other hand in confinement I have known an adult female to be perfectly docile."

Family Hystricidæ.

Dentition, I. $\frac{0}{0}$; R.T. $\frac{2}{2}$; P.M. $\frac{2}{2}$; M. $\frac{0}{0}$.

Clavicles imperfect, attached to the sternum only.

HYSTRIX, *Linnaeus*.

The body covered with spines, some stout and rigid, others long and flexible. Tail terminates in a brush of open tubes, of a parchment-like material, supported on slender stalks, which when violently agitated produce a rattling sound.

H. BENGALENSIS, Blyth.

Crest small and thin. The body spines flattened, grooved, and terminating in a slight seta. Flexible quills white, with a black central band. Thick quills white towards the base, the rest black, with a white tip. A distinct white gorget.

Head and body 28; tail 8 inches.

Ranges from Bengal into Arakan.

H. YUNANENSIS. Andamans.

Very near to *H. (Acanthion) Javanica*, but possessed of a moderate crest, and equally near or nearer to *H. sub-cristata*, Swinhoe, from which Anderson dissociates it on the presumption from Swinhoe's remarks that that species is not an *Acanthion*, as the present one is. Colour dark brown on the head, neck, shoulders and sides, passing into deep black on the extremities. A narrow white line from the gape to the shoulder. Below whitish. In the skull the nasals terminate anteriorly to the orbit, and even before the anterior angle of the external portion of the lacrymal.

The country East of the Kakhyen Hills, between 2000 and 4500 feet.

The porcupines of Burma have not been properly determined, and Blyth only doubtfully refers the common species to *Bengalensis*, and alludes to the probable occurrence of *H. longicauda* also in Tenasserim. Dr. Mason observes, "An individual lately turned up in my compound, and it was amusing to see how the animal defended itself. When pursued, it uniformly rushed into the nearest corner, put down its head, as if it would conceal itself, erected its quills like a hemisphere of spears, and shook together the quills of its tail, which produced a rattling noise in tones of defiance. In that position it seemed fearless of all attacks."

Family Leporidæ.

Dentition I. $\frac{0}{0}$; R.T. $\frac{1}{1}$; P.M. $\frac{1}{1}$; M. $\frac{0}{0}$.

LEPUS, *Linnaeus*.

L. PEGUENSIS, Blyth.

Pegu hare. Phu-goung.

Distinguished from *L. ruficaudatus* of India by the tail being black above. Tho

colour of the upper parts contrasts sharply with the white of the belly, instead of grading into it. The fur above is basally dusky-grey, thin, black, and finally fulvous-brown, with black extreme tips (size as in *R. ruficaudatus*).

Inhabits the open country in Northern Pegu.

Order CHIROPTERA.

The fore limbs with four elongated ulnar digits united by a membranous extension of the integument. Mammaræ pectoral.

Sub-order MEGACHIROPTERA.

Frugivorous bats.

Crowns of the molar teeth smooth, marked with a longitudinal furrow. Bony palate continued behind the last molar. Index finger generally terminating in a claw. Pyloric extremity of the stomach greatly elongated.¹

Fruivorous. Limited to the tropical and subtropical regions of the Eastern hemisphere and Polynesia.

Family Pteropidæ.

PTEROPUS, Brisson.

Muzzle long, narrow and cylindrical. Upper lip with a vertical groove in front, bounded laterally by naked prominences. Index finger with a distinct claw. Tail none.

Dentition, I. $\frac{1}{1}$; C. $\frac{2}{2}$; P.M. $\frac{1}{1}$; M. $\frac{2}{2}$.

P. MEDICUS, Tem.

P. Edwardsii, Geoffroy.

P. leucocephalus, Hodgson.

P. Assamensis, MacClelland.

Len-hwai. The Indian flying fox.

The nape of the neck and shoulders are usually reddish yellow, or golden yellow, or pale straw-colour; the varying colours depending on sex, age and season, females being darker than males. The remainder of the fur is blackish or dark brown, often grizzled with greyish hairs.

Length of a male, head and body, 10·5 inches.

“This large bat has been very appropriately named the “Flying fox.” for it bears a strong resemblance to a small fox in everything but its wings. Nor is it very small. Adults measure from three to four feet across the wings from tip to tip. They abound on the coast, and it is quite impossible to keep ripe fruit from their depredations without inclosing it in basket-work.” A good description of this animal was given by Lieut. Tickell in the Calcutta Journal of Natural History, who remarks: “It must have been a familiar sight to many to see some huge tree in the centre of a village, on the skirts of a forest, or in the midst of a wide plain, garnished by hundreds of the dangling bodies of these animals. A person stationed near such a spot at the first break of dawn might see the Pteropi come stealing back to their retreat from all quarters. From the arrival of the first comer, until the sun is high above the horizon, a scene of incessant wrangling and contention is enacted amongst them, as each endeavours to secure a higher and better place, or to eject a neighbour from too close vicinage. In these struggles the bats hook themselves along the branches, scrambling about hand over hand with some speed, biting each other severely, striking out, with the long claw of the thumb, and shrieking and cackling without intermission. Each new arrival is compelled to fly several times round the tree,

¹ The descriptions of species of this order are condensed from those contained in the admirable monograph of Asiatic Chiroptera by G. G. Dobson, M.A., F.L.S., etc., London, 1876.

being threatened from all points, and when he eventually hooks on, has to go through a series of combats, and be probably ejected two or three times before he makes good his 'tenure.' The 'alarums' and 'excursions' continue till 8, 9, or 10 A.M., when the bats get sleepy, and hang side by side in peace, fanning themselves with their wings, which in repose they wrap around the head, slumbering with the chin on the breast, and the muzzle covered by the membrane of the last phalanges. The usual noises of a village, in the centre of which they often select their roosting-place, do not appear to disturb them, or to cause further stir, than the production of two or three heads, from within their mantles, which after a look on the houses and people below, and a few rapid tremulous movements of the ears, are again popped into their envelopes. The report of a gun causes dreadful commotion. They rise in clouds from the tree, and continue circling round and round, having to fight their battles over again, when left to settle, and to go through the whole scene, shrieking, cackling and contention of the morning. . . The flying fox is easily tamed. It will eat or drink from the hand a day or two after capture even when wounded. It drinks eagerly at all hours, lapping milk or water with its long pointed tongue, and it readily learns to eat in the day-time as well as at night. 'Hookey,' as a tame one has been named, has become perfectly familiar, rather fearless than tame, for he attacks the approaching hand, tooth and nail (literally), although he will eat and drink from it. He is accommodated with a high narrow box, having a projecting grating, to which he hangs suspended, endeavouring to grapple all passers, with sound hook or thumb claw (one being broken in capture), to see whether they have any eatables upon them. When angry, he opens his mouth, growling or cackling in the fashion of a monkey, and striking out forcibly with the aforementioned claw or hook. If the contest wax too warm for him, he swings round, and strides back into the box, head downwards all the time, of course." These animals are very cleanly in their habits, and when about to void their excrement, adroitly reverse their position by letting go with their feet and holding on with their thumb-claws, when, as Ticklell remarks, there is "with reference to its own head, no further occasion for precaution!" They are much infested with a very nimble spider-shaped tick. There is but one species throughout India and Burma; unless *P. edulis*, Geoffroy, also should prove to range into Southern Tenasserim.

P. NICOBARICUS, Fitz.

P. melanotus, Blyth.

Resembles *P. medius*, but the skull differs in being shorter, wider across the maxillary and nasal bones, and in having all its processes and crests more strongly developed, and in the foramen ovate being divided by a process of bone, which is wanting in *P. medius*.

Inhabits the Nicobar and Andaman Islands.

CYNOPTERUS, F. Cuvier.

Muzzle much shorter and comparatively thicker than in *Pteropus*, but otherwise similar. Tail present, save in *C. ecaudatus*, from Sumatra. The shortness of the muzzle causes the suppression of the last molar.

Index finger with a claw.

Dentition, I. $\frac{1}{4}$ or $\frac{1}{2}$; C. $\frac{2}{2}$; P.M. $\frac{1}{1}$; M. $\frac{4}{4}$.

Sub-genus CYNOPTERUS. Incisors $\frac{1}{1}$.

C. (PTEROPUS) MARGINATUS, Geoff.

Pteropus tittheachilus, Tem.

Pachysoma Diardii, Is. Geoffr.

P. Duvaucellii, Is. Geoffr.

P. brevicaudatum, Is. Geoff.

P. Luzoniense, Peters.

Pteropus pyrivorus, Hodgson.

Cynopterus Horsfieldii, Gray.

Eleutherura marginata, Gray.

Colour of fur very variable; dark-brown, reddish-brown, smuff-brown, olive-brown; and during the breeding season the male is distinguished by a collar of stiff radiating reddish yellow hairs, the coarseness and colour of which appear to depend upon the presence of glands on the sides and on the inferior surface of the neck, similar to those on the shoulders of most species of *Pteropus*. Eyes white margined.

Length of male, head and body, 4·4 inches.

Inhabits the whole of India, Arakan, Pegu, Tenasserim, and the Andaman Islands.

Blyth says this is an "extraordinarily voracious feeder, and will devour more than its own weight at a meal, voiding its food, apparently but little changed, while slowly munching away."

This statement is corroborated by Dobson, who writes (Monograph Asiatic Chiroptera, p. 25): "To a specimen of this bat, obtained by me at Calcutta, uninjured, I gave a ripe banana (plantain), which, with the skin removed, weighed exactly two ounces. The animal immediately, as if famished with hunger, fell upon the fruit, seizing it between the thumbs and the index fingers, and took large mouthfuls out of it, opening the mouth to the fullest extent, with extreme voracity. In the space of three hours the whole fruit was consumed. Next morning the bat was killed, and found to weigh one ounce, half the weight of the food eaten in three hours! Indeed the animal when eating seemed to be a kind of living mill, the food passing from it almost as fast as devoured, and apparently unaltered, eating being performed alone for the sake of the pleasure of eating."

C. BRACHYOTUS, Müll.

C. marginatus, var. *Andamensis*, Dob.

Resembles *C. marginatus*, but the ears are much smaller, 0·7 long, 40·4 broad, against 0·95 and 0·6 in *C. marginatus*.

Inhabits the Andaman Islands.

C. BRACHYSOMA, Dobson.

Body short and thick. Fur slaty blue, with a greyish or silvery tinge, the tips of the hairs sooty-brown.

Length of adult female, 2·9; tail 0·25=3·15 inches.

Inhabits the Southern Andaman Island.

C. SCHERZERI, Fitz.

Resembles *C. marginatus*, but its ears are much smaller and not margined with white.

Length of adult female 3·70; tail 0·55=4·25 inches.

Inhabits Car-Nicobar Island. Found beneath the leaves of cocoa-nut palms.

CYNOXYCTERIS, Peters.

Muzzle long and cylindrical, upper lip with a wide groove in front, with smooth not elevated margins. Index finger with a claw. Tail short.

Dentition, I. $\frac{4}{4}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$; M. $\frac{6}{6}$.

C. (PTEROPUS) AMPLEXICAUDATUS, Geoff.

Pteropus Leschenaultii, Desmar.

P. seminudus, Kelaart.

Head long, triangular. Upper lip with a wide groove directly continuous with the emargination between the nostrils. The edges of the groove smooth, not thickened as in *Pteropus* and *Cynopterus*. Ears moderate, triangular, rounded at the tips. Fur short, from dark olive or smoky-brown to reddish or yellowish-brown. First lower premolar small, not half the size of next one.

Length of male, head and body, 4·3; tail 0·65 inches.

Inhabits Bengal, Southern India, Burma, etc.

EOXYCTERIS, Dobson.

Muzzle long and cylindrical, upper lip with a shallow vertical groove. Index finger without a claw. Tail short.

Dentition, I. $\frac{4}{4}$; C. $\frac{2}{2}$; P.M. $\frac{1}{1}$; M. $\frac{6}{6}$.

E. SPELEA, Dobson.

Head long, abruptly narrowed in front of the eyes. Tongue very long and pointed. Fur of a uniform dark colour. Tail about half an inch, half inclosed in the narrow interfemoral membrane as in *Cynonycteris*.

Length of male, head and body 4.5; tail 0.55 inches.

Inhabits the Farm Caves near Maulmain.

MACROGLOSSUS, F. Cuvier.

Muzzle cylindrical. Upper lip not grooved in front. Tongue very long and attenuated. Index fingers with a claw. Tail very short. Wing membrane from the base of the fourth toe.

Dentition, I. $\frac{4}{4}$; C. $\frac{2}{2}$; P.M. $\frac{1}{1}$; M. $\frac{6}{6}$.

M. (PTEROPUS) MINIMUS, Geoffroy.

Pteropus rostratus, Horsfield.

Muzzle cylindrical, very long and narrow. Tongue long, attenuated in its terminal third, and covered with numerous brush-like papillæ. Fur reddish-brown. Upper incisors in a triangular series, very small, scarcely raised above the level of the gum, each tooth separated from the next by an interval.

An adult female, head and body 2.3 inches.

Inhabits the Himalayan Mountains, Burma, etc.

Eonycteris and *Macroglossus* are social bats tenanted caves in frequently incredible numbers, from which they issue at dusk in a living stream, which has been not inappropriately likened to the smoke from a ship's funnel. Mr. Alfred Hough has noticed that at the Pahghat cave above Kaugoon, numbers of Kites and Hawks assemble near the caves at evening and seize and devour numbers of the bats when they first issue forth.

The 'guano' afforded by the species inhabiting the Farm Caves, and others in the Martaban district, is collected by Chinamen in Maulmain for use in their gardens.

Sub-order *MICROCHIROPTERA*.

Insectivorous bats.

Crowns of the molar teeth acutely tubercular, marked by transverse furrows. Bony palate not continued laterally behind the first molar. Index finger not terminated by a claw. Stomach simple, or with the cardiac extremity more or less elongated. Carnivorous, feeding principally on insects, but the larger species devour small vertebrata as well, such as frogs, sparrows, and the smaller bats themselves. Distributed through the temperate and tropical regions of both hemispheres.

Without plates it is impossible to convey an adequate idea of the curious nasal appendages of many members of this division of Chiroptera, but full descriptions and plates are contained in Dr. Dobson's Monograph on the Asiatic Chiroptera, from which the present notes on the species of Bats inhabiting Burma have been mainly derived.

Family *Rhinolophidæ*.

RHINOLOPHINE.

First toe with three, the remaining toes with two joints each.

RHINOLOPHUS, Geoffroy.

Nose-leaf very complicated, consisting of three distinct portions, anterior, central and posterior. The anterior horizontal portion is horseshoe-shaped, usually angularly emarginate in front, containing within its circumference the nasal orifices, and the central erect nasal process; the posterior nose-leaf is triangular, erect, and with cells on its anterior surface; the central process rises between and behind the nasal orifices,

is flattened anteriorly, and posteriorly sends backwards a vertical, laterally compressed process, which is either connected with the front surface of the posterior nose-leaf, or is free.

Dentition, I. $\frac{2}{4}$; C. $\frac{2}{2}$; P.M. $\frac{3}{3}$; M. $\frac{3}{3}$.

Second lower premolar minute and placed exteriorly to the rest. First upper premolar minute, pointed, standing in the row with the rest or jammed in the outer angle between the closely approximated canine and second large premolar.

R. LUCRUS, Tem.

R. morio, Gray.

R. perniger, Hodgson.

This is the largest of the genus, and remarkable for its peculiar and highly developed nasal appendages. Fur long and dense, usually of a jet black colour, with grey tips to the hairs, whence its specific name, but all shades of reddish-brown have been observed.

Adult male, head and body 3.6; tail 2.25 inches. Breadth of horseshoe 0.65. Females are a trifle smaller.

Ranges from Nipal to Sikkim and the Khasi Hills to Java, and doubtless is to be found in suitable spots in Burma, that is, on the higher mountain ranges. Capt. Hutton described this species as flying rather early in the evening and low, or between 20 and 30 feet from the ground, round buildings and large trees in search of beetles. It appears to be a solitary species found in pairs, and not congregating together as some of its congeners.

R. AFFINIS, Horsfield.

R. Rouxi, Tem.

Ears shorter than the head, acute. Horizontal horseshoe-shaped membrane moderate, not extending so far in front or laterally as to conceal the sides of the muzzle when viewed from above. Extreme tip of the tail projects from the interfemoral membrane.

Colour varies from greyish or reddish-brown to golden orange-brown.

Length 2.3; tail 0.90 inches.

Inhabits India and Burma.

R. ANDAMANENSIS, Dobson.

Resembles *R. affinis*, but the anterior horizontal horseshoe-shaped membrane is very broad, completely concealing the muzzle when viewed from above. Fur bright reddish-brown above and beneath.

Length of a male, head and body 2.5 inches.

Inhabits the Southern Andaman Island.

R. PEARSONI, Horsfield.

R. larvatus, A. Milne-Edwards.

R. Yunnanensis, Dobson.

Ears large, acutely pointed. Nose-leaf large. Horseshoe broad, projecting laterally and in front beyond the upper lip, so as to conceal the muzzle from above. Tail short, and wholly inclosed save the tip. Fur uniform dark-brown above and beneath, very long and dense.

Head and body 2.7; tail 0.9 inches.

Inhabits the Himalayas, Tibet and Yunnan.

R. MINOR, Horsfield.

R. pusillus, Tem.

Horizontal nose-leaf as in *R. affinis*. Lower lip with three vertical grooves. Fur light brown above, greyish-brown beneath.

Length—head and body 1.75; tail 0.85 inches.

Inhabits Yunnan and Burma.

R. GAROENSIS, Dobson.

Closely allied to *R. minor*, Horsf., from which the broad terminal portion of the

nose-leaf, not emarginate on the sides, distinguishes it. Wing membrane from the ankles; interfemoral membrane square, behind; the extreme tip of the tail free. It is the smallest species of the genus.

Length of head and body 1·5; tail 0·7 inches.

Inhabits the Garo Hills, Assam, and will probably be found in Arakan as well.

R. CÆLOPHYLLUS, Peters.

Ears large, with narrow acute tips projecting outwards. Chin marked with three small vertical grooves. Fur above brown, the hairs being white towards their base. Beneath, pale brownish white.

Length—head and body 2·0; tail 0·8 inches.

Inhabits Martaban and Upper Burma.

PHYLLORHININÆ.

Toes equal, of two phalanges each.

PHYLLORHINA, Bonaparte.

Dentition, I. $\frac{2}{4}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$; M. $\frac{6}{6}$.

Many species are provided with a sac behind the nose-leaf, which can be everted at pleasure. The sides of the sac secrete a clammy substance, like the gular sac secretion of *Taphozous*, and its extremity supports a pencil of hairs of which the ends alone project, when the sac is inverted.

P. ARMIGERA, Hodgson.

Hipposideros diadema, Cantor.

P. Swinhoei, Peters.

This is the largest Asiatic leaf-nosed bat yet discovered, the fully expanded wings measuring nearly two feet across from tip to tip. Colour dark brown, usually paler towards the base of the hairs.

Adult male—head and body 4·2; tail 2·1 inches.

From Nipal to the Khasi Hills and China (Amoy), and doubtless found in suitable localities in Burma.

P. LEPTOPHYLLA, Dobson.

This species is distinguished from the last by its considerably smaller size, by the upper transverse nose-leaf being simple, and not lobed as in that species, and by the incised front edge of the horseshoe, which in *P. armigera* is invariably plain.

Length of an adult male—head and body 2·5; tail 1·65 inches.

Type from the Khasi Hills, ranging doubtless into Arakan.

P. DIADEMA, Geoffroy.

Rhinolophus nobilis, Horsf.

R. griseus, Meyer.

Hipposideros lankadiva, Kelaart.

Ears moderate, acutely pointed, concave beneath the tip. Last caudal vertebrae free. Fur above pale shining buff, for two-thirds the length of the hair, the rest chocolate or reddish-brown, with ashy extremities. Beneath light greyish or buffy brown throughout.

Length—head and body 3·4; tail 2·3 inches.

Inhabits India and Burma.

P. MASONI, Dobson.

The concave front surface of the terminal nose-leaf is divided into two cells only, by a median vertical ridge. From the under surface of the symphysis of the mandible, a small conical bony process projects downwards, about equal to the lower canine tooth in vertical extent, and covered by skin. In other respects resembles *P. diadema*, of which it is probably a race, if not a mere individual variety.

Length—head and body 3·65; tail 1·65 inches.

Inhabits Martaban Province.

P. SPEORIS, Schneider.*R. Dukhunensis*, Sykes.*Hipposideros apiculatus*, Gray.*H. penicillatus*, Gray.

This species resembles *P. larvata*, but is distinguished by the absence of the incision in the front free edge of the horseshoe, and by the last caudal vertebrae being completely free from the interfemoral membrane.

Length—head and body of a male 2·4; tail 0·85 inches.

Inhabits Pegu and Upper Burma.

P. LARVATA, Horsfield.*R. insignis*, Tem.*Hipposideros vulgaris*, Blyth.

Variable as to colour and development of the facial appendages. Colour golden yellow for the basal three-fourths of the hair, the remainder dark ferruginous brown. Sometimes bluish-black, paler towards the base of the hair.

Length of male, head and body 2·8; tail 1·4 inches.

Inhabits Bengal, Arakan and Burma.

P. NICOBARENSIS, Dobson.

Ears large, acute. No frontal sac behind the nose-leaf. The last caudal joint alone free. Fur above, light-brown at the base, then greyish with light-brown tips. Beneath pale brownish.

Head and body 3·0; tail 1·1 inches.

Inhabits the Nicobars.

P. GALERITA, Cantor.*P. Labuanensis*, Tomes.*P. longicauda*, Peters.*P. brachyota*, Dobson.

Ears comparatively small, as broad as long. Frontal pore small, indistinct, not larger than in the females of *P. larvata*. Fur above light brown at the base, the terminal third of the hairs dark reddish-brown. Beneath similar, but paler. The fur on the shoulders and along the spine darker. Wings and interfemoral membranes very dark brown. The second upper premolar is separated from the canine by a wider interval than usual in this genus; in the midst of this space, but rather to the outside, the small, scarcely distinguishable first premolar is placed.

Length of head and body 2·0; tail 1·6 inches.

Inhabits Java, Pinang, India, and doubtless Burma.

P. BICOLOR, Temm.*Phyllorhina antricola*, Peters.

Ears as long the head. Fur above, reddish-chestnut, the basal three-fourths of the hair reddish-white. Beneath paler.

Head and body 1·9; tail 1·2=3·1 inches.

Inhabits the Nicobars, the Himalayas, and Java.

The next species only differs in having larger ears, and is regarded therefore as a subspecies only by Dobson.

P. (HIPPOSIDEROS) FULVA, Gray.*H. murinus*, Gray.*Rhinolophus fulgens*, Elliot.*H. atratus*, Kelaart.*P. aurita*, Tomes.*H. cineraceus*, Blyth.

Ears large, longer than the head. Fur above white for its basal three-fourths, the rest reddish-brown or black. Beneath white or pale yellowish white, the white colour both above and below sometimes replaced by brilliant golden yellow, with the tips above rich reddish-chestnut, the brilliancy of the fur of some individuals being

probably unequalled by any other mammal. Dr. Dobson once thought that this seasonal golden yellow fur in the Chiroptera was restricted to the pregnant females (P.Z.S. 1873, p. 250), but he subsequently thus modifies his former opinion, "However, during the second Yunan Expedition, Dr. Anderson obtained several males of this species in the same cave, all of which possessed this golden yellow colour, while males and females, obtained at the same time in adjoining caves, were of the common black and white kind. These very differently coloured animals differed, however, in no other respect, agreeing in structure in all respects and in measurements. The conditions under which this remarkable difference in colour occurs are therefore still unexplained; but the golden-yellow colour may be developed equally in males and females when the sexes come together, which may not occur at the same season for all" (Mon. Asiat. Chir. p. 71).

Length of adult male—head and body 1·9; tail 1·1 inches.

In Nicobar specimens the tail is 1·2.

The whole of India and Burma, ranging to Amoy.

Dobson remarks, "As *P. fulva* can be distinguished from *P. bicolor* by its larger ears only, I am unable to consider it more than a subspecies."

Family Nycteridæ.

Bats with distinct nose-leaves; large united ears with well-developed tragi. Upper incisors absent, or very small, in the centre of the space between the canines. Molars well developed with acute W-formed cusps.

Dentition, I. $\frac{0}{4}$ or $\frac{2}{6}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$ or $\frac{2}{4}$; M. $\frac{0}{0}$.

MEGADERMINÆ. Tail very short.

MEGADERMA, Geoffroy.

Nostrils at the bottom of a cavity at the end of the muzzle, concealed by the base of an erect cutaneous process. Tail short, in the base of the large interfemoral membrane.

Dentition, I. $\frac{0}{4}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$ or $\frac{2}{4}$; M. $\frac{0}{0}$.

M. SPASMA, L.

M. trifolium, Geoffr.

M. Philippinensis, Waterhouse.

Colour pale slaty blue, paler below.

Length of head and body, 3·4 inches.

Inhabits Tenasserim and the Malay Peninsula, etc.

This species closely resembles *M. lyra*, Geoff., which inhabits the whole of India, differing from it only in trifling points. Whether both species range into Arakan and Pegu is not known.

In a paper "On the Sanguivorous and Predaceous Habits of the Bats of the Genus *Megaderma*" (J.A.S.B. vol. xi.) the following interesting remarks are made by Mr. Blyth on the closely allied *M. lyra*, which apply to habits no doubt possessed by all its congeners. "Chancing one evening to observe a rather large bat enter an outhouse, from which there was no other egress than by the doorway, I was fortunate in being able to procure a light, and thus to proceed to the capture of the animal. Upon finding itself pursued, it took three or four turns round the apartment, when down dropped what at the moment I supposed to be its young, and which I deposited in my handkerchief. After a somewhat tedious chase, I then secured the object of my pursuit, which proved to be a fine female of *Megaderma lyra*. I then looked to the other bat, which I had picked up, and to my considerable surprise found it to be a small *Vespertilio*, nearly allied to the 'Pipistrelle' of Europe, which is exceedingly abundant not only here, but apparently throughout India.¹ The individual now referred to was feeble from loss of blood, which it was evident the *Megaderma* had been

¹ *Vesperugo abramus*, Tem.

sucking from a large and still bleeding wound under and behind the ear; and the very obviously suctional form of the mouth of the Vampire was of itself sufficient to hint the strong probability of such being the case. During the very short time that elapsed before I entered the outhouse, it did not appear that the depredator had once alighted, and I am satisfied that it sucked the vital fluid from its victim as it flew, having probably seized it on the wing, and that it was seeking a quiet nook where it might devour the body at leisure. I kept both animals separate till next morning, when procuring a convenient cage, I first put in the *Megaderma*, and after observing it for some time, I placed the other Bat with it. No sooner was the latter perceived, than the other fastened upon it, with the ferocity of a tiger, again seizing it behind the ear, and made several efforts to fly off with it, but finding it must needs stay within the precincts of the cage, it soon hung by the hind legs to one side of its prison, and after sucking its victim, till no more blood was left, commenced devouring it, and soon left nothing but the head and some portions of the limbs."

Both frogs and sparrows would also seem to form the prey of the larger bats, to judge by the remains of nocturnal feasts in the form of bones and feathers, which are sometimes seen in the verandahs of houses tenanted by them.

Family Vespertilionidæ.

Bats with simple nostrils, unprovided with leaflets (save a rudimentary appendage in *Nyctophilus*), with moderately developed generally separate ears. Eyes minute.

PLECOTUS, Geoffroy.

Ears united above the forehead, very large. Nostrils opening on the upper surface, at the extremity of the muzzle, in front of semilunar naked depressions. Tail almost wholly inclosed within the interfemoral membrane. Post-calcaneal lobe distinct.

Dentition, I. $\frac{4}{6}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$; M. $\frac{6}{6}$.

P. HOMOCHEOUS, Hodgson.

Fur basally both above and below dark; on the upper surface light shining brown; beneath, pale ashy or dirty white; occasionally there is a reddish tinge over the back, and specimens from dry and desert regions are paler than those captured in moister countries. This species is, in Dobson's opinion, only a subspecies or race of *P. auritus*, L., distinguished by the greater length of the ears and comparative shortness of the thumbs.

Length of head and body, 1.7; tail, 1.7 inches.

Inhabits the Himalaya and Khasi Hills, not improbably ranging into Arakan.

SYNOTUS, Keyserling and Blasius.

Ears conjoined at the bases of their inner margins, which meet on the forehead slightly in front of the eyes; the outer margin is also carried forwards, in front of the eyes, terminating on the face above the upper lip, so that the eye is contained within the external ear.

Dentition, I. $\frac{4}{6}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$; M. $\frac{6}{6}$.

S. DARJELINENSIS, Dobson.

The ears laid forward, extend nearly one-tenth of an inch beyond the end of the muzzle, as in the European 'Barbastelle,' but the outer margin has no projecting lobe, at the junction of its upper and middle third, and is uninterrupted by any abrupt projection from the tip to its termination above the mouth. The tip rounded off, not truncated.

Length of adult female—head and body 2.0; tail 1.8 inches.

Inhabits the Himalayas, Sikkim, the Khasi Hills and probably ranges into Arakan.

VESPERTIGO, Keyserling and Blasius.

Ears separate, generally much shorter than the head, broad and triangular, the outer margin extending forwards beyond the base of the tragus, the internal basal

lobe rounded. Nostrils opening sublaterally, by simple crescentic apertures on the front surface of the naked extremity of the muzzle. A small cutaneous lobe on the calcaneum usually present behind.

¹Dentition, I. $\frac{3}{3}$; C. $\frac{2}{2}$; P.M. $\frac{1}{4}$ or $\frac{2}{4}$; M. $\frac{0}{0}$.

Outer upper incisors unicuspidate and shorter than the rest, often minute (rarely absent).

Sub-genus *Vesperugo*.

I. $\frac{3}{3}$; P.M. $\frac{1}{4}$. Post-calcaneal lobe well developed; thumbs and soles of feet simple.

V. NOCTULA, Sehr.

Vespertilio lasiopterus, Schreb.

V. magnus, Berkenhout.

V. altivolans, White.

V. serotinus, Geoffr.

V. proterus, Kuhl.

V. labiata, Hodgson.

V. Macuanus, Peters.

Nostrils wide apart, with a slightly concave interspace. Ears as broad as long, tips very broadly rounded. Feet thick. Thumb short, with a blunt claw. Wing membrane attached to the ankles. Post-calcaneal lobe large, semicircular, placed on the calcaneum, at the same distance from the tibia as the breadth of the foot. The last rudimentary caudal vertebra free. First upper premolar very small. Last upper molar triangular in cross section. Length of head and body, 3.0; tail 2.0 inches.

Ranges from the Himalayas to the Malayan Peninsula, and temperate parts of Europe, Asia, and Africa.

V. LEISLERI, Kuhl.

Very like *V. noctula*, "but while the outer incisor on each side in *V. noctula* is but half the transverse diameter, at its base, of the inner incisor, in this species it is equal to it. The lower incisors also stand in the direction of the jaws, and are not crowded."

Length of head and body of adult male 2.3; tail 1.65 inches.

Europe and temperate regions of Asia from the Azores to the Himalayas.

V. ABRAMUS, Tem.

V. imbricatus, Tem. (non Horsfield).

Scotophilus Javanicus, Gray.

S. Coromandra, Gray.

Vespertilio Coromandelicus, Blyth.

Vesperugo Blythii, Wagner.

V. imbricatus (Hutton), Peters.

Colour above dark brown, the hair tipped with light yellowish-brown. On the head, face and neck wholly yellowish-brown. Beneath sooty-brown, the extremities of the hairs much paler than upon the upper surface.

Length—head and body 1.75; tail 1.4 inches.

Inhabits India and Burma, and is the commonest bat in Southern Asia.

V. MAURES, Blasius.

V. mordax, Peters.

V. pulveratus, Peters.

Pipistrillus Austenianus, Dobson.

Fur long and dense, uniformly sooty-brown, or deep black throughout, with ashy tips. Cutaneous system black. The nose, ears and naked glandular prominences of the upper lip are intensely black.

Length of head and body 1.9; tail 1.6 inches.

[¹ *Scotozous*, Dobson, has only 2 upper incisors.]

Specimens from Java are a trifle larger, and from China a trifle smaller.

Distributed over Europe, the Canary Islands, China, the Khasi Hills, and no doubt Burma also.

V. AFFINIS, Dobson.

Head flat; glands of the upper lip so developed as to cause a deep depression between them on the face, behind the nostrils. The tail is long, of nine vertebrae, the last free. Colour above chocolate-brown, lighter on the head and neck. Beneath dark brown, with paler or ashy tips to the hair. On the pubes and along the thighs dirty white or very pale buff.

Length of head and body 1·9; tail 1·65 inches.

Inhabits Bhamo, Yunnan.

Sub-genus *Vesperus*.

Incisors $\frac{4}{3}$; P.M. $\frac{3}{3}$. Post-calcaneal lobe narrow. Wings from the base of the toes. Thumbs and soles of the feet simple.

V. PACHYOTIS, Dobson.

"This species is readily distinguished by the peculiar thickness of the lower half of the outer side of the ear-conch, which appears, as it were, excavated out of the thick integument of the neck." Muzzle very broad and short; with well-developed glandular prominences. Immediately behind them, a furrow extends from the anterior corner of one eye to that of the other, beyond which, the fur of the head does not pass.

Fur brown, dark above, paler below.

Adult male, head and body 2·2; tail 1·6 inches.

Type from the Khasi Hills. This species probably ranges into Arakan.

Dobson remarks, "In the form of the ears and muzzle especially, and generally in the whole conformation, this species appears to belong to the sub-genus *Vesperugo*, but the absence of the first minute upper premolar relegates it to *Vesperus*. Nothing could illustrate better the artificial character of these subgenera, which, however, are convenient in determining the species" (Mon. Asiat. Chir. p. 105).

V. ANDERSONI, Dobson.

Head broad and flat. Tail of eight vertebrae, the last alone free. Fur above dark brown, with greyish tips. Beneath light greyish-brown for the basal two-thirds, the remainder of the hair ashy.

Length—head and body 2·6; tail 1·9 inches.

Inhabits Momein, Yunnan.

Sub-genus *Tylonycteris*.

Incisors $\frac{4}{3}$; P.M. $\frac{3}{3}$. Base of the thumbs and soles of the feet with broad fleshy pads. Crown of the head remarkably flattened.

V. PACHYPUS, Tem.

Scotophilus fulvidus, Blyth.

T. Meyeri, Peters.

Tail projecting by the extreme tip only. Fur dense, above bright reddish-brown, paler beneath.

Length—head and body 1·75; tail 1·3 inches.

Inhabits India, The Andaman Islands, and Tenasserim.

Sub-genus *Alobus*.

Incisors $\frac{4}{3}$; P.M. $\frac{3}{3}$. No postcalcaneal lobe.

V. ANNECTANS, Dobson.

Extreme tip of tail free. Colour brown, darker above, and the tips of the upper surface paler, of the lower surface reddish. The hair forms a thick fringe along the margin of the upper lip.

Length of head and body 2·0; tail 1·6 inches.

Inhabits the Naga Hills, and probably ranges into Arakan. This species unites the external appearance of a *Vespertilio* with the dentition of *Vesperugo*.

SCOTOPIHILUS, Leach.

Ears longer than broad, generally considerably shorter than the head, with rounded tips; the outer margin terminating near the angle of the mouth. Nostrils close together, opening by simple lunate apertures in front, or sublaterally, their inner margins projecting. Fur short, and nearly confined to the body; wing and interfemoral membranes very thick and leathery.

Dentition, I. $\frac{2}{2}$; C. $\frac{2}{2}$; P.M. $\frac{2}{2}$; M. $\frac{2}{2}$.

An additional external incisor on each side above in the opening. Upper incisors long, unicuspidate, acute, close to the canines. Upper premolar large, close to the canine. First lower premolar small, crushed in between the canine and second premolar.

S. TEMMINCKII, Horsfield.

S. Köhlii, Leach.

Vespertilio Belangeri, Is. Geoffr.

V. noctulinus, Is. Geoffr.

V. castaneus, Gray.

Nycticejus luteus, Blyth.

N. flavocolus, Blyth.

Colour variable; dark olive-brown above and reddish or yellowish-white beneath. Sometimes deep chestnut throughout or below yellow.

Length—head and body of male 3·1; tail 2·1 inches.

Inhabits India and Burma.

S. ORNATUS, Blyth.

Fur light isabelline-brown, remarkably pied with white spots and a longitudinal patch of white on the crown, and a white band, two-thirds the length of the spine. A white spot at the base of the ears and two white patches behind the head of the humerus. A white band below the neck. The position of the white patches is generally very constant, but their size varies, being greatest apparently in individuals of a pale rusty-red colour, and these I have always found to be males. The females have much darker fur, and the white spots and bands are of less size and are occasionally altogether absent.

Length of head and body 3·1; tail 2·5 inches.

Inhabits Sikkim, the Kakhyen Hills, and Yunnan.

Dobson remarks that this bat is the nearest representative of the American genus *Atalapha* (= *Lasiurus*).

VESPERTILIO, Keyserling et Blasius.

Muzzle long; small glandular prominences between the nostrils and eyes, which scarcely increase the breadth of the face. Nostrils opening sublaterally by simple crescentic apertures. Ears separated, oval, longer than broad. Tail usually less than the length of the head and body. Postscapular lobe absent or very small. Face hairy.

Dentition, I. $\frac{2}{2}$; C. $\frac{2}{2}$; P.M. $\frac{2}{2}$; M. $\frac{2}{2}$.

Upper incisors nearly equal; the inner incisor on each side generally has a distinct second cusp, placed posteriorly and externally. First and second upper premolars very small; the second often minute and pressed inwards; the last upper molar rather less than half the antepenultimate.

Sub-genus *Leuconoe*.

Feet very large. Interfemoral membrane forming a very acute angle in the centre of its free margin behind; one or two last caudal vertebræ project beyond the membrane.

V. HASSELTII, Tem.

Fur very short, above and beneath; the muzzle in front of the eyes almost naked. Fur scarcely extends to the wing membranes, except at their origin; on the interfemoral membrane, both above and below, it extends as far as a line drawn

between the knee-joints. The fur on the under side of the wings extends to a line drawn from the elbow joint to the commencement of the distal third of the femur. Fur above basally dark, with brown tips; beneath, dark brown or black, with white ends. The second premolar in both jaws is extremely small, and with difficulty seen even with a lens. It is placed in the angle between the first and third premolars, and in vertical height does not equal the cingulum of either tooth.

Length of adult female—head and body 2·1; tail 1·8 inches.

Inhabits Java, the Malayan Peninsula, Siam and probably Tenasserim.

In no species of *Vespertilio* is the second lower premolar quite internal, and placed in the angle between the adjoining teeth, without filling it.

Sub-genus *Vespertilio*.

Feet moderate. Interfemoral membrane forming an obtuse angle in the centre of its free margin behind. Tail wholly contained within the membrane, or the extreme tip alone projecting.

V. *MURICOLA*, Hodgson.

Kerivoula trilatitoides, Gray.

V. caliginosus, Tomes.

V. ater, Bernstein.

V. (Pternopterus) lobipes, Peters.

V. Blanfordi, Dobson.

V. moupinensis, Alph.

Second upper premolar slightly internal to the tooth row, and so small as to be barely perceptible without the aid of a lens. Colour above black, with yellowish brown tips. Beneath black, with ashy tips.

Length—head and body 1·6; tail 1·55 inches.

Inhabits the Himalayas, Arakan, and the Malay Peninsula.

V. *MONTIVAGUS*, Dobson.

Muzzle obtuse. Ears narrow, with rounded tips. Feet very small. Tail wholly inclosed. Fur above, dark brown, the extreme tips paler and shining. Beneath, much darker, almost black from the basal three-fourths, the terminal fourth of the hairs ashy. The eyes buried in hair, the tip of the nose alone naked. On each side of the muzzle, two or three glandular elevations may be discerned through the hairs. The ears naked anteriorly, their bases clothed posteriorly. Inner incisors longest, with a small acutely pointed talon near their extremities on the outer side. In the lower jaw the second premolar is small, but distinctly visible in the teeth row. In the upper jaw the second premolar is very minute, and placed interiorly, and barely visible with a lens.

Head and body 1·8; tail 1·6=3·4 inches.

Inhabits Hotha in Yunan.

V. *FORMOSUS*, Hodgson.

Kerivoula pallida, Blyth.

V. auratus, Dobson.

Wing-membranes very broad, attached to the base of the toes, and remarkably variegated with orange and rich brown-black. The portions of dark-coloured membrane are triangular in form, and occupy the interspaces between the second, third, and fourth fingers, and the space between the fourth finger and a line drawn from the carpus to the ankle. All the remaining portions of the membrane, including the ears and interfemoral apron, are orange. The second upper premolar very minute, and difficult to discover even with a lens.

Length of adult female—head and body 2·4; tail 1·9 inches.

Ranges from Nipal to the Khasi Hills and Shanghai.

KERIVOULA, Gray.

Dentition, I. $\frac{3}{3}$; C. $\frac{2}{2}$; P.M. $\frac{0}{0}$; M. $\frac{0}{0}$.

Second upper premolar smaller than the third but not so minute as in *Vespertilio*.

Second lower premolar equal to or slightly larger than the first and nearly or quite equal to the third. Tail long, wholly contained within the interfemoral membrane.

K. picta, Pallas.

Fur above deep orange, beneath paler. The wing-membrane between the humerus and the posterior limb, the free margin of the membrane between the foot and the fourth finger, along the posterior side of the forearm, and on both sides of each finger, deep orange; the remainder deep black, with scattered orange dots.

Length—head and body 1.55; tail 1.6 inches.

Inhabits India and Burma.

Dobson makes the following interesting remarks on the colouration of this and some allied bats. "The very peculiar markings of the membranes of this bat, of *Vespertilio formosus* and of *V. Welwitschii*, Gray, from S.W. Africa, are on the same plan, and appear to be the result of 'protective mimicry,' the colours being arranged so as to resemble the leaves or the fruits of the trees in which these bats take up their abode. Of one of the two first-named species probably, Mr. Swinhoe remarks, 'A species of *Keriroula*, allied to *K. picta* and *K. formosa*, was brought to me by a native. The body of this bat was of an orange-brown, but the wings were painted with orange-yellow and black. It was caught suspended, head downwards, on a cluster of the round fruit of the Longan tree (*Nephelium longanum*). Now this tree is an evergreen, and all the year through some portion of its foliage is undergoing decay, the particular leaves being, in such a stage, partially orange and black. This bat can therefore at all seasons suspend itself from the branches, and elude its enemies by its resemblance to the leaf of the tree.'"—Mon. Chiropt. p. 147.

HARPIOCEPHALUS, Gray.

Muzzle elongated, conical; nostrils prominent, tubular, produced beyond the upper lip, and opening laterally or sublaterally. Ears thin, generally covered with glandular papillæ. Thumb very large, with a large strongly curved claw. Interfemoral apron very hairy.

Dentition, I. $\frac{4}{3}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$; M. $\frac{6}{6}$.

Upper incisors on each side parallel, stout, and blunt; posterior upper molar small, or consisting of a thin transverse lamina of bone, and sometimes absent in the adult.

H. HARPIA, Tem.

Noctulina lasyura, Hodg.

Lasiurus Pearsonii, Horsfield.

Muzzle rather short; end of nose projecting considerably beyond the lip, and composed of the diverging tubular nostrils. Teeth thick and strong, with blunt cusps. Posterior or third molar small, deciduous, and generally absent in adults.

Length of adult female—head and body 2.5; tail 2.0 inches.

Inhabits Sikkim, the Khasi Hills, Java and doubtless suitable spots in Burma.

These bats, to judge by their teeth, prey chiefly on the harder and more robust *Coleoptera*.

MINIAPTERUS, Bonaparte.

Dentition, I. $\frac{4}{3}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$; M. $\frac{6}{6}$.

The first phalanx of the second or longest finger very short. Tail as long as the head and body, and wholly inclosed in the interfemoral membrane. Upper incisors in pairs on each side, separated from the canines.

M. SCHREIBERSII, Natterer.

The four lower incisors in front equal and trilobed, those next the canines larger, with rounded summits. Margin of the eye prominent; a deep horizontal groove on the side of the face parallel to the mouth, below the eye. Colour variable. The basal half of the hairs always dark-greyish black or brown; the extremities of the hairs varying from light grey or reddish-grey to dark-reddish brown or black.

Length—head and body 2.25; tail 2.3 inches.

Inhabits Burma, also the Philippines, Timor and Australia.

M. SCHREIBERII, Natterer.

Var. PUSILLUS, Dobson.

M. australis, Dobson (non Tomes).

Dr. Dobson thus describes this species: "This form inhabits probably the same countries with *M. Schreibersii*, which it resembles in all respects except in size and in the distribution of the fur. The head and forearm are conspicuously shorter, and these characters are not founded on observation of immature specimens, but on measurements taken from perfectly adult individuals obtained in large numbers at different times from the same and different localities. In all these the length of the head never exceeded 0.6, and that of the forearm 1.6. On the upper surface the fur extends upon the intertremal membrane as far as the end of the third caudal vertebra. Fur intensely black throughout, the extreme tips of the hair sometimes greyish."

Inhabits Burma and the Nicobars.

Family Emballonuridæ.

Bats with nostrils at the extremity of the muzzle, simple or valvular, without distinct cutaneous appendages. Ears large, often united. The first phalanx of the middle finger is folded in repose, forwards on the upper surface of the metacarpal bone.

TAPHOZOUS, Geoffroy.

Dentition, I. $\frac{7}{1}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$; M. $\frac{6}{6}$.

Upper incisors weak and deciduous. The last molar consists of a narrow transverse lamina.

Tail perforates the intertremal membrane, and appears on its upper surface.

Sub-genus Taphozous.

a. Radio-metacarpal pouch distinct. Lower lip scarcely grooved.

T. MELANOPOGON, Tem.

T. Philippinesis, Waterhouse.

No gular sac. The openings of small pores appear along a line occupying the position of the gular sac in other species.

Colour dark brown above, the hairs white towards the base, and tipped with grey. Beneath paler.

Length of male—head and body 3.1; tail 1.0 inches.

Inhabits Burma and the Philippines.

T. THEOBALDI, Dobson.

No gular sac in either sex. This species is distinguished from *T. melanopogon* by its larger ears, and by the absence of fur on the upper surface of the wing and intertremal membranes.

Inhabits Tenasserim.

T. LONGIMANUS, Hardwicke.

T. fulvidus, Blyth.

T. brevicaudus, Blyth.

T. Cantori, Blyth.

A gular sac in the male. In the female by a rudimentary fold of naked skin. Colour dark brown to black, the bases of the hairs white.

Length—head and body 3.1; tail 1.0 inches.

Inhabits India and Burma.

Sub-genus Taphonycteris.

b. No radio-metacarpal pouch. Lower lip deeply grooved.

T. SACCOLAIMUS, Tem.

Gular sac well developed in both sexes. Colour above black, the basal portion of the hair white. Beneath dark brown.

Length—head and body 3.5; tail 1.3 inches.

Inhabits India and Tenasserim.

RHINOPOMA, Geoffroy.

Nostrils valvular in the anterior margin of a rudimentary nose-leaf. Ears united across the forehead, which is marked by a deep concavity, as in *Taphozous*, between the eyes. Index fingers with two phalanges. Tail slender, produced considerably beyond the truncated interfemoral apron.

Dentition, I. $\frac{2}{4}$; C. $\frac{2}{2}$; P.M. $\frac{2}{4}$; M. $\frac{6}{6}$.

Upper incisors rudimentary, suspended in the small premaxillary bones, which meet in the centre, and are connected laterally by slender processes, as in *Emballonura*, with the maxillary bones.

R. MICROPHYLLUM, Geoffroy.

var. R. HARDWICKII, Gray.

Extremity of the muzzle thick, obtuse, obliquely truncated, and projecting considerably beyond the lower lip. Nasal apertures composed of valvular slits. Face almost naked.

Length of adult—head and body 3.0; tail 2.35 inches.

How extremely gregarious this bat is, may be inferred from the fact, that a man, to whom I had expressed a wish for bats, produced one morning a sack containing two hundred and seventy individuals, which had been captured the previous night in an old tomb near Bhera, on the Jhillum, below Pind Dadan Khan. Great was the worthy countryman's surprise when, with the exception of a few specimens placed in bottles, the rest were thrown away. Having been paid for their capture, he evidently supposed that I should at once order them to be cooked for my breakfast; and no wonder, for, in the eyes of an uneducated Mahomedan, a man who will eat the abhorred flesh of the pig, cannot have any scruples of delicacy regarding any other meats. These bats I remember were enormously fat in the pubic region, as observed by Dobson in the case of this species and *Taphozous nudiventris* only.

This species is merely the Asiatic race (or subspecies), in Dobson's opinion, of the African *R. microphyllum*, and is more nearly related to *Taphozous*, than to *Megaderma*, near which it has been usually classed, and Dobson remarks, "*Rhinopoma* is, in my opinion, closely related to *Taphozous*. Its connexion with that genus is shown in the peculiar frontal depression, in the projecting muzzle and valvular nostrils, in the weak and deciduous upper incisors, in the form and folding of the wing; in the production of the tail beyond the interfemoral membranes, and even in the microscopical structure of the hair. Further, the species of these genera show remarkable similarity in their habits, and in them, an enormous deposit of fat is heaped up, about the root of the tail, before the hibernating season. Similar deposits of fat have not been observed by me in any other genera of Chiroptera."

CHEIROMELES, Horsfield.

Ears separate. Muzzle projects beyond the lower jaw. Premaxillary bones well developed, conjoined, and supporting two strong incisors. Tail thick and long, projecting more than half its length beyond the short interfemoral apron.

Dentition, I. $\frac{2}{2}$; C. $\frac{2}{2}$; P.M. $\frac{2}{4}$; M. $\frac{6}{6}$.

C. TORQUATUS, Horsf.

Dysopes cheiropus, Tem.

C. caudatus, Tem.

An enormous gular sac extends round half the neck, the interior margin of its mouth on a level with the front of the sternum. Into this sac the oily secretion between the internal origins of the pectoral muscles is discharged, in males by a series of small pores, collected in two circular slightly elevated patches, and in females by a single large orifice.

A deep axillary pouch is formed in both sexes, by an extension of the thick integument covering the breast and sides of the body, to the under surface of the humerus, and longitudinally to the femur. In the anterior part of this pouch, on the side of the body, behind the axilla, the mamma is placed.

Skin thick and almost naked, but a collar of short hairs round the neck, and a few short hairs upon the under part of the body and interfemoral apron.

Length of adult male—head and body 5.3; tail 2.6 inches.

Inhabits Borneo, Java, Sumatra and the Malayan Peninsula, and possibly ranges into Tenasserim.

This bat is perhaps one of the most repulsive to the casual observer known, from its naked skin and the offensive odour which emanates from the glands in the gular sac. Dr. S. Müller records that this odour was so offensive as to induce headache and nausea in the artist, M. Van Oort, who could with difficulty therefore complete his drawing of the animal. It would be interesting to know more of the habits of this remarkable creature, which from its wide distribution cannot be considered as rare.

There is no reasonable doubt that a vast number of species of bats still remain unrecorded from Pegu and Tenasserim. The above list has been compiled from Dobson's Monograph already quoted, some species being included which have not been captured within Burmese limits, though from their ascertained range, *e.g.* from Java to the Khasi Hills, no doubt occurring there in suitable localities. But many species, hitherto only recorded from the Malayan region, or Java, Borneo and Sumatra, no doubt extend their range into Tenasserim at least, and will reward some future collector who may specially devote himself to these interesting but not easily procured animals.

Order INSECTIVORA.

Plantigrade lissencephalic mammals, having sharp or complex (insectivorous) molars, and small canines.

Family Talpidæ.

Fore feet large; fossorial with large claws. External ears none. Eyes very minute. Tail short or none. Habits fossorial.

TALPA, *Linnaeus*.

Dentition, I. $\frac{1}{1}$ or $\frac{2}{2}$; C. $\frac{2}{2}$; P.M. $\frac{6 \text{ or } 8}{4}$; M. $\frac{4}{4}$.

TALPA LEUCURA, Blyth.

Nearly allied to *T. microura*, but differing in the greater development of the tail, and in possessing only two upper premolars (instead of three as in *T. microura* and *T. europæa*). In this, as in *T. microura*, there is no perforation of the integument over the eye.

Ranges from Silhet to the valley of the Sittoung (Schwagheen).

Family Soricidæ.

The Shrews comprise a number of small animals, which are popularly confounded with rats and mice, though the one are insectivores, the others rodents. The two middle incisors above are large and hooked, the lower ones are slanting and lengthened. The snout is lengthened, pointed, and very mobile and sensitive. Some species possess a powerful musky odour, which others want. Dr. Anderson's study of these animals has led him to judge "those adult in which the *basi-occipital* and *basi-sphenoid* bones have been united. This is the last suture to disappear, and its obliteration in shrews is the only reliable test of full maturity."

For a full account of the various species which occur in Assam, some of which doubtless range into Burma, reference may be made to a paper by Dr. James Anderson in the Journ. As. Soc. Beng. 1877, Part II. p. 261.

a. *Teeth white.*ANUSOREX, *A. Milne-Edwards.*Dentition, $\frac{4}{2}$; $\frac{2}{2}$; $\frac{8}{2+6}$; 26.

The intermaxillary suture between the first and second lateral teeth.

A. ASSAMENSIS, Anderson.

The type was from Assam, and the species may perhaps range into hills of Arakan.

CINIMARROGALE, *Anderson.*

Feet scaly, ciliated, toes not webbed. Tail long, scaly, quadrangular, thickly clad with coarse adpressed hairs. Snout elongate. Ears almost hidden, valvular. Habits aquatic.

Dentition, $2\frac{1}{2} + \frac{2}{2} + \frac{8}{2+6} = 28$.

C. HIMALAYICTS, Gray.

Upper incisors furnished with a talon. Fur velvety, above dark grey, deeply washed with dark fuliginous brown. Below silvery grey, washed with rusty on the throat and middle of the belly. Eye small, almost hidden. Nostrils with an anterior cartilaginous valve.

Head and body 3.83; tail 3.00 inches.

Ponsee at 3500, Darjiling, Assam.

CROCIDURA, *Wagner.*Dentition $\frac{6}{2} + \frac{2}{2} + \frac{8}{8} = 28$.

C. FULIGINOSA, Blyth.

Fur dense, velvety. Fuliginous brown, with inconspicuous hoary tips, and basally slaty. The scattered long hairs on the tail fine. Soles bare to the heel. Inhabits Tenasserim.

A nearly allied species, *C. Kingiana*, Anderson, inhabits Sikkim; but this latter species is "distinguished from it, among other details in its structure, by its narrower feet, although it is a larger form." *C. Kingiana* measures—head and body 3.2; tail 2.42; total 5.62 inches.

PACHYURA.

Dentition, $\frac{6}{2} + \frac{2}{2} + \frac{18}{8} = 30$.

P. INDICA, Geoff.

The musk rat. Kywet-sōk.

Uniform pale grey, the naked parts flesh-coloured.

Head and body 7.50; tail 3.75=11.25 inches.

This is the common 'musk rat' of Bengal and Burma, and possesses a powerful musky odour. It haunts kitchens and larders in search of victuals, and enters houses in pursuit of cockroaches and spiders, and from the repulsive odour it diffuses and imparts to objects it has passed over, is one of the greatest animal pests in the East. The idea of its musky odour penetrating a bottle is absurd, but should the lip of the bottle have been defiled by the animal, the taste will no doubt be imparted to the contents when poured out.

P. MURINA, L.

Brownish-grey above, greyish-brown below, the fur longer and coarser than in *P. indica*. Ears large and nude. Size a little less than the last, and the musky odour far less powerful.

Inhabits the Malayan Peninsula, ranging into Burma according to Jerdon, but this is doubted by Blyth.

P. GRIFFITHII, Horsfield.

Blackish grey. Teeth large. Ears small.

Head and body 5.75; tail 2.4 = 8.15 inches.

Ranges from the Khasi Hills into Arakan.

What the above species really is seems doubtful, as specimens so considered by Blyth are referred by Tomes to *S. carulescens*. Whilst profiting by these doubts, Anderson strikes in, as it would seem, and describes what probably is the same species under a name of his own.

P. BLYTHII, Anderson (J.A.S.B. 1877, p. 264).

S. Griffithii, Horsf. apud Blyth.

S. carulescens (part), Tomes.

Colour a rich rusty brown, with a golden sheen, beneath rusty grey, some individuals much darker.

Adult female—head and body 5.00; tail 2.50; total 7.5 inches.

Inhabits Assam, Cherra and Arakan.

C. NUDIPES, Blyth.

C. macrotis, Anderson.

Snout long and broad. Claws well developed. Fur short. Colour above shining dark brown, lower half of ears, chin and feet yellowish-brown. Ears very large and rather patulous. Limbs rather feeble. Short haired from the elbow and knee downwards, feet only sparsely covered with short brown hairs.

Adult female—head and body 1.75; tail 1.27; total 4.02 inches.

Inhabits Tenasserim.

As in Dr. Anderson's opinion the feet are not more nude than in other species, he claims to rename it himself, but a difference of opinion on a comparative character of this sort is no warrant for setting aside the original name bestowed by its first discoverer; besides, it was not the sole point of discrimination, the largeness of the ear being also adverted to by Blyth.

Family Tupaiidæ.

TUPAIA, *Raffles*.

Dentition, I. $\frac{3}{8}$; C. $\frac{0}{0}$; P.M. $\frac{8}{8}$; M. $\frac{0}{0}$.

Orbits complete. Mammæ four. Habits diurnal. Uniparous.

T. BELANGERI, Wagner.

T. Peguana, Jerdon.

The Pegu tree shrew. Tswai.

Colour dusky greenish-brown—lighter below, and with a pale buff line. A stripe from the throat to the vent, broadest between the fore arms. Ears livid red.

Head and body 7.33; tail, with hair, 6.80=14.13 inches.

According to Jerdon, it ranges from Sikkim to Arakan, including Tenasserim, and Blyth adds: "common throughout British Burma," south of which it is replaced by *T. ferruginea*, Raffl., of which Blyth considers it as little more than a local race. Col. MacMaster describes them as residing in trees, but freely entering houses, adding: "I cannot indorse Jerdon's statement regarding their extraordinary agility, for they did not appear to me to be nearly so active as squirrels, at least I remember one of my terriers on two occasions catching one, a feat which I have never seen any dog do with a squirrel. Cats of course often pounce upon them." Dr. Mason records that "one that made his home in a mango tree near my house in Toung-ngoo, quite uninvited, made himself nearly as familiar as the cat. Sometimes I had to drive him off the bed, and he was very fond of putting his nose into the teacups immediately after breakfast and acquired quite a taste for tea and coffee. He lost his life at last by incontinently walking into a rat trap. Some years afterwards another one adopted the habit of coming into the house almost daily for several months. He displayed great tact in getting off the top of the sugar-bowl, sugar seeming to have more attractions for him than any other article of food. He was a great pet, but though very quick in his movements, the cat came on him unawares one day and he lost his life." Blyth remarks: "In the vicinity of Malacca the small *T. javanica*, Horsf., is associated with *T. ferruginea*, though

unnoticed in Dr. Cantor's 'Catalogue of the Mammalia of the Malayan Peninsula;' and perhaps the most extraordinary instance in the class of what has been termed 'mimicry' occurs in a squirrel, *Rhinosciurus tupaioides*, Gray, differing little, if at all, from *Sciurus laticaudatus*, S. Müller, of Sumatra and Borneo, which inhabits the same district. Not only does this rodent resemble *T. ferruginea* in size and the texture and colouring of its fur, but the muzzle is singularly elongated, and there is even the pale shoulder-streak usual in the genus TUPAIA. As a group of *Insectivora* the Tupayes would seem to 'mock' the squirrels; but the particular species of squirrel referred to again specially simulates the *Tupaia ferruginea* of the same locality."

As regards the identity of *T. Peguana* and *T. ferruginea*, Mr. W. T. Blanford remarks: "Skins collected by Mr. Davison in Southern Tenasserim have all the posterior portion of the back distinctly ferruginous. Others from Myáwadi, west of Maulmain, are almost equally rufous on the rump, while other specimens again, from the same neighbourhood, have no rufous tinge. A specimen from Tavoy has scarcely a trace of rufescent. Without a larger series of Malacca specimens than I have at hand, I cannot positively say that the two forms pass into each other; but I am strongly disposed to suspect that they do." A better ground for separating these species appears to have been detected by Dr. Anderson, who remarks, "The skull of this species (*T. Peguana*) is distinguished from the skull of *T. ferruginea*, by the less elongated character of the facial portion, and by its smaller size. . . . The teeth are smaller than in *T. ferruginea*, and the second upper premolar wants the internal cusp and the cusp on the anterior margin, both of which are unmistakably developed in the last mentioned species; but these structures are nevertheless represented in the present species by little more than a ridge in the first, and in the second by an obscure tubercle."

It remains, however, to be shown if these and other differences are graduated as the colouration is, and the result of one being a small race of the other, or if they hold good, and can be discriminated, in the area (Tenasserim) where the two races are said to meet and coexist.

T. FERRUGINEA, Raffles.

Rich dark ferruginous above, yellowish below, washed with ferruginous. Tail greyish. Shoulder streak more or less rufous. Dr. Anderson adds, "The snout is longer than in *T. Belangeri*, and the species is larger," and this difference is seen in the skull characters; but it does not seem to be established whether these differences are constant, or graduate into each other, when a series of skulls is examined. What would seem to be the case is, that most of the so-called species are really local races, which, as our knowledge increases, it will be found necessary to amalgamate, as Dr. Anderson has so successfully done with the squirrels.

T. CHINENSIS, And.

Nearly allied to *T. Belangeri*, but paler and smaller.

Adult male—head and body 6·50; tail 6·16=12·66 inches.

Inhabits the Kakhyen Hills and the valley of the Upper Irrawaddy between 2000 and 3200 feet.

T. NICOBARICA, Zelebor.

The face and outside of the fore limbs, throat and chest golden, outside of the hind limbs, sides and abdomen, a rich rufous brown. The top of the head is rich dark brown, changing to pale golden brown between the shoulders, bordered by a maroon band. The rest of the back and tail almost black. Beneath the tail a yellowish brown central band.

Body and head 7·10; tail 8·00 inches.

The Nicobars.

Family Hylomidæ.

Characters of genus, and intermediate-between *Tupaia* and *Erinaccus*.

HYLOMYS, *Muller.*

Orbit imperfect. Pelvis posteriorly depressed.

Dentition, I. $\frac{2}{2}$; C. $\frac{2}{2}$; P.M. $\frac{2}{2}$; M. $\frac{6}{6}$ = 14.

H. SCILLUS.

H. Peguensis, Blyth.

This species was named by Blyth from specimens received from Schwegyeng (J.A.S.B. 1859, p. 294); but that naturalist, after examining the Bornean animal, considered them identical.

Valley of the Sittoung, and Pensee, in the Kakhyen Hills at 3000, also Borneo.

Family **Erinaceidæ.**

GYMNURA, Vigors and Horsfield.

Dentition, I. $\frac{2}{2}$; C. $\frac{2}{2}$; P.M. $\frac{2}{2}$; M. $\frac{6}{6}$ = 14.

G. RAFFLESII, Vig. and Horsf.

Mr. W. T. Blanford thus describes the Tenasserim animal:—"This species was mentioned in Mr. Blyth's list of the mammals of Burma as probably existing in Mergui, although its occurrence within British limits had not been recorded. It has since been obtained at Bânkasûn in Southern Tenasserim, by Mr. Davison, to whom I am indebted for a perfect female in spirit.

"The skins from Bânkasûn vary much in the extent of white on the fore part of the body. Generally the head and neck are white, with the exception of a broad black patch above each eye and a variable amount of black bristles mixed with white on the crown. The anterior portion of the back is clad with mixed white and black bristles, the proportion varying; on the hinder back, sides, limbs and lower parts from the breast, the long hairs are generally black, but in one specimen there is a line of white bristles down the middle of the breast and belly; this line is wanting in the other two skins which I have examined. The extent of the white varies so much that it is not at all improbable that specimens wholly white or wholly black may occur. The fine woolly under fur is dusky olivaceous at the base, brown at the tips on the upper parts, ashy with brownish ends beneath. The terminal portion of the tail is compressed, and in some specimens partially or wholly white in colour, and the under surface of the tail is thinly clad throughout with scattered short bristles, about a quarter of an inch long. These bristles are wanting on the upper part of the tail, which has very much shorter scattered hairs. The small scales covering the tail are indistinctly arranged in rings, and subimbricate; on the lower surface the scales are convex and distinctly imbricate, the bristles arising from the interstices. Thus the under surface of the tail is very rough, and may probably be of use to the animal in climbing.

"The characters of the tail just mentioned, do not appear to have been noticed in the published descriptions of *Gymnura*, all of which are probably copied from that by Horsfield and Vigors. Another important difference from the original account is to be found in the claws of the specimens before me not being retractile. In the original description the retractility of the claws is mentioned, both in the Latin characters and in the English note pointing out the distinction between *Gymnura* and *Tupaia*. It is possible that the Tenasserim animal differs from that found in Sumatra, but the distinction between retractile and non-retractile claws would in all probability be of generic importance, and it is difficult to conceive that two genera of insectivora, so closely resembling each other in their very peculiar external characters, and yet differing in so important a detail, should inhabit two regions of which the fauna is, for the most part, identical. At the same time it is possible that I am mistaken in referring the Tenasserim animal to *Gymnura Rafflesii*.

"The following are the dimensions of the female specimen in spirit—

"Length from nose to anus,	12	inches.
" of tail,	8.5	"
" of ear from orifice,	0.94	"
" of tarsus and hind foot (claws not included),	2.15	"

“The stuffed specimen is nearly the same, except that the tail is rather longer. The dimensions given by Horsfield and Vigors for an adult are rather more;—head and body 14·25 inches, tail 10·5, whilst the tarsus is stated to be only 2 inches long, but the difference is trifling.

“Mr. Davison informs me that *Gymnura* is purely nocturnal in its habits, and lives under the roots of trees. It has a peculiar and most offensive smell, not musky, but rather alliaceous, resembling decomposed cooked vegetables.”

Family Galeopithecidæ.

GALEOPITHECUS, Shaw.

Dentition, I. $\frac{3}{3}$; C. $\frac{2}{2}$; P.M. $\frac{1}{1}$; M. $\frac{6}{6}$; total 34.

G. VOLANS, L.

The flying lemur. ‘Myouk-hloung-pyan.’

Colour of fur olive-brown, with whitish patches, which render its body difficult to distinguish from the bark of the tree it frequents. A membranous fold, covered with fine hair, extends on either side from the fore to the hind limbs, and which is expanded as a parachute, when leaping from one tree to another. Mr. Wallace remarks that “it is sluggish in its motions at least by day, going up a tree by short runs, as if the action was difficult,” and adds, “In a bright twilight, I saw one of these animals run up a trunk in a rather open space, and then glide obliquely through the air to another tree, on which it alighted near its base, and immediately began to ascend. I paced the distance from one tree to the other, and found it to be seventy yards; and the amount of descent at not more than thirty-five or forty feet, or less than one in five. This I think proves that the animal must have some power of guiding itself through the air; otherwise in so long a distance it would have little chance of alighting exactly upon the trunk. The *Galeopithecus* feeds chiefly on leaves, and possesses a very voluminous stomach and long convoluted intestines. The brain is very small, and the animal possesses such remarkable tenacity of life, that it is exceedingly difficult to kill it by any ordinary means. The tail is prehensile, and is probably made use of as an additional support when feeding. It is said to have only a single young one at a time, and my own observation confirms this statement, for I once shot a female, with a very small blind and naked little creature clinging closely to its breast, which was quite bare and much wrinkled, reminding me of the young of marsupials, to which it seemed to form a transition. On the back, and extending over the limbs and membrane, the fur of these animals is short, but exquisitely soft, resembling in its texture that of the Chinchilla.” Raffles, however, states that it produces two young at a time, and Mr. A. Adams, who accompanied Sir E. Belcher in the exploring voyage of H.M.S. “Samarang,” found two young in one which he dissected.

The range of the flying lemur is a wide one. It inhabits the Malayan countries and Tenasserim, and, according to Mr. Dunn, the Valley of the Koladyne River in Arakan, but has not been obtained in Pegu, although Major Spearman remarks that he saw one near the town of Bheeleng.

B.—GYRENOCEPHALA.

Hemispheres of brain more or less convoluted, and extending more or less over the cerebellum and olfactory lobes.

Order CETACEA.

Nostril usually forms a blow-hole on the top of the head.

Anterior feet changed into fins. No posterior extremities. No external ears. Tail horizontal, a distinctive character of aquatic mammalia.

Family Balænopteridæ.

Head enormous. Teeth none, being replaced by transverse horny lamina (whalebone or ‘*baleen*’) adhering to the upper jaw. Bony teeth exist, however, in

the foetal animal. Mammaræ pendulæ. Individuals of this family grow to 100 feet in length, and yield 600 to 800 plates of whalebone 12 to 15 feet long. The lower jaw is furnished with fleshy lips only, but neither teeth nor 'baleen.'

BALENOPTERA, *Laccépède*.

Head one-fourth of total length. An adipose fin on the back. Belly marked with longitudinal grooves.

B. INDICA, Blyth.

The Indian Rorqual, Finner, or Pike-whale.

Length of animal	1008 inches.
„ ramus of mandible	250 „
„ radius	35.6 „
Breadth of ditto	6.50 „

This animal was stranded on the Arakan coast.

B. EDENI, Anderson.

The Tsittoung or Eden's whale.

Length of animal	456 inches.
„ of mandible	119 „
Curvature of do.	14.5 „

This animal was stranded in the Thaybyoo choung.

B. BLYTHII, Anderson.

Intermediate in size between *B. indica* and *B. Edeni*, and supposed by Anderson to grow to 60 feet.

Of necessity the materials for the study of these huge animals are fragmentary and imperfect, but Dr. Anderson has shown fair grounds for discriminating the above three species in Indian seas.

Family **Catodontidæ**.

Head enormous. Jaws armed with teeth.

To this family belong the sperm whales, so called from yielding the '*spermaceti*' of commerce, which is found fluid in large cellular cavities in their heads, but solidifies on cooling. Their hardened excrement constitutes '*ambergris*,' once so valued for its appetising smell and balsamic properties, and respecting which Balfour records that an excreted mass, picked up in Japan in 1693, and weighing 185 pounds Dutch, was purchased by the Dutch East India Company for £2000. Milton, it may be remembered, makes allusion to the culinary virtues of this substance.

“He spake no dream, for as his words had end
Our Saviour, lifting up his eyes, beheld
In ample space, under the broadest shade,
A table richly spread in regal mode,
With dishes piled, and meats of noblest sort
And savour, beasts of chase or fowl of game.
In pastry built, or from the spit, or boiled,
Gris-amber steamed.”—Par. Reg. ii. 337.

Doubtless the origin of this substance in the bowels of a whale was unknown to our ancestors who flavoured their dishes with it.

The temper of the *Cachalots* is fierce and uncertain, and they are dangerous animals to wound or meddle with.

Family **Delphinidæ**.

Teeth numerous, conical. Head moderate.

ORCELLA, Gray.

Head round, blowhole crescentic, convex posteriorly. Pectoral fin moderate. Dorsal behind the middle of the body. Projecting snout none. Food crustacea and fish.

O. FLUMINALIS, Anderson.

Colour pale slaty above, whitish below.

Length from snout to fork of tail	90	inches.
„ from the snout to the dorsal fin	55.75	„
Tip of snout to the base of the pectoral fin	18.75	„
„ to the blowhole	10.00	„
Length of dorsal fin	4.75	„
„ of pectoral fin in front	17.00	„
„ „ behind	11.75	„
Girth over the blowhole	28.25	„
„ in front of the pectorals	39.35	„
„ at the base of the tail	9.00	„

Teeth $\frac{3}{5}$, but many disappear with age, and their sockets are more or less obliterated.

Inhabits the Irrawaddy above the influence of the tides.

Blyth also records *Delphinorhynchus rostratus*, F. Cuv., from the Nicobars.

Order SIRENIA.

Herbivorous cetaceans.

Nostrils opening in the upper lip. Teeth of two kinds, incisors, preceded by milk teeth, and molars with flat crowns. Mammæ two, pectoral. Head of moderate size. Body as in the cetacea. Algivorous.

Family Halicoridæ.

HALICORE, Illiger.

Dentition, I. $\frac{2}{5}$; C. $\frac{2}{5}$; P.M. $\frac{1}{4}$; M. $\frac{3}{5}$; in the adult.

In the young I. $\frac{4}{4}$; P.M. and M. $\frac{1}{5}$; according to Kelaart.

H. DUGONG, Erxleben.

Colour uniform bluish, sometimes blotched with white below, or pale fulvous above and white below.

Grows to 10 feet or more.

Inhabits the shores of the Bay of Bengal and Burma, especially delighting in estuaries and the mouths of rivers, and is common in the Andaman Islands and the Mergui Archipelago, where it was first noticed by the Rev. S. Benjamin, in 1853.

The flesh of the Dugong is excellent eating.

In the seventh volume of the Records of the Geological Survey of India, p. 142, I have discussed the question as to what animal, the Sanscrit term 'jala hasti,' or water elephant, was really applicable, as some scholars have supposed that it may have applied to the now extinct Hippopotamus of the Nerbudda. Dr. Falconer's mature conclusion was that that animal must have been extinct long anterior to the occupation of India by a Sanscrit-speaking race, but that the animal may possibly have coexisted in India with its earliest human colonists. The conclusion, however, to which I have come is, that the 'jala hasti' really applied to the Dugong.

Order PROBOSCIDEA.

Family Elephantidæ.

Two incisors (termed tusks) in the upper jaw, none in the lower. Snout elongated into a long prehensile proboscis. Mammæ two, pectoral.

ELEPHAS, LINNÆUS.

E. INDIENS, Cuv.

Wild elephant. Tor-lisen.

The Indian elephant belongs to the subgenus '*Eutelephas*,' of which it is the sole surviving member, whilst the African elephant is similarly the sole living representative of the subgenus '*Loxodon*.' In addition to differences in the teeth, the Indian elephant has a less rounded head than the African, and very much smaller ears, and one pair fewer ribs. The caudal vertebræ in the Indian animal are, moreover, according to Jerdon, 33, but in the African only 26, a longer tail in the former compensating for its shorter ears, as a defence against insects.

The period of gestation in the elephant would seem to be somewhat variable. Prof. Owen quotes one case of 595 days, another of 593, and Col. Heysham another of 593, and alludes to one of similar length. So that 593 or 594 days may be assumed as the usual duration with Indian elephants. But this period is sometimes exceeded, as in the Zoological Gardens, Philadelphia, a case of gestation is recorded of 629 days, which displays a variation in length of over a month, but it is not stated if the animal in question was an African or an Indian one (Trans. Zool. Soc. London, vol. xi. p. 129 and Proc. Zool. Soc. Lond. 1880, pp. 23 and 223). It is just possible, too, that the inappropriate food supplied to the animal in America may have had the effect of prolonging gestation, as privation is known to do, in the human female.

These valuable animals are subject to many diseases, one of which is thus described by Dr. Mason :

"The Bghais, in part of Ko-oung in Toung-ngoo, reported that in one year as many as thirty-eight elephants had died with a swelling, sometimes on the breast, sometimes on the legs, and sometimes on the rump. The swelling is local, does not spread to other parts of the body, and they die usually the same day they are attacked, and sometimes in a couple of hours. They seem to be poisoned, as their flesh becomes poisonous. A man, too, brought down the tusks of one that had died, carrying them on his shoulder, and the part that had been in contact with the tusks swelled up. Moreover, the man, in cutting out the tusks, allowed the blood of the dead elephant to strike his legs, and his legs swelled up like the elephant's legs. My informant watched one man who was taken in the legs. His legs swelled up, and the swelling passed up to his bowels until he died, but the man complained of no pain, and was sensible, and could talk till he died, being five or six days from the time he was taken ill, but he lost all appetite, and did not eat rice after the attack.

"When a Karen has a good male elephant, he hires it out sometimes to the the Burmans, and gets fifty rupees a month. This, so far as I have ever heard, is the maximum. Then, if he can obtain constant work for it, he always lets it rest the three hot months of the year, lest it should be killed by overwork. The gross annual income therefore for a good male elephant amounts to 450 rupees."

The Burmans have a superstition regarding the elephant very similar to that which prevails in some parts of India regarding the tiger, to the effect that the spirits of such human victims as he may have killed, ride on his head, and serve to warn him of any dangers from pitfalls or hunters who may be plotting his death or capture. The Burmans regard it therefore as a very hopeless attempt to pursue, or even fire at, an elephant which has killed many men, from the protection which he consequently enjoys from their spirits in attendance on him.

It should be known that an elephant when tracked will as a rule 'head back' and return along the path he has just passed, which I presume he does to avoid the anticipated risk of being driven into a trap or pitfall; and I know of a fatal case resulting from the ignorance or disregard of this habit of the animal. A large tusker made his appearance in the rains opposite Myanoung on the Irrawaddy, and it was feared he would drive off some female elephants belonging to the Forest Department, which had been turned out into the forest to feed. A party therefore started from Myanoung to kill or drive him away. The ground was a swampy plain, covered with water and tall elephant grass, through which almost the only way for a man on

foot to go was by keeping to the path made by the elephants through the grass. A Burman tracker led the way, followed by two European forest officers with rifles, and a long line of armed Burmans bringing up the rear. All were in single file picking their way along the path the elephant had just taken.

Directly the elephant scented his pursuers, down he came. The leading Burman was struck down and crushed on the spot; a volley of musketry from the men behind followed, but the elephant charged through the midst and was never more seen. One European found himself in a tree on one side of the road, and the other was similarly hurled in an opposite direction, and their followers were equally unceremoniously disposed of. When they had all reassembled, the European officer, who had been in front, complained that his foot was injured, as he supposed by the elephant, and he was carried home, but on examination it was found that a bullet had gone through his foot, probably whilst in the air, and he died of tetanus in a few days.

A similar instance occurred to myself. I was crossing the Arakan mountains with twenty porters and two guides. The road lay down a valley through virgin forest, and elephants were numerous. At one spot the guides said an elephant had just passed, and asked leave to follow it up, and shoot it for its flesh. I accordingly halted the party in the bed of a broad stream, and the two guides, each armed with a musket, started in pursuit of the elephant, which they declared was not far off in the forest. In about five minutes or a little more, two shots were heard, and instantly every porter commenced ascending the tree nearest to him, leaving me and one or two servants standing alone in the bed of the stream, not a little astonished by the behaviour of my men. Almost immediately, however, the cry was raised, "He is coming!" and I at once comprehended the situation, and bolted for a high bank near, but had scarcely reached it, when a fine young male elephant, with tusks about a yard long, rushed past me within twenty yards, and disappeared in the forest, and we saw no more of him. Across the forest path, along which he came, a huge tree had been blown down, and below its trunk there was a clear space of some three feet. Beneath this trunk, on this very path, one of my servants, who was no better climber than myself, squatted, supposing the tree would turn the elephant. But no, he came straight for it, and scrambled over it, leg after leg, in a wonderful fashion, actually knocking off the man's turban, who was paralyzed by fright. It is probable he never saw the man, at all events he made no attempt to touch him; but it was clear that the elephant, on being fired at, had turned round and retraced his steps along the very path on which we had struck his trail.

There is a striking contrast between the treatment of an elephant by a Burman or Karen, and by an Indian Mahout. In Burma an elephant is driven with a short and light piece of bamboo, not shod with iron, in place of the cruel and ponderous iron goad used in India, the result being that the head of an elephant belonging to a Burman or Karen is as sound as any part of its body, instead of being, as is too often the case in India, a mass superficially of coehymosed tissue, infiltrated with pus. It were well if it could be said that the ignorant Indian Mahout was the chief offender as regards the brutal usage of these poor creatures in India. But much of the suffering and misery undergone by elephants must be laid to the door of the responsible European Officers in charge of Government elephants, who, by their ignorance of the habits of the animals they are paid to look after, cause their lives to be passed in ceaseless misery. An elephant is very impatient of the sun, and suffers greatly by exposure to it. Yet in all our cantonments these animals are tethered out in the full glare of the mid-day sun, instead of being, as they should be (in default of forest shelter), housed in well-roofed sheds. A Karen is too wise and too careful to expose his elephant in this fashion to torture and injury. If it dies or goes blind, the loss is his. The well-salaried official, however, who has perhaps 50 Government elephants under his charge, knows or cares nothing for this. If they die, he simply buys others. Their sufferings touch neither his heart, nor his pocket; and if the '*sahib bahadur*' is so careless, how can one blame the rapacious and obsequious '*Gomashta*' crew for not instructing him in his duty, and in some elementary ideas of the requirements of the animals in his charge? Who has not seen these poor brutes, tethered in

the 'lines' or 'pil-khanah' of our cantonments, the live-long day, in a blazing sun, endeavouring to shelter themselves from its cruel rays, by heaping straw or dust and rubbish on their simmering heads? It is a cursed sight, and were the delinquent, in place of a high official, some wretched owner of hack ponies, he would soon find himself in the grip of the criminal law, if he did not alter his ways; and yet to persistently expose a nocturnal animal like the elephant with its sensitive skin to the full glare of the tropical sun, is at least as cruel, and far more injurious to its health, than working a hack pony or horse with a sore back—a good modern illustration of the adage that it is safer for some men "to steal a horse than it is for another to look at the animal over a gate."

The skin of an elephant is thick, but it is vascular and sensitive, and in the forests an elephant is often seen covered with blood from the attacks of flies. The back consequently readily 'galls.' I myself once returned a Government elephant, of which I had the loan, with a slightly sore back, which rest and a water dressing would have cured in a few days. How many weeks elapsed before the animal was reported fit for duty, I do not remember; but I was called on to pay for something like a hundredweight of pitch plaster for the wretched beast. The only wonder is that he ever got well at all, if this heating mess was honestly applied, which I hope it was not. The notions of Mahouts and other natives about curing wounds are curious. They imagine that maggots help to dry up a sore, and so tie up an animal's tail, that he may not disturb the blowflies, or hinder the deposition of maggots in a wound.

As is well known, male elephants become seasonably very excitable and dangerous, or 'must,' as they are called in India, and during the height of which paroxysm a thin fluid trickles from a minute orifice in each temple, analogous to the exudation which is secreted by certain glands at the back of the neck of male camels, giving that part the appearance of being moistened with thin treacle; and this temporal exudation is frequently alluded to in Hindu poetry as a familiar phenomenon, though so unobservant are too many Europeans of the marvels of nature that some hardly know that such a phenomenon exists. The late popular excitement, however, and the cause which led the Zoological Society to part with their old friend 'Jumbo,' has somewhat contributed to make more generally known the fact that occasionally, that is, when 'must,' the male elephant is a very dangerous and unmanageable animal. In India the general treatment, elephants at this time are subjected to, is strict confinement and low diet, but a better plan, when practicable, is to turn the animal loose in the forest, near water, whence, if a female elephant is tethered near him, he will never wander far, and may soon be reclaimed. It sometimes, too, happens, through stupidity or fear, that the animal is tied up, and no proper means provided to supply him with water, in which case he soon becomes maddened with thirst, which is all put down to his being 'must' by the ignorant wretches in charge of him. This was the case with an elephant that I once saw tethered near the circuit house at Prome, and the first thing this poor beast did, when it did break loose, was to walk down into the river to drink. I marched towards Allan-myo the next day, and at my first halting-place again made the acquaintance of this animal, now at large. I had marched with three female elephants, and encamped as usual along the road-side. I had turned into bed, when I was roused by hearing my elephants rush past my tent, and on getting up, my Mahouts told me they had turned the elephants loose for them to escape into the jungle, as the 'must Elephant' was coming up the road, and, sure enough, I could distinguish the clink of a bit of chain which still remained attached to his leg. There was indeed now no doubt that he was following the track of my camp, in pursuit of my elephants, and he was followed at a respectful distance by his own Mahout, mounted on another elephant, for the purpose of watching his movements. The word was now quickly passed for every one in camp to shift for himself, and we were soon all of us inside the village. Ere long the elephant passed through the camp, and, not detecting the elephants, went further on. As soon as it was light, I secured my elephants, struck camp, and marched off through the jungle to evade pursuit. I had hardly quitted the ground, before back came the elephant, who had evidently found that he had overshot his mark, and after destroying

a rice bin in the village, and seriously injuring by a charge his Mahout, who was endeavouring with a spear to repel him, he eventually returned to near Prome, and was, I believe, in a month or so secured by a Burman; but again, I think, broke loose and was shot, but of this I am not sure. Before reaching my camp, he came across two men asleep on the road-side, one of whom he killed, but whether he killed many more I do not know, but the damage he did was immense. Now all this loss of life and property and the sort of state of siege the whole country was thrown into whilst he was at large, might have been avoided by a little common sense on the part of the owner, the Commissariat Department. All disastrous consequences would have been avoided, had the animal, when first becoming '*must*,' been sent out into the forest, where water was procurable, and one or two female elephants been turned out with simple shackles on their feet to keep him company. Instead of being a source of terror and annoyance to a whole district for months, he would, if treated as suggested, have been reclaimable in the course of a few weeks.

A somewhat similar adventure happened to me on the opposite side of the river in the Mayanong district. I was marching for a particular village, when I was warned by some men to be on the watch, as a '*must*' Elephant belonging to some timber merchants was about. I accordingly pushed on ahead of my three female baggage elephants, towards a village on my road, and was met at its outskirts by the headman, who told me the elephant in question was on the other side of his village, standing in the very road I had to take, and, sure enough, on going through the village, there he was, standing waiting for us! I had just time to send back to order a halt, and after a brief consultation, altered my line of march to another village, without his catching sight of my elephants, though he may have got their wind. That night passed without interruption, and the next day I reached the village I should have, the previous day, but for this interruption. I could at first get no tidings of the whereabouts of my friend; but towards evening, men dropping in, reported having seen him in the neighbourhood, and we all prepared for an anxious night. As evening drew on, other elephants were brought in by various owners, and securely fastened up in the village. My three elephants were tied up to trees and houses, and I requested a police-guard might be furnished during the night in case the animal should attack us. Having seen all things snug, as sailors would say, and eaten my dinner in a '*Ziat*' just outside the village, I took my usual evening walk up and down a little path close to the '*Ziat*,' bounded on each side by high grass, but close to the village, and within sight and hearing of my people. I had walked backwards and forwards about ten minutes, and it was getting dark, when, as I turned to return to the '*Ziat*,' I heard a '*flap*,' which I recognized, or thought I did, as that of an elephant's ear thrown back on his neck. I instantly stood motionless and listened intently, but as no other sound was audible, I thought I was mistaken, and that it was a dead palm-leaf which must have flapped on a tree close by. I therefore returned to my '*Ziat*,' and was on the point of calling for tea, when a terrible uproar ensued, and I heard a heavy tramp close by, followed by the shrill trumpetings of all the elephants in the village, the rending sound of ropes and chains, the shouts of men, and here and there a shot or two. Before I had time to recover from my surprise, I saw the form of my Burmese interpreter flash past me, his long hair streaming comet-wise behind him, revolver in hand, and disappear into the jungle, followed by some of my pluckiest servants. I at once saw the extent of our misfortune. The '*must*' Elephant had crept stealthily up, and when I heard him, was probably not five paces from me, and had a few minutes later charged into the village, causing every elephant to burst its bonds, and take to flight into the jungle. My three had all disappeared, but as one was very wild and difficult to retake when loose, I had luckily put additional shackles on her fore feet, which prevented her going far; but my largest female was missing, and next day we found she had been carried off, and I did not recover her from her ravisher for upwards of a fortnight, and eventually she produced a calf. Had the elephant which gave us all this trouble been a wild one, it would have been easy to have shot it; but as it was a valuable animal, the property of some timber merchants, I had to wait patiently till I could secure my female, and this was not easy, as she was jealously guarded by the other, and my men could not get near her.

It is a common, and in my opinion pernicious plan to anoint an elephant's head with oil, as it not only darkens the colour of the skin and renders it more receptive of heat, but clogs the pores. A far preferable plan, I can certify by long experience, is to give a coat of pipe-clay or whiting over the elephant's head before he goes out. This on drying turns white, and keep the head cool, enabling the animal to travel much later in the day than he otherwise would, and in comparative comfort. As, however, the Mahout cannot use a moiety of the pipe-clay in his curry, it is a plan which never fails to be strenuously objected to. It is an excellent and most humane one nevertheless. *Crede experto.*

Order UNGULATA.

a. *Perissodactyla. Toes uneven in number.*

Family Rhinocerotidæ.

RHINOCEROS, *Linnaeus.*

Feet with three toes. Head with one or two horns behind the nose. Dentition variable. Molars complex, and characteristic of the species.

R. SONDAICUS, F. Cuv.

The lesser one-horned Rhinoceros. Kyan-hsen. 'Elephant Rhinoceros.'

Mr. Blyth's remarks on the Rhinoceroses of Burma are so interesting that I quote them at length:

"The Lesser one-horned Rhinoceros. So far as I have been able to satisfy myself, this is the only single-horned Rhinoceros of the Indo-Chinese and Malayan countries, its range of distribution extending northward to the Gáro hills, where it co-exists with the large *R. indicus*, and to eastern and Lower Bengal. It would appear to be the only Rhinoceros that inhabits the Sunderbans, occurring within a few miles of Calcutta; and yet I know of but one instance of its having been brought to Europe alive, and then, it was not recognized as differing from *R. indicus*, which latter is not uncommonly brought down the Bráhmáputra from Assam, and sent to Europe from Calcutta. There is reason, also, to believe that *R. sondaicus* is the species which was formerly hunted by the Moghul Emperor Báber on the banks of the Indus. Southward it inhabits the Malayan Peninsula, Sumatra, Java, and Borneo. It is about a third smaller than *R. indicus*, from which it is readily distinguished by having the tubercles of the hide uniformly of the same small size, and also by having a fold or plait of the skin crossing the nape, in addition to that behind the shoulder-blades. In *R. indicus* the corresponding fold does not thus meet its opposite, but curves backward to join—or nearly so in some individuals—the one posterior to the shoulders. A fine living male, before referred to, was exhibited for some years about Great Britain, and was finally deposited in the Liverpool Zoological Gardens, where it died, and its preserved skeleton is now in the anatomical museum of Guy's Hospital, Southwark. Two passable figures of it from life are given in the 'Naturalists' Library,' where it is mistaken for the huge *R. indicus*."

Dr. Mason writes thus of this species: "The common single-horned Rhinoceros is very abundant. Though often seen on the uninhabited banks of large rivers, as the Tenasserim, they are fond of ranging the mountains, and I have frequently met with their wallowing-places on the banks of mountain streams two or three thousand feet above the plains. They are as fond of rolling themselves in mud, as a hog or a buffalo. The Karens when travelling have quite as much fear of a rhinoceros as they have of a tiger. When provoked, the rhinoceros, they say, pursues his enemy most unrelentingly, and with indomitable perseverance. If to escape his rage the huntsman retreats to a tree, the beast, it is said, will take his stand underneath for three or four days in succession, without once leaving his antagonist. There are seasons when the rhinoceros is very dangerous and ferocious, attacking everything that comes near its haunts, yet it is believed the stories related of them are exaggerated. In the Latin Vulgate the rhinoceros is put where unicorn is read in the English Bible, and

a similar rendering has been adopted in several Indian versions, though unsupported by any philological considerations. The Hebrew name '*reem*' bears no resemblance to the name of the rhinoceros in any of the countries adjacent to Judæa. In Persian it is called '*karg*.' The Southern Karens say there is a third species of rhinoceros in the jungles, which is distinguished from both the others by its skin being covered with small tubercles, and above all by its eating fire. Wherever it sees fire it runs up and devours it immediately. I once lost my way among the hills and valleys of Palaw and Katay, and on obtaining a Karen, who lived in that region, for a guide, he laid special charge on every member of the party to follow him in silence, for a fire-eating rhinoceros had been recently seen, and it always came to noises, instead of fleeing from them as most animals do." Dr. Mason goes on to state that a similar dislike for fire is well known in the black African rhinoceros, and has been recorded by Blyth of *R. Sumatrensis*, and it may not improbably exist in other species of the genus. The habit of attacking a fire and trampling it out (the eating part of the performance being probably an embellishment) may have originated in the sagacity of the animal or to the mixed operation of fear and rage combined, as a savage dog will pursue and bite the stone thrown at it; and in time an act wholly unconnected with the natural economy of the animal, and developed by an accidental circumstance, may, by the operation of the laws of heredity, have become converted into an instinct. This idea receives some support by the behaviour of bees. When preparing to smoke off a swarm of bees from their comb in the jungle, especial care is taken by the Burmans not to allow the flame to rise, or to 'crackle,' as the bees are said to be at once roused to fury by the sound of flames, and to attack every one within reach. Doubtless experience has taught them the danger to their home which attends a crackling fire in the wood, and they at once resort to the weapon of offence with which they are provided. A rhinoceros is actuated by precisely the same sentiment, and he rushes to the detested fire and tramples it beneath his feet as he would a living enemy.

R. LASIOTIS, Selater.

R. Crossii, Gray.

Ear-fringed two-horned Rhinoceros.

Blyth inclines to unite this species and *R. Crossii*, Gray, which has an anterior horn sometimes 32 inches long. Blyth remarks: "In the Rhinoceroses of this type the hide is comparatively thin, and is not tessellated or tuberculated, nor does it form 'a coat of mail,' as in the preceding, but there is one great groove (rather than fold or plait) behind the shoulder-blades, and a less conspicuous crease on the flank, which does not extend upwards to cross the loins, as represented in F. Cuvier's figure; and there are also slight folds on the neck and at base of the limbs; the skin being moreover hairy throughout. There is also a second horn placed at some distance behind the nasal one. Until recently the existence of more than one species was unsuspected. In 1868 a young female was captured in the province of Chittagong, and on its arrival in the London Zoological Gardens, early in 1872, was believed to represent the *Rhinoceros sumatrensis* of Bell and Raffles; but soon afterwards another two-horned Rhinoceros was received at the same establishment from Malacca, obviously of a different species, which proved to be the veritable *R. sumatrensis*. Since its arrival, it has now (1873) considerably increased in size, and it probably is not yet quite full-grown. As compared with *C. sumatrensis*, it is a considerably larger animal, with much smoother skin, of a pale clay colour, covered with longer and less bristly hair, the latter of a light brown colour, as seen in the mass. The ears are placed much further apart at the base, and are not lined with hair as in the other, but are conspicuously fringed with long hair; and the tail is much shorter and largely tufted at the end. The horns are worn away, but if the species be truly assigned to *C. erossii*, the anterior would grow very long and curve to a remarkable extent backwards, while the posterior horn would probably be short. A second specimen of an anterior horn, almost as fine as the one first described, has recently turned up among the stores of the British Museum; and I found a smaller anterior horn of *R. erossii* in the Museum of the London Royal College of Surgeons, confirmatory of its peculiar

shape. In this group the horns are remarkably slender except at the base, and of much more compact texture than in other rhinoceros horns. I have reason to believe that this is the two-horned species which inhabits the Arakan hills, those of northern Burma, and which extends rarely into Assam; and I think it highly probable that the skull figured in Journ. As. Soc. B. xxxi. p. 156, pl. iii. f. 1, represents that of *C. crossii* (seu *R. lasiotis*), in which case the range of the species would extend into the Tenasserim provinces. A detailed notice of the individual sent to London has been given by Dr. Anderson (P.Z.S. 1872, p. 129)."

The skulls of a male and female of this species procured by myself on the coast near Koranji Island, in 1866, are now in the British Museum. A curious fact elicited during the transport of the Chittagong specimen, was her inability to swim. In crossing the Sungoo River she had to be towed across between two elephants, for she was unable to do more than just keep her head above water by paddling with the fore feet like a pig (see Proc. Zool. Soc. Lond. 1872, pp. 493 and xxiii).

R. SUMATRENSIS, Bell.

R. Javanus, F. Cuv. Very young.

R. Blythii, Gray.

Kyan.

The Sumatran Rhinoceros is much smaller than the preceding species, with a harsh and rugose skin, which is black, and clad with bristly black hairs; the ears less widely separated at base, and filled internally with black hairs; the muzzle anterior to the nasal horn much broader; and the tail conspicuously longer, tapering, and not tufted at the end. Horns attaining considerable length, and curving but slightly backwards, as represented in Journ. As. Soc. Bengal, xxxi. p. 156, pl. iv. f. 1.

In the Proc. Zool. Soc. for 1873 (p. 104), an account is given by Mr. Bartlett of the birth of a young one of this species, and from observations recorded in this case, the period of gestation would seem to be about thirty weeks. The newly-born calf was 3 feet in length, 2 feet high, and weighed a little over 50 lbs. The plate (*i.e.*) suggests the idea of the young animal being in poor condition, which may be accounted for by the fact of its mother having just performed the voyage from Singapore, and this may account for the early death of the calf, accelerated by the stupid exposure of the young one to cold and rain on shipboard. *Rhinoceros Sumatrensis* is the ordinary two-horned Rhinoceros of Tenasserim and the Malay countries, and would seem to be replaced in Arakan by *R. lasiotis*, which perhaps also spreads into Assam and Tenasserim.

'Kyan' is the generic name for a Rhinoceros in Burma, from a root, according to Dr. Mason, signifying "to be firm in structure or mind," and its horns and blood are extravagantly valued by the Chinese for their medicinal properties.

As regards the occurrence of *R. indicus*, Cuv., in Burma, Blyth thus sums up the evidence *pro* and *con*.

"According to Helfer, the *R. indicus*, in addition to *R. Sondaicus*, inhabits the northern portion of the Tenasserim Provinces; and Mason asserts that a single-horned Rhinoceros from the Arakan jungles was purchased by the London Zoological Society, and lived for many years in the Regent's Park; the species in that case was undoubtedly *R. indicus*. Again, according to a writer in the Oriental Sporting Magazine (July, 1832, p. 301), both species of one-horned Rhinoceros occur in Burma, and he cites, as his authority for the statement, a writer in the first series of the same periodical (vol. ii. p. 35), mentioning that his said authority appears to be 'a thorough sportsman and no mean naturalist.' I nevertheless hesitate, upon present evidence, to admit the great Indian Rhinoceros into the list of Burmese animals."

Family Tapiridæ.

TAPIRUS.

Four toes in front, three behind. Snout produced into a short fleshy mobile trunk. Hair short and close.

Dentition, I. $\frac{3}{2}$; C. $\frac{2}{2}$; P.M. $\frac{3}{3}$; M. $\frac{3}{3}$.

TAPIRUS MALAYANUS, Raffles.

The tapir. 'Ta-ra-shu.'

"The tapir has been long known to exist in the Southern provinces, but has never been heard of north of the valley of the Tavoy River. It is believed that none have ever been killed or captured in the Provinces except one that was procured from a Karen, by a writer of the late Major Macfarquhar at Tavoy. It was a very inoffensive animal, and became as much domesticated as a cat. It followed its master round the compound like a dog, but looked as unseemly as a hog. It differs in no respect from the descriptions of the Malay tapir, has the same white-blanket-like appearance on its back, and like that frequents the uplands. Though seen so rarely, the tapir is by no means uncommon in the interior of Tavoy and Mergui provinces. I have frequently come on its recent foot-marks, but it avoids the inhabited parts of the country."

b. Artiodactyla. Number of toes even.

Family Suidæ.

Sus, Linnæus.

Four toes on all feet, toes separately hoofed. Canine large in the males. Molar teeth tuberculate.

SUS CRISTATUS, Wagner.

Tor-wet. Wild hog.

Mr. Blyth remarks, "A boar which I examined at Akyab was the ordinary Bengal race, but the Tenasserim wild boars are considerably smaller, the skulls of adults being one-fifth less in linear dimensions, though otherwise similar. The race requires to be critically examined. That pigs are inimical to snakes is well known, but Mason mentions that he has seen the head of a Python 'that was killed by a drove of hogs, whose whole length measured 18 feet.' It is a remarkable fact (if quite trustworthy) that a number of hogs should thus combine to destroy a large Python."

S. ANDAMANENSIS, Blyth.

Dentition, I. $\frac{3}{3}$; C. $\frac{2}{2}$; P.M. $\frac{8}{8}$; M. $\frac{3}{3}$ = 44.

More than twenty years have now elapsed since Blyth first indicated this species (J.A.S.B. May, 1858), and we know as little of the anatomy of one of the most remarkable and best characterized vertebrates of the Andamans as we did then. The adult boar's skull would seem to be 10.25 inches in length, with a breadth of 4.5 inches. Mr. Blyth remarks (*l.c.*), "From the size of the skull of the adult boar it may be estimated that this animal would not exceed 15 inches in height, if indeed it is even so high at the shoulder. The skull is much less elongated, anterior to the orbit, than in ordinary swine, that portion occupying somewhat less than three-fifths of the entire length. Profile a little concave anterior to the eyes, the forehead bulging into a convexity."

This species, Mr. Blyth remarks, most requires comparison with *Sus Papuensis* of New Guinea, but as yet the soft parts of the animal appear to be undescribed. Gray remarks, "The skull of this species is more nearly related to the *Babirussa*, than any others of the pigs (*Sus*)" (Proc. Zool. Soc. Lond. 1868, p. 30).

c. Ruminantia.

The ruminating section of the Ungulata possess four stomachs, thus described by Jerdon. The paunch or first stomach is capacious, with two well-marked constrictions. The second stomach is small and globular, and called by some the honey-combed bag, being lined with polygonal cells. The third stomach, or "*monyplies*" of the Scotch, is small and subglobular, but much increased in capacity by the folding of the lining membrane. The fourth or last stomach is the true digestive sac, one-third the size of the paunch, and of an elongated pyramidal form.

Family Tragulidæ.

Canines in the males only. No eye, groin, or feet pits. No horns in either sex.

TRAGULUS.

Characters of the family.

T. KANCHIL, Raffles.

The smaller mouse-deer.

Colour rufous or dark rufous, with a dark mesial stripe on the chest, bordered with white. Size that of a hare.

Ranges from the Malay countries into Tenasserim.

T. NAPU, F. Cuv.

The larger mouse deer.

Much larger and stouter than the last. Colour brown, with a dark stripe down the back of the neck, and five white stripes below the throat. Belly white.

Ranges into Tenasserim with the last, but is less common than it.

Mr. Blanford thus contrasts these two species:—

“As was suggested by Blyth in his remarks on *Tragulus kanchil*, the larger form of chevrotain is found in Southern Tenasserim, Mr. Davison having procured an adult and a young animal from Bunkasún. Owing to the extreme confusion which formerly prevailed as to the synonymy of the *Traguli*, the nomenclature and distribution of the different species cannot be said yet to be rightly determined in all cases, but it is clear that two distinct forms are found in the Tenasserim provinces, and these forms appear to be the *T. kanchil* and *T. napu* of A. Milne-Edwards' monograph of the *Tragulidæ* in the 'Annales des Sciences Naturelles,' as has already been pointed out by Mr. Blyth.

“The most striking differences between the two species are,—first, size; *T. napu* being probably thrice the weight of *T. kanchil*;—second, the much stouter limbs of the former; the length of the tarsus and hind foot in two specimens before me of *T. napu* and *T. kanchil* respectively being 5·85 and 4·8, whilst the circumference of each tarsus in the middle is 1·3 and 0·85;—and, third, colouration, especially below. There is but little difference above; both are brown, becoming paler and greyer on the sides, but the dark line from the nape down the back of the neck is much more distinct in *T. kanchil*. The colouration of the throat and belly, however, is very different; in *T. napu* there are five white stripes on the throat, one longitudinal in the middle, and two oblique stripes on each side, the upper lateral band being much shorter than the lower. In the adult skin from Tenasserim all these bands unite in front, but not in the young specimen, in which the median stripe is separated from the others, as described by Milne-Edwards. The interspaces between the white bands are dark brown, darker than the sides of the neck, but this appears sometimes to be the case in *T. kanchil* also. The abdomen in adult *T. napu* is mostly white, the breast and the space between the thighs purer white than the rest; in the young all the middle portion of the abdomen between the broad white breast and the narrower white groin is smoky brown; in both there is a rudimentary dark median band, not nearly so distinct as in *T. kanchil*.

“In *T. kanchil* there are but three white stripes on the throat, the median line being sometimes entirely distinct from the two broad and long oblique lateral stripes, sometimes coalescing with them in front; the abdomen is pale rufous and white in patches, the centre of the anterior portion and the sides of the posterior portion being white, and the remainder rufous, but the proportion of the two colours varies; there is, however, a well-marked dark median line along the anterior half, beginning from the dark transverse band on the breast.

“In both species the rump is rufous, and the tail brown above, white below and at the tip. All the differences noticed, except the number of white stripes on the throat, have already been pointed out by Blyth.”

Family Cervidæ.

Horns deciduous, and in all species (except the reindeer), confined to the males. End of muzzle nude and moist. Lacrymal pits present. Metatarsal glands on the hind legs, and sometimes feet pits in front or hind limbs. No gall-bladder.

RUSA, Hamilton Smith.

Horns with one basal and one upper tine. No feet pits.

R. ARISTOTELIS, Cuv.

The Sambhur deer. Tsat.

This deer is commonly diffused through Burma, but does not, according to Blyth, attain the same size or such fine horns as in Hindostan. The following are measurements of some Indian Rusa horns for comparison.

	1	2	3	4	5
Length along outside curve . . .	36	38	43	44	40½
Length of brow antler. . . .	13½	12¾	11	15	15½
Circumference at "burr" . . .	9	9	10¼	10	9½
" below brow antler. . .	13	10	—	—	11
" above do. do. . . .	7½	6	7¾	8	—
Spread between tips	26	23½	—	—	34

HYELAPIUS.

H. PORCINUS, Zimm.

The hog deer. Darch.

The horns of this species resemble those of a young spotted deer (*Axis maculatus*), with basal and upper tines very small. Regarding its distribution Blyth remarks:—

"The *Drai*, or Hog Deer, is very abundant. Mason observes, however, that this species seems to be confined to the plains. 'It abounds,' he states, 'north and east of Maulmain, and on the large islands south of Tavoy; but it is not found north of the station, nor eastward among the hills, nor in the valley of the Tenasserim, but is found again on the plains of the Sitang.' Some individuals (especially does) are more or less distinctly 'menilled' or spotted when in their summer coat, which has given rise to reports of the Indian Spotted Deer (*Axis maculatus*) having been observed in Burma."

They are very abundant near Rangoon, where a dozen or more may be seen in the market after a successful hunt in the rains. Mason says, "They are often hunted by persons in companies after dark, who go into the plains where they are found, beating tin kettles and ringing bells and gongs, which is said to bring the animals to a stand with astonishment, so that the huntsman can walk up and shoot them at his convenience." I have heard a somewhat different account of this method, which is undoubtedly practised. A dark night is selected, and two or more hunters start off to the spot deer are known to be in. One is armed with a sharp heavy knife or gun; the other carries a light on his head, and gently tinkles a bell. The deer are attracted by the sound of the bell, and advance up to the light, on which their every faculty is concentrated (probably not seeing the man who carries it), and so allow the confederate to creep up and hamstring several before the rest take alarm and disperse. Occasionally the hunters come across a tiger, who acts precisely as the deer do, and this brings the night's sport to a close, as the hunters extinguish their light and retreat as they best can.

PANOLIA.

P. ELDT, Guthrie.

Thamme or Thamen of the Burmans. Sungrai, in Manipur.

Inhabits Manipur, and thence to Pegu and Tenasserim, Mergui, Keddah, etc.

The following particulars of this species are extracted from a paper by Capt. R. C. Beavan, in the Journal of the Asiatic Society of Bengal for 1867 (p. 175),

and the very first sentence quoted has the true ring about it of the born naturalist: "Pioneered by him (J. Davis, Esq., Superintendent of Police, Martaban District), early in October last, I visited the haunts of the *Thamen*, near Thatōn (a town about forty miles N.W. of Maulmain), and although, owing to the dense nature of the vegetation covering the plains at that time of the year, I was only able to see a few scattered females and young of the second year, yet the insight thus afforded into their habits and economy more than repaid us for the severe attack of illness I subsequently incurred, by exposure to the heat and wet.

"This plain of Yengyaing was then, owing to the recent and heavy falls of rain, one large swamp. Nearly the whole of its unbroken extent, which embraces an area of 14 miles in length, with an average breadth of 10, could be traversed in a small canoe, except here and there, where mud and vegetation combined, obliged me to resort to a very unpleasant system of half wading in water, and half sticking in deep slime. A continuation of this plain, broken up by belts of jungle, extends for several hundred miles up the Burmese coast, and has evidently been formed by the gradual retirement of the sea, which at one time doubtless dashed its waves against the Martaban and other continuous ranges of laterite hills. It is now, at Yengyaing, some eight to ten miles distant from the hills, and seems to be still retiring, since the water along the coast of this gulf of Martaban is very shallow and studded with sandbanks. For the primary cause of this we may doubtless look to the immense amount of silt deposit brought down by the waters of the Salween, Beeling, Sittang and Rangoon rivers, all of which discharge themselves into the Gulf of Martaban. As the sea retires, a belt of mangrove jungle about a mile in width appears to travel with it, thus inclosing the plain with a barrier of vegetation on one side, and the mountains on the other. This strip of mangrove jungle gives cover to numberless hog-deer, tiger, leopard, and pig, but is never entered by the *Thamen*, except where somewhat open; nor on the other side do they ever attempt to penetrate into the mountains. The plain is intersected by numerous tidal creeks, which in the hot weather, when deprived of water from the hills, appear to dry up to a great extent, and those still open at that time of year contain no admixture of fresh water, so that it is evident, that for two, if not three, months in the year, the *Thamen* must be entirely deprived of fresh water, whilst during the rainy season, for six months at least, they may be said to live in water. It appears wonderful how they can manage to exist in such extremes of heat and wet. With the exception of a few stunted trees, and a fringe of hibiscus bushes along the creeks, the plain is covered with nothing but grasses and paddy, of which latter both the wild and cultivated varieties are abundant: owing, however, to the paucity of the population and the consequent demand for labour in this immediate neighbourhood, perhaps only one-fourth of the whole area is under cultivation for paddy: this crop succeeds here admirably, and the grain forms one of the staple articles of export from Maulmain and other Burmese ports. The remaining three-fourths are covered with the indigenous uncultivated plants which, in seasons of scarcity, are reaped and used for food. This tract of country forms a vast grazing ground both for the *Thamen*, and for large herds of tame buffaloes which are during the rains pastured here by the Karens, but withdrawn into the heavy jungles near the hills, when, in April and May, the whole of the vegetation on the plain becomes parched up, or is devoured by jungle fires. At the time of my visit vast flocks of waders and other water-birds were arriving from the north, and the creeks were filled with pelicans of several species; whilst the mud flats absolutely swarmed with stints, sandpipers, egrets, and especially the rosy tantalus. Here and there, stalking gravely amongst the flowering paddy, might be seen pairs of the Sarus crane (*Grus antigone*), or a troop of adjutants, both of which breed in the neighbourhood. Occasionally the rarer Javanese adjutant was met with, and the Jabiru stork, *Mycteria australis*.

"The colour of a full-grown buck is dark brown, especially about the back and neck, with underparts lighter. The females are hornless, and in colour like the female sambar (*R. Aristotelis*), but perhaps a little lighter. The female gestates nearly seven months, and brings forth her young in October and November amidst the jungle paddy, which is then flowering or in seed, and at its greatest height. The doe will

breed a second time in eighteen months after bringing forth, so that the young of two seasons are not unfrequently seen with their parents. Females produce but one at a birth, and the young are spotted or mottled, but this disappears with age. In the second year the males first begin to acquire horns, which are perfectly developed in March, and shed about September. After two years they get two tines, and when about seven years old are in their prime, with twelve tines, including the brow antler. The average weight of the buck is about 190 lbs.

"Their habitat and range, according to Mr. Davis, are as follows: In the Martaban District they inhabit exclusively the open grassy plains between the sea and the mountains. In the Pegu plains they are perhaps more abundant than in any other part of Burmah; next to them the Yengyaing plain in Martaban produces most; near Rangoon they are found in the Dallah plain. About Pegu and Yengyaing they are found in herds from fifty to a hundred in the month of March, but when hunted, they congregate much more, and as many as two hundred may then be seen together. In habits they are essentially gregarious, and associate with no other species, although hog deer abound in the grass and jungle along the edges of the plain; nor will they allow the tame buffaloes to come nearer to them than about 100 yards. In habits they are very wary and difficult of approach, especially the males; they are also very timid, and easily startled. The males, however, when wounded and brought to bay with dogs, get very savage, and charge vigorously. On being disturbed, they invariably make for the open, instead of resorting to the heavy jungles like hog deer and Sambur. In fact, the *Thamen* is essentially a plain loving species, and although it will frequent tolerably open tree jungle, for the sake of its shade, will never venture into any composed of dense or matted under-wood, *i.e.* bush jungle in contradistinction to 'tree jungle.' Indeed I was credibly informed of a large stag which, being driven into a corner of the plain last year, by herd boys, with pariah dogs, and finding no means of escape, took refuge in heavy jungle, where its horns got entangled in a hibiscus bush, and so was actually captured alive.

"When first startled, their pace is great. They commence by giving three or four large bounds like the *axis* or spotted deer, and afterwards settle down into a long trot, which they will keep up for six or seven miles on end where frequently disturbed. This is when the vegetation on the plain is comparatively short. In the rains they do not go far before they find a hiding-place in the long paddy. Their powers of leaping are highly developed. On the Yengyaing plain alone there are at the present time about a thousand head; on the Thatong plain, a little further to the north-west, perhaps a hundred head only, which go about in small herds of seven or eight.

"An intelligent Burmese shikarree (hunter) told me that in former years, before Martaban was taken by the British, the '*Thamen*' were much more abundant than they are now, and the natives used to destroy them wholesale at battues: a large number of men would assemble from the surrounding villages and gradually encircle three or four moderately sized herds with long strings, upon which plantain leaves were tied so as to flutter in the wind. The circle originally formed at some distance was gradually lessened, as the deer, afraid to pass the scarecrows, got gradually driven together, until they were completely surrounded and at the mercy of the hunters. The object was to get them into a corner near the heavy jungle, into which if they attempted to run, they either became entangled or allowed their pursuers to get up quite close. My informant tells me that, in former years, he has himself seen as many as 150 to 200 killed in one battue. To such a length was this system carried, and such enormous havoc thereby created, that the Burmese Government, fearing that the species would be utterly exterminated, wisely put a stop to the practice. This shikarree informed me that five-and-twenty years ago he has seen as many as five hundred head in one herd, and his account was confirmed by others."

CERVULUS, *Blainville.*

Horns raised on bony pedicles, covered with hair. Large upper canines in both sexes. Two conspicuous longitudinal facial folds. Eye pits large and mobile.

C. AUREUS, H. Smith.

The Barking deer. Gyi.

Colour bright rufous bay. Inside limbs, pubic region, and tail white. Facial creases dark brown. Mason remarks of this species as follows:

"The barking deer is more abundant and more universally diffused than any other species. It is very appropriately named; for its cry, which is constantly heard in the jungles after nightfall, is very like the barking of a dog. It uses its horns with great effect when brought to bay, and, according to Karen fable, the tiger will not attack it. In ancient times, the story goes, when all animals had the power of speech, the tiger said to the barking deer, 'Oh barking deer, what is the use of thy horn? It seems to me they would be in my way.' The barking deer answered, 'A single push of my horns will make the eye of my antagonist start from its socket.' On hearing this, the tiger was afraid, and never after attempted to devour the barking deer."

Family Capridæ.

NEMORILEDUS, *Ham. Smith.*

N. BUBALINA, Hodgson.

Colour grizzled black, clay coloured on the flanks. A black dorsal stripe. Fore-arms and thighs anteriorly reddish-brown, the rest of the limbs hoary. Below whitish.

Length 5 feet or more. Weight 200 lbs.

Western Yunan, at elevations of 6000 to 7000.

N. MILNE-EDWARDSII, David.

This species, writes Anderson, "is distinguished from *N. bubalina* by the uniform brownish-black colour of the upper parts, which tends to ferruginous on the thighs, and by the red colour of the lower parts of the legs, which are grey in *N. bubalina*."

The hill ranges of Western Yunan.

N. RUBIDA, Blyth.

Tor-tsaik.

A female shot on the grass and bamboo-covered slopes of Zwägaben, near Maulmain, is thus described by Beavan (*Proc. Zool. Soc. Lond.* 1866, p. 4): "The animal was full grown, but had not had young, and was of a thick set 'porcine' build. Lacrymal sinus small, slightly developed. General colour black, with a tinge of hoary. Inside of ears white, with black tips and edges. Belly and tibiæ rufous. Throat rufous, white-tipped. Intradigital pores apparently absent. False hoofs of fore and hind legs $1\frac{3}{8}$ inch. Irides dark brown. Teats four. Buttocks rufous and white. Said by Karens to have only one young one at a time."

	feet	inches
Length, from tip of nose to tip of tail	4	6
Tail, including end tuft of hair . . . . .	. . . . .	7
Height at shoulder	2	$10\frac{1}{2}$
Girth behind forearm	2	10
Ear, length of . . . . .	. . . . .	$8\frac{3}{4}$
Horns, along the curve . . . . .	. . . . .	6
Length of hoof . . . . .	. . . . .	$1\frac{7}{8}$
Extreme stretch	6	4
Mane, stiff black bristles, erect . . . . .	. . . . .	6

This species appears to be distributed from Arakan through Pegu to the extremity of the Malayan Peninsula, and to occur in Siam and Formosa, and also in Sumatra. Blyth observes:—

"This species varies much in colour, from red to black, and the black sometimes with a white nape, or the hairs of the nape may be white at the base only. Two flat skins from Arakan are of a pale red-brown colour; with black dorsal list, and

quite resemble the figure of one from Formosa, which is styled *C. Swinhoei*. Mason also states that it is common on the mountains of Toung-ngoo, and Cantor obtained it from those of the Malayan Peninsula. The 'wild goat' mentioned by Crawford, as stated by the Siamese 'to be found in some of the mountains of their country, and to be shot for their horns, which are prized by the Chinese for certain alleged restorative properties,' can hardly be any other. On comparison of skulls from Sumatra, Arakan, and Mergui, I could detect no distinguishing character, and they differ little from those of *C. bubalina* of the forest region of the Himalaya, except in being considerably smaller. The genus is a very peculiar one, by no means so nearly related to the Goats and Gorals as is generally supposed, but examples of it should be studied in captivity before it can be thoroughly understood."

CAPRA, *Linnæus*. OVIS, *Linnæus*.

Domestic goats, Dr. Mason observes, thrive well in Burma, but the reverse is the case with sheep, and Dr. Mason records that Major Macfarquhar, who formerly owned the only sheep in the province of Tavoy, during one rainy season lost forty out of a hundred and fifty. At Maulmain they appear to do a little better, and at Thayet-myo, where there is less rain, they are said to do well. At Thayet-myo, however, the sheep are now lodged in raised houses, where they are well protected from the damp of the rainy season. Formerly many sheep were carried off by leopards, which brutes however steadily avoided entering a large trap which was set and baited for them. They were in the habit of leaping the thorn fence surrounding the fold and carrying off their prey in spite of it. A clever serjeant, however, hit on the happy thought of surrounding the trap with a high hedge of thorns similar to that round the fold. This was accordingly done, and the same night a leopard leaped over the hedge and entered the trap, which had been vainly set for him before.

Family Bovidæ.

GAVÆUS, *Ham. Smith*.

Horns slightly flattened on one side. Spinous processes of the dorsal vertebrae greatly developed.

G. GAURUS, *Ham. Smith*.

The Gour. Pyoung.

Colour dark chestnut or coffee-brown. Legs below the knee white. Horns pale-greenish, tipped with black. Similar in shape in both sexes, but much more massive in the male.

Length 9 or 10 feet; tail 34 inches. Height at shoulder to 6½ feet.

The cranium of a Burmese bull, without the lower jaw, weighed 34 lbs.

In the male a hump, which is absent in the female, rises over the shoulder.

The 'Pyoung' is diffused throughout Burma, and extends as far south as Singapore, the animal reaching perhaps to a fuller development in the forests of Burma than in India.

G. SONDAICUS, *S. Müller*.

The 'Banting.' Lesser Burmese wild bull. Tsein or Sain.

Horns of the male resemble those of the 'gour,' but in the female are slender and lyrate. Colour chestnut, with white stockings. Blyth remarks that "the 'banting' has bred in the Zoological Garden of Amsterdam, where I have seen bull, cow and calf in fine condition. The bull more especially has an indication of a hump, which however must be specially looked for to be noticed, and he has a broad and massive neck like the Gaur, but no raised spinal ridge, nor has either of these species a deep dewlap like Gayal. The cow is much slighter in build, with small horns that incline backwards; and she retains her bright chestnut colour permanently, while the bulls become black as they attain maturity, excepting always the white 'stockings,' and also the white patch on each buttock, which is characteristic of the species. In the old bull the cuticle between the bases of

the horns becomes enormously thickened, corneous and rugged, and this begins to show before the coat has commenced to change colour, as may be seen in a stuffed specimen in the British Museum, which is that of an animal procured in Pegu by the author of this paper, and which lived for some time in the London Zoological Gardens. How far to the eastward the range of this animal extends in the Indo-Chinese countries, remains to be ascertained; but I have reason to believe that two other species of *Bos* remain to be described there, one of which is domesticated in Siam and the other in Cochin-China."

G. FRONTALIS, Lambert.

The Gayal, or Mit'hun.

General colour as in the '*Gour*,' but it possesses a dewlap, which the '*Gour*' does not, and, unlike that animal, is easily domesticated. The wild animal inhabits the upper part of the Assam Valley and Mishni Hills, ranging thence into the borders of China. The domesticated race extends through the Tippera and Chittagong Hills, as far south as the Koladyne River in Arakan.

Mr. W. Blandford, in his interesting zoological notes (Journ. As. Soc. Bengal, 1867, Part II. p. 193), thus describes the differences outwardly visible between the Gour and Gayal:—"The most remarkable of course are the comparatively straight and wide-spreading horns, and the enormously developed dewlap of the Gayal as contrasted with the sharply curved horns and absence of any dewlap in the Gour and the shorter tail of the former. In the Gayals the head is shorter, and I think altogether smaller than in the Gaur, and the dorsal ridge is not quite so high. In the adult bull Gayal in Calcutta the skin of the back and sides is almost naked, as in the buffaloes of the plains of India; this I have never seen in the Gour." As the above animal was one (procured, I fear, in a questionable manner) that had lived, if not been bred, in captivity, it will be interesting to ascertain how far this condition of the skin is natural to the animal in a wild state, or induced, as I suspect, by captivity.

BUBALUS, Hamilton Smith.

Forehead convex, rounded. Horns large in both sexes, inclined backwards and upwards, laid back horizontally when the animal is in motion. Hair scanty, black.

B. ARNI.

The wild buffalo.

The horns are either straight and long, curving at the tips only, or crescentic throughout. The former are found chiefly in Assam, and a pair has been known to exceed 12 feet, measured along the curve from tip to tip. The latter form is the handsomer and more formidable, and is seen in Burma to perfection, though single horns of that sort do not usually exceed 3 feet in length.

Dr. Mason remarks: "There are great numbers of wild buffaloes in the jungles of the south, which are supposed by the natives to be indigenous, but they are more probably of the domestic race that have run wild, like the wild horses of America." This is more or less doubtful, but Blyth instances in support of it that the Indian buffalo now abounds in a state of wildness on the north of Australia, where they have spread from Port Essington, and there are many in the delta of the Nile, where they must have descended from domestic stock. As the Burmans do not consume milk, or any of its products, the calves receive their full share and develop into noble animals, equal almost to the wild in plumpness and vigour. It is a curious sight to see a herd of these creatures tended by a boy of five or six years old, stretched at length on the back of an old bull, who seems as regardless of his burden as though a goat had settled on him, yet the child will drive and manage a herd of these creatures, with nothing but a small switch. A tiger will not attack a herd of buffaloes, as it is credibly reported that if a herd sights a tiger, it charges *en masse*, and destroys its adversary; but if separated from the herd, buffaloes are easily overpowered by a tiger. The strange sight (to them) of a European, especially if on horseback, is very likely to evoke an alarming display of hostility from these

animals; but if their keeper is with them, they are easily restrained, and a child can drive them off. Curiosity and distrust of an unknown object has quite as much to do with their behaviour, alarming though it often is, as any special dislike to a European. Horses, however, are undoubtedly distasteful to them, and a horse-man will always act wisely by giving a herd a wide berth.

Dr. Mason remarks: "There is perhaps no domesticated animal in the world concerning which learned men in Europe and America" (and Asia he might have added) "are so profoundly ignorant as the Buffalo. From misapprehensions of the character of the animal, they have very generally concluded that the unicorn of the English Scriptures was the Buffalo. Gesenius, Hengstenburg, and De Wette in Germany, render the word by 'der Buffel,' and Stuart, Robiinson, and Noyes, in America, say 'Buffalo.' The oriental Buffalo, observes one, appears to be so closely allied to our common ox, that without attentive examination it might be easily mistaken for a variety of that animal." Dr. Mason was, however, far from exhausting the absurdities of authors regarding so marvellous a beast. In Webster and Wheeler's People's Dictionary one of the definitions given is a "kind of African stag," whilst in the Cyclopædia of India the following cluster of mistakes is recorded: "The buffalo inhabits *Thibet*," which is absurd, "but is *domesticated* in India," the fact being it is *indigenous in the wild state* to the grassy plains along the Ganges and Berhampootra, "the Indian Archipelago and Southern Europe. It is the *only indigenous ruminant* in Ceylon," a statement one would hardly have expected to see in a work published but ten years ago, with Kelaart's 'Prodromus' in the hands of the compiler!

Order CARNIVORA.

Raptorial mammals, some killing their prey, some eating carrion, and some subsisting on a mixed diet. Toes with sharp or blunt claws. Mammaræ abdominal. Clavicles wanting or rudimentary.

a. Plantigrada.

Family Ursidæ.

HELARCTOS, Horsfield.

Dentition, I. $\frac{6}{6}$; C. $\frac{2}{2}$; P.M. $\frac{6}{6}$; M. $\frac{4}{4}$.

The 'sun bears' are distinguished from typical bears by their small size, short fur and rounded skulls.

H. MALAYANUS, Raffles.

The sun-bear. Wet-wun (Pig bear).

Cantor thus describes the *Helarctos* of the Malayan Peninsula:—"Colour of the young, snout and lips pale ferruginous. Head, back, and outside of the limbs black, mixed with pale rust colour, in consequence of many of the black hairs having the point, or a part next to the point, of the latter colour. Ears, tail, paws and inner side of the extremities shining black. The somewhat woolly hairs of the abdomen are faintly marked with ferruginous, and are mixed with longer stiff black hairs." The V-mark on the chest is described as variable. In the living animal it is of a pale rust or orange colour, in some individuals with a few small blackish spots, fading after death to a yellowish white.

The common bear of Burma is usually referred to this species, but though it may range into Tenasserim, it is doubtful if it does so into Pegu, and the correct determination of the species of bears inhabiting Burma has yet to be effected.

Blyth says this is the only bear which inhabits British Burma, but I greatly question the accuracy of this statement. I believe *Ursus Tibetanus* occurs in Pegu, and is the 'wet wun' of that province, and I certainly had at Toung-ngoo a young bear with only four upper incisors, which I can hardly suppose to be anything else than a young *Procheilus* (W.T.). Dr. Mason remarks, "On one occasion, while sleeping in a Karen field that had been recently harvested, I was disturbed all night by a drove of them digging up the roots of the sugar-cane that had been left in the

field. They will occasionally attack a man when alone. On descending the Tenasserim a few years ago on rafts, the foremost raft passed over a rapid, and made a short turn into a little cove below, when a bear from the shore made a plunge at the raft and threw the two Karens on it into the water. At this moment the other rafts came in sight, and the bear retreated. On another occasion I met with a Burman and a bear that he had just shot, and the Burman assured me that he shot the bear in the very act of running upon him; and last year a Karen of my acquaintance in Toung-ngoo was attacked by one, overcome and left by the bear for dead. Though severely bitten, the man recovered. The Kamees and Karens describe a smaller species, yellow on the breast, for which they have a distinctive name, but I imagine it is a variety of the above. The Burmese and northern Karens say there is a species with feet and hands like a man, which they call (loo-woon) man-bear. This I suspect to be a fabulous animal, founded on reports of the ourang-outang." Is it not equally probable that it may apply to the *U. Tibetanus* or *Procheilus*, and the smaller species with a distinctive name to *Helarctos*? It seems strange that the "northern Karens" only should hear of the ourang-outang.

URSUS, *Linnaeus*.

U. TIBETANUS, F. Cuv.

Two young bears which I once reared (of I believe this species) afforded me a pleasing illustration of Burmese feeling. I procured them very young, when about to proceed by boat through the delta, to Rangoon, and having no milch goat with me, and knowing the repugnance of Buddhists to supply milk, I was rather at a loss how to rear them. I soon found, however, all my difficulties smoothed over, for no sooner did I make known the wants of my tender charges to the women of the villages at which I stopped, than quite a competition ensued among them as to which of them should contribute milk for their support, the act of so doing being a work highly meritorious, in a Buddhist point of view, as contributing to save life, and more matrons' milk was delivered on board my boat than I knew what to do with, and wonderfully did the young bears thrive on it. An adult shot by myself in the Pegu district measured in the flesh 6 feet and 2 inches. This was, I believe, *U. Tibetanus*, and was quite unlike the little Malayan species, *U. Malayanus* (W.T.).

PROCHEILUS, *Illiger*.

Differs from other *Ursidae* by having only 4 upper incisors.

II. LABIATUS, *Blain*.

The Indian black bear.

This animal has not hitherto been recorded in Burma, but a young bear I once had in Toung-ngoo with only 4 upper incisors could hardly have belonged to any other species.

ARCTONYX, *F. Cuvier*.

Dentition, I. $\frac{3}{3}$; C. $\frac{2}{2}$; P.M. $\frac{3}{3}$; M. $\frac{4}{4}$.

Feet plantigrade, with five strong fossorial claws. Habit that of a badger, but more robust.

A. COLLARIS, *F. Cuv.*

Khwaë-tawet or Wet-tawet.

Colour, upper parts, with head, throat, and breast yellowish-white, more or less grizzled. Nape, a narrow band across the breast, anterior portion of abdomen and the extremities deep blackish-brown. There is also a brown band from the middle of the upper lip, gradually widening posteriorly, and including the eyes and ears, and another smaller and narrower band from the lower lip passing through the cheek and uniting with the other on the neck.

Head and body 25; tail 7 inches.

Ranges from Nipal to Bengal and Assam, and thence to Arakan and the Tsittoung Valley.

* Remove *Arctonyx* to Page 466 under *Viverrida*.

Dr. J. Anderson, in a note to Blyth's "Mammals of Burma," p. 29, infelicitously attempts, in my opinion, to correct Dr. Jerdon, maintaining that 'Bali soor' = 'sand pig,' and not 'Bhaloo soor' = 'Bear pig,' is the animal's proper name. Dr. Anderson adds that the name 'sand pig' is "in consonance with its known habits." Does Dr. Anderson suppose it to live *on* sand, or *in* sand, because I doubt if the creature does either the one or the other, in spite of such authority for its "known habits." Its claws are so remarkably like those of a bear that I think 'bhaloo soor,' bear-pig, as likely to be correct as 'baloo sur,' sand-pig, at all events till its arenaceous proclivities are more clearly demonstrated than they have as yet been.

A. TAXOIDES, Blyth.

About half the size of *A. collaris*, and a coat very like that of the European badger, but softer. Muzzle less broad and hog-like than in *A. collaris*, and with proportionately smaller ears.

b. Digitigrada.

Family **MUSTELIDÆ.**

LUTRA, Ray.

Dentition, I. $\frac{3}{3}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$; M. $\frac{2}{2}$.

Ears small. Feet palmate. Tail round, depressed towards the top, flat beneath. Eye provided with a nyctitating membrane.

T. NAIR, F. Cuv.

The common Indian Otter. Phyan.

Colour hair-brown or light chestnut-brown, sometimes grizzled with hoary tips, or marked with isabelline yellow. Beneath yellowish or reddish white. Sides of head and neck, chin and throat, whitish. Head and body up to 29 inches, tail 17, and 3 inches broad at the base.

L. LEPTONYX, Horsfield.

Small-clawed otter.

Distinguished from the last by its small claws.

"Otters," remarks Dr. Mason, "abound in some of the streams. In the upper part of the Tenasserim, a dozen at a time may be occasionally seen on the rocks in the river. The Burmese sometimes domesticate them, when they will follow a man like a dog." This is true I believe everywhere; they are rollicking, frisky creatures, but make bad pets, as they can inflict a cruel bite, and not unfrequently do. Dr. Anderson thinks that *L. nair* does not range into Burma, but is there replaced by a species which he inclined to identify with *L. simung*, Raffles. How many species or what species they are which occur in Burma is not thoroughly known, and to this end it is essential that the skull in each instance should accompany the dried skins.

MARTES, *Linnaus.*

Allied to the weasels (*Mustela*), but with an additional upper premolar, and a tubercle on the inner side of the carnassier.

M. FLAVIGULA, Bodd.

Colour, head, face, and upper parts of body and limbs glossy blackish-brown, the chin and lower lip white; throat and breast yellow, from pale to yellowish-orange. Colours vary considerably.

Head and body 20; tail 12 inches, with hair.

This is a wide-spread species in India, and in the Himalayas ranges up to 11,000 feet or more. It ranges into Arakan and Malayana, the Malayan race being paler-coloured than the Indian one, and with shorter fur.

HELECTIS, *Gray.*

Dentition, I. $\frac{3}{3}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$; M. $\frac{2}{2}$.

The upper carnassier three-lobed, with a wide two-pointed inner process.

H. NIPALENSIS.

The Nipal wolverine. Kyouk pyan or Kyoung-pyun.

Above earthy brown. Below with the edge of the upper lip and insides of the limbs and terminal half of the tail yellowish. A white vertebral stripe from the nape to the loins. Forehead with a white band confluent over the cheeks with the pale under surface.

Head and body 16; tail (with hair) 9 inches.

Ranges from Nipal through Arakan to Pegu, south of which it is probably replaced by the allied (if not identical) species.

H. Orientalis, Horsf.

The Hebrew word, Dr. Mason remarks, rendered "*weasel*" in Leviticus, is identical with the Arabic '*Khalad*,' which signifies a mole.

H. MOSCHATA, Gray.

The colour is paler than in *H. Nipalensis*, the hair on the thighs and fore-arms being white-tipped.

Inhabits Yunnan at 5000.

Dr. Anderson considers that the three Indian species, *H. Orientalis*, *H. Nipalensis*, and *H. moschata*, are separable from each other by three different types of skull; the first distinguished by its shortness, large teeth, short palate and a small infra-orbital foramen; the second by its greater length, large teeth, long palate, and small infra-orbital foramen; and the third by its long skull and palate, small teeth and large infra-orbital foramen.

Family Canidæ.***C. rutilans*, Hodgson.**

Dentition, L. $\frac{3}{1}$; C. $\frac{3}{2}$; P.M. $\frac{3}{1}$; M. $\frac{3}{1}$ = 10.

General structure as in *Canis*, but with only 12 molars and premolars in either jaw, the second tubercular premolar of the lower jaw being wanting. Mamme 14.

C. RUTILANS, Müll.

Wild dog. Tor-khwē.

Colour bright rusty red or rufous fawn colour, paler beneath. Tail moderately 'brushed,' reaching to the heels, and usually black-tipped.

Distributed in suitable localities over the whole of India, Ceylon and Burma, Sumatra, etc., but from its retiring habits is rarely seen.

An 'Indian wild dog' is described by Dr. Murie (Proc. Zool. Soc. L. 1872, p. 715), which I believe represents an animal from Burma; anyhow there can be little question, from the consensus of opinion of those who have studied the animals alive, that there is but one Asiatic species, though Gray (P. Z. Soc. L. 1868, p. 498) separates into as many species the Nipal, Southern Indian and Sumatran wild dogs (*C. primævus*, *C. Sumatrensis* and *C. Dekkanensis*).

Dr. Mason remarks, "There is a wild dog in the Provinces which Mr. Blyth regards as a distinct species, and the Karens have described to me an animal that makes his kennel in the ground like a fox or a jackal, which they say is found in the Shan country. The 'fox' of the English Bible is probably the 'jackal.' The Hebrew word is '*shugal*,' the Persian name of the jackal is '*shaghal*' and '*shakal*,' and the Pali is '*theugala*' and '*sheugala*,' from the same root which the Burman books render 'earth-dog.'" The wild dog, according to Hodgson and Jerdon, preys by night and by day, but chiefly by day. Six, eight or ten unite to hunt down their victim, maintaining the chase rather by scent than sight. In hunting, they bark like hounds, but in discordant tones, alike differing from those of the domesticated dog, or the jackal and fox. Of some kept in confinement, Hodgson remarks that "after ten months' confinement they were as wild and shy as at the first hour I got them. Their eyes emitted a strong light in the dark, and their bodies had the peculiar fœtid odour of the fox and jackal in all its rankness."

The wild dog is said to kill even tigers, though this is improbable, but Dr. Jerdon once came on a tame cow buffalo which had been killed by them; but 'sambur' and smaller game, including pigs, are their more usual prey.

CANIS, *Linnaeus*.

C. ACREUS, L.

Dentition, I. $\frac{6}{6}$; C. $\frac{2}{2}$; P.M. $\frac{6}{6}$; M. $\frac{6}{6}$ = 42.

The Jackal. Myae-khwē.

Colour rufous grey, the hairs mottled black-grey and brown. Tail reddish-brown, with a dark terminal tuft. Individually the colour varies greatly, there being specimens in the Calcutta Museum pure white, coal black, and bright rufous or chestnut (Blyth, J.A.S.B. 1858, p. 275).

Ranges into Arakan as far south as the Naf River. In Burma it has been shot about Prome, and Thayet-myo, but neither Mr. Blyth nor Dr. Mason would seem to have met with it further south. I have myself seen it near Maulmain, but the doubt exists if the pair I saw may not have been descended from specimens imported for hunting purposes by some sporting members of the European community. This is, however, unlikely, and Dr. Mason alludes to the existence of an animal which makes its "kennel in the ground, like a fox or a jackal," in the "Shan country" (upper Salween Valley?), which may very likely be this animal.

Family Viverridæ.

VIVERRA, *Linnaeus*.

Dentition, I. $\frac{6}{6}$; C. $\frac{2}{2}$; P.M. $\frac{6}{6}$; M. $\frac{6}{6}$.

A large anal pouch, which secretes an odorous substance called 'civet.' Pupil vertical and oblong. An erectile mane along the back. Thumbs not remote. Does not climb trees well.

V. ZIBETHA, L.

The grey civet cat, Khyoung-myen, or 'horse-cat,' of the Burmese, from its mane.

Colour yellowish or hoary-grey, with black spots and stripes. Throat white, banded with black. Tail with six black rings. Limbs black or sooty. Mane distinct. Sometimes the spotted markings are faint or obsolete.

Length of head and body 33 to 36 inches. Tail 13 to 20 inches (with hair). This animal produces the odorous secretion called 'civet' from a large subcaudal gland $2\frac{1}{2}$ inches in diameter. The animal is sometimes kept caged, and the odorous secretion scraped out of its receptacle from time to time, for use by perfumers. Mason says this animal is not so abundant in Burma as *Viverricula*.

V. MEGASPILA, Blyth (J.A.S.B. 1862, p. 331).

V. tangalunga, Cantor.

The large spotted civet-cat.

Resembles *V. zibetha* in size, but the body-markings and spots large and black. Blyth remarks, "I have seen flat skins of this animal from Prome resembling those which Dr. Cantor procured in Province Wellesley, and one brought from Sumatra by Sir Stamford Raffles. It is nearly allied to *V. civettina*, of S. Malabar, but very different from *V. tangalunga*, Gray, of the Malay countries, which is a much smaller animal, with more cat-like tail, and the spots of which are much smaller and more numerous."

Dr. Günther gives the length of an adult from Penang (Proc. Zool. Soc. 1876, pl. xxxvii. p. 427). Body and head, 36.0; tail 17.0 inches; total 4 feet 5 inches.

Ranges from Prome to Penang.

VIVERRICULA, *Hodgson*.

Form longer than in *Viverra*. Thumbs remote. Climbs well. Anal pouch as in *Viverra*.

V. MALACCENSIS, Gmel.

The common civet-cat. Kyoung-ka-do.

Tawny grey or greyish-brown, with several longitudinal lines on the back and croup. The sides longitudinally spotted, sides of the neck with some transverse bands. Belly unspotted. Head darker, with a black stripe from the ear to the shoulder. Tail long, with eight or nine dark annular rings.

Length of head and body 22 to 23 inches; tail 16 to 17 inches.

Common in Burma and the Malay countries.

Mason remarks, speaking of this species, "The Indian civet-cats secrete an odoriferous substance identical with '*civet*,' though not the '*civet*' of commerce. This species is not infrequently found in the villages, and its secretion enters into the Burmese *Materia medica*."

PTOXODON, Horsfield.

Dentition, I. $\frac{3}{3}$; C. $\frac{2}{2}$; P. $\frac{3}{3}$; M. $\frac{7}{7}$.

Body slender. Limbs short. Claws retractile. Tail very long. Five toes on all feet. Thumbs approximate. Soles well furred. No anal pouch. Mamme two pectoral, two inguinal.

P. PARDICOLOR, Horsf.

Colour orange-buff or fulvous, spotted with black. Four irregular lines down the neck, and seven longitudinal rows of squarish or elliptic spots, each row consisting transversely of eight spots, diminishing in size from the dorsal line. Below entirely unspotted. Tail with eight or nine annuli.

Head and body 16; tail 14 inches.

Ranges from Nipal to the Kakhien Hills, where Anderson procured a skin.

P. MACCLOSUS, W. Blanford.

"Upper part brownish-black, broken up by greyish-white bands, lower parts white, tail brownish-black, with 7 white rings, tip whitish. Two broad black bands run down each side of the upper part of the neck, between them is a narrow greyish white band, with a faint mesial dark streak, somewhat interrupted, and passing into two bands of elongate spots between the shoulders. The two broad dark bands pass into the dark patches of the back; on each side of these bands is a white rather wavy stripe, commencing at the ear and continued along the neck, above the shoulder, and down the side to the thighs, becoming more irregular behind; below this again is a dark band somewhat broken up into spots in front, passing over the shoulder, and continued as a line of large spots along the side. The back is chiefly brownish black, crossed by six narrow transverse whitish bands, the first five equidistant, the foremost communicating with the mesial-neck band, and the hinder all uniting with the white band on the side, so as to break up the dark colour into large spots. There are small black spots on the fore neck, lower portion of the sides, and outside of the limbs, the spots on the fore neck forming an imperfect gorget. The white rings on the tail are not much more than half the breadth of the dark rings; the last dark ring, near the tip, and the first white ring, are narrower than the others. Nose dark brown mixed with grey, a dark ring round each orbit, with a streak running back to below the ear, and another passing up to the crown; forehead between and behind the eyes, and in front of the ears, and cheeks, pale grey. Ears rounded and clad with blackish hairs outside, and near the margin inside, a few long pale hairs on the inner surface of the ear-conch. Whiskers long, extending to behind the ears, the upper brown, the lower entirely white. Soles, except the pads, which are naked, covered with fine hair."

Head and body 18.25; tail 16.75 = 35 inches.

Ranges through Martaban and Tenasserim.

"This species," Mr. Blanford remarks, "appears well distinguished from *P. gracilis* and *P. pardicolor* by its larger size, and by the much greater prevalence of dark colour on the upper surface generally. In external characters *P. maculosus* is nearer to the Malay species, *P. gracilis*, the Himalayan *P. pardicolor* having the upper parts covered with comparatively small spots, and more numerous rings on the tail. With

P. gracilis I am only acquainted by description and figures. Judging by these, the principal difference in the colouration is, that in *P. gracilis* the pale tint prevails very much more than in *P. maculosus*, the upper parts of the former being marked by irregularly-shaped blackish spots on a pale ground, whereas the upper surface of the latter is dark, with a few white streaks dividing the colour into patches. On the tail of *P. gracilis* the dark rings are represented as narrower, and, towards the tip, much narrower than the white rings, and there is a long white tip. In *P. maculosus* the dark tail rings are nearly twice as broad as the light, and the white tail tip is very short, shorter than the last dark ring. The distribution of colour on the head also appears different, the whole nasal region in front of the eyes being dark in *P. maculosus*, but not in the figure of *P. gracilis*. The more important dimensions of *P. gracilis* as given by Horsfield are: length of the body from the extremity of the nose to the root of the tail 1ft. 3½in.; length of tail 1ft. ½in."

PARADOXURES, *P. Cuvier*.

Five toes on all feet, connected by a web. Claws semiretractile. Pupil elliptic, vertical. In some species a glandular fold exists near the anus, which secretes a peculiar substance, devoid of the odour of 'civet,' but no distinct odoriferous pouch. Diet mixed. Climbs well.

P. GRAYI, Bennet.

P. Nipalensis, Hodg.

Colour above light unspotted fulvous brown, in some lights ashy, beneath paler. Limbs ashy, darker towards the feet, which are black. Tail same colour as body, the end dark, white-tipped. Ears and face black. Forehead, nose-streak, and subocular band, whitish.

Length of head and body 30; tail 20 inches.

Ranges as far south as the Arakan Hills.

A specimen described by Hodgson in Nipal was very cleanly in its habits, and devoid of unpleasant smell; but when irritated, was capable of producing a shocking stench, by the discharge of a thin yellow fluid from two pairs of pores situated on each side of the anus. It preferred boiled rice and fruit to flesh, offered to it, but preferred to anything, birds if captured by itself, in which it was wonderfully expert, darting on them, from its feigned sleep in a corner, with unerring aim.

The 'earnassier' tooth of this species is shorter than in other *Paradoxures*, and it has been ranged by some as a *Paguma*.

P. MUSANGA, F. Cuv.

The common Paradoxure. Khyoung-wōn-baik.

Colour brownish-black, with some dingy yellowish lateral stripes, sometimes obsolete. The forehead sometimes white-banded, and a white spot above and below each eye, and usually a black median nasal streak. The colour, however, is subject to much variation. The tail is yellowish-white towards its termination. Belly sometimes marked with elongated white spots.

Occasionally the tail is spirally distorted, so that the underside, towards its tip, is uppermost, and on an individual peculiarity of this sort the generic name of '*Paradoxurus*' or '*screw-tail*' was based, according to Blyth.

Length of head and body 22 to 25; tail 19.5 to 21 inches.

Common in Burma, the Andaman Islands, the Malay countries, India, and Ceylon.

P. TRIVIRGATUS, Tem.

The three-striped Paradoxure. Khyoung-na-gā.

Colour grey, with three dark streaks. Fur soft and silky.

Head and body 26.5; tail 27 inches.

"This animal is very common, and occasionally enters houses in the town in pursuit of rats. When young, it is easily domesticated, and valuable as a ratcatcher."

Ranges into Tenasserim from the Malay countries, and has been shot by myself in the Arakan Hills near Nioung-ben jo on the Sandoway Road.

P. LEUCOTIS, Blyth.

P. Tytleri, Tytler.

The white-eared Paradoxure. Khyoung-na-zwet-hpyu.

Fur dense and woolly at base, with long hairs intermixed. The prevailing colour is fulvous brown, with three blackish dorsal streaks; below paler, more or less albescent. A white streak on the nose between the eyes. Ears black at the base, with the terminal half flesh-coloured and scantily clad with white hairs. Paws and terminal half of tail blackish.

Head and body 18; tail 18 inches; total 3 feet.

Arakan to Tenasserim (J.A.S.B. 1858, p. 274).

ARCTICTIS, *Temminck*.

Canines stout, lower ones very long, compressed at the base, and grooved externally. Body long. Legs short. Tail long and prehensile. Tocs five on all feet. Claws strong, curved and semiretractile. An anal gland secreting an oily fluid of an intense but not fetid odour.

A. BINTURONG.

The Binturong or monkey-tiger. Myouk-kyā.

Colour black throughout, with a white border to the ears, with a ferruginous wash sometimes, or grizzled and hoary. Head, face, throat, and base of tail whitish or hoary. Tail excessively thick at the base, and tapering to a point.

Head and body 28 to 33 inches; tail 26 to 27 inches.

Ranges from the Malay countries into Assam.

“This animal was first discovered in Malacca. In its habits,” says Dr. Cantor, “it is both arboreal and terrestrial and nocturnal, sleeping till the sun is below the horizon, when it displays great agility in searching for small quadrupeds, birds, fishes, earth-worms, insects, and fruit. The howl is loud, resembling some of the Malayan Paradoxuri. It is remarkable, says Mr. Blyth, for being the only placental mammal of the old world which is furnished with a truly prehensile tail.”

Family Herpestidæ.

URVA, *Hodgson*.

Structure intermediate between *Gulo* and *Herpestes*. Mammæ, six, ventral.

U. CANCRIVORA, Hodg.

The crab mongoose. Mwai-bā.

Colour fulvous iron-grey, variable. Inner fur woolly, outer of long lax hair of mixed black, white, and fulvous. Belly brown, limbs blackish-brown. A white stripe from the ear to the shoulder. Tail rufous or brown, with rufous tip. Body elongate.

Head and body 18; tail 11 inches. Weight 4 pounds.

Ranges from Nīpal to Tenasserim, and is said by Blyth to be the only mongoose found in Burma.

According to Hodgson, this animal is somewhat aquatic in its habits, feeding much on frogs and crabs (*Thelphusidæ*).

HERPESTES, *Illiger*.

Dentition, I. $\frac{3}{2}$; C. $\frac{2}{2}$; P.M. $\frac{4}{4}$; M. $\frac{4}{4}$.

Five toes on all feet, with semiretractile claws. Ears small, rounded. Eye small. Muzzle pointed. Mammæ four. Anal pouch or glands present, but no fetid secretion. Habits active, diurnal, bold and sanguinary.

H. MALACCENSIS, F. Cuv.

The Bengal mongoose.

Colour rich reddish-brown, mixed with hoary yellow, redder on the ears, face, and limbs. Hair harsh, diffuse and not closely applied.

Head and body 15; tail 10 or 11 inches.

Jerdon says this species ranges through Assam, Burma and the Malay countries, though Blyth would seem never to have received specimens.

H. AUROPUNCTATUS, Hodg.

Colour olive-brown, with a golden tint due to the yellow annulation of the fur. The sides are paler, and the under parts dirty yellowish-white.

Length—Head and body 12·70; tail 10·25=22·95 inches.

Inhabits Bengal and ranges to the Punjab on one hand, and Assam, Upper Burma (Bhamo), and Malayan Peninsula on the other.

Family Felidæ.

Dentition, I. $\frac{3}{1}$; C. $\frac{2}{1}$; P.M. $\frac{4}{1}$; M. $\frac{3}{1}$.

FELIS, *Linnaeus*.

Five toes before, four behind. Claws retractile. Habits nocturnal. Some species are easily domesticated, though somewhat uncertain and dangerous playmates, being all of them highly sanguinary, and the most perfect type of raptorial carnivora.

F. TIGRIS, L.

The Tiger. *Kyā*.

Colour bright fawn, more or less rufous in hue, with dark stripes. The average size (says Jerdon) of a full-grown male tiger is from 9 to 9½ feet in length; but occasionally one may reach to a few inches over 10 feet. These measurements, of course, are taken over the body, as the skin, after it is removed, may be stretched a foot or two more.

Tigers, as a rule, kill their own prey; but rather than die of starvation, they will condescend to carrion. Jerdon relates a case of a tigress and two cubs devouring a buffalo which had died of disease, and the still more remarkable fact of a tiger removing the body of a tigress which had been shot, before the pad elephant, which had been sent to bring in her body, arrived, and devouring half of the body. This was related by a celebrated sportsman in Khandeish, and was probably the result of the starving condition of the animal. Dr. Mason remarks, "No animal seems to be more universally diffused than the Royal Tiger. While other animals vary in species over a large extent of country, the tiger seems the same from the Indus to the Menam, and from Malacca to the Himalayas. In travelling we come on their tracks ever and anon, but till tigers have by some peradventure tasted human blood, they do not appear to attack man, but confine themselves to his dogs, hogs, goats or ponies. They do not habitually come within a fence, but a fence is no obstacle to a hungry tiger. I stopped one evening in the school-house of a large Bghai village, which was surrounded by a high bamboo fence, with no entry into the inclosure but by a small gateway. I had a stout Shan pony with me, tied up under the room (all houses in Burma being raised five or six feet from the ground) where I was sitting and writing, about eight o'clock in the evening. Suddenly there was an agonizing snort from the pony, followed by a loud crash of the fence close by, and nothing more was heard. In the morning the half-eaten body of the pony was found at the foot of the hill half a mile distant. It is noteworthy that at the time the tiger carried off the pony, my cook was boiling the kettle for tea just outside the gateway, not more than two or three yards from the entrance, where the tiger must have passed in." Dr. Mason goes on to add that this tiger was wounded and probably killed the next night by a gun set with a spring close to the carcase of the pony. "It is sometimes said a tiger will not attack an elephant; but one of our Karen Christians, engaged in the timber-trade in 1871, turned his elephant out to feed at evening near the foot of the mountain on which Baugalay stands, and he found it next morning mortally wounded by a tiger. Its back and rump were dreadfully bitten up, and it was supposed that the tiger had come upon it, while laid down and asleep, for tigers do not often attack elephants." In explanation of the above remarkable case, it may be suggested that

the elephant was weakly and sick, as elephants in health do not lie down, but sleep standing. A case may here be quoted illustrating the risk of going near a recent 'kill.' A friend of mine, Mr. Montgomery, when surveying in Arakan, was surprised one morning to find a fine dish of pork chops on his breakfast table. On inquiry he found that his people had found a pig just killed by a tiger near the village, and had appropriated the meat to their own use. After breakfast my friend strolled out to see the spot, a Burman leading the way, and several men bringing up the rear of the party. They had barely reached the spot, when the exasperated and hungry tiger, with a terrible roar, flung himself into their midst. The Burman, who was leading, was thrown down, and died in a few hours of his injuries, whilst my friend had his leg torn open from the hip to the knee, seemingly by the hind claws of the tiger, and was for weeks laid up and incapable of walking. The tiger, satisfied with the vengeance he had inflicted, disappeared, and was not seen again. Alluding to the ravages of tigers in India, Dr. Mason remarks: "The difference however, it is believed, is not in the tigers, but in the men. Whenever a man-eating tiger turns up among the Karens, they set traps, and nooses, and pitfalls, and spring spears, and give him no rest until he is caught one way or other. Then his captors take his body, slung on bamboos, to exhibit him in all the surrounding villages, and every village contributes whatever they choose, to remunerate the party which has delivered them from so dangerous a neighbour, which in the aggregate often amounts to a handsome sum, and this keeps up the stimulus to hunt down such nuisances whenever they appear. When natives are travelling in small parties, they often extemporize a bamboo staging among the branches of a tree, on which to spend the night, but they are no security from the attacks of tigers. I have heard of a Karen being carried off whilst asleep among the upper branches of a tree by a tiger which had stealthily crawled up the trunk. I was formerly incredulous of the native reports of tigers running up trees, but quite recently the thing occurred in the presence of a party of Europeans." Unfortunately the quotation on which Dr. Mason relies gives neither names nor dates, so that it is possible that leopards, not tigers, were the animals; neither is it certain that the witnesses were sportsmen, who are not in the habit of confounding the two animals. I believe the consensus of opinion among sportsmen is that tigers do not ascend trees. On the Arakan Coast, where tigers are numerous, I have often noticed what seemed a most inadequate protection from these animals, but which I was assured was really not so. A number of strips of bamboo, some three feet long, stuck into the ground, each bent into a semicircle, overlapped by the adjoining ones, much as a flower pot is surrounded in an English garden. A puppy could jump over the circle thus formed, but I was assured no tiger would attempt to do so. I can only suppose that the tigers suspect the arrangement to be connected with some spring spear, or other contrivance, which their experience has led them to dread.

After mentioning several cases of both Karens and Burmans being killed by tigers, Dr. Mason adds, "These few facts, which might easily be multiplied, have been mentioned because the opinion has gone abroad that Burmese tigers are not dangerous. Dr. Helfer wrote, 'They are of quite a different nature from those in Bengal, and probably more afraid of men, than men of them. Accidents very seldom happen to natives who penetrate daily into untrodden jungle, sometimes quite alone.' Such representations may prove fatal to strangers and persons new in the country, as they already have in the case of Dr. Woodford, who lost his life by a tiger on the Ataran a few years ago, wholly owing to his want of suitable precaution in going away from the boat near evening to shoot a peacock." The circumstances of this case help to explain the immunity with which people traverse the haunts of these animals. The tiger is nocturnal in his habits, and having been on the prowl all night, and probably fully satisfied his appetite, is during the day very indisposed to move, or to interfere with either man or beast passing near his lair. Towards sunset, however, the case is different, and the risk vastly increased, but men do not usually move about the jungles during the night. Tigers in Burma vary greatly in size, and the Burmans recognize a large and a small race. The large race is regarded as inoffensive to man as a rule, but the small tiger is much more dreaded.

F. PARDUS, L.

The leopard. Thyt-kyā.

Colour rufous fawn, variable in shade, with black spots grouped in rosettes. Tail more or less ringed. Belly whitish. Leopards vary greatly in size, and it is not certain if two species are not included under the same name. Length from 6 to 8 feet, and their habit and proportions seem to vary even more than their extreme length. There are probably several local races, but Jerdon merely separates two, the *Panther*, a large animal with a longer skull in proportion than the other, and the *Leopard*, with a shorter head proportionally, and longer fur. "Leopards," Dr. Mason remarks, "are probably more numerous than tigers, and they will sometimes attack man, though he seek refuge in the tree tops. Two Karens were travelling on one occasion in the forests of Maulmain, and when daylight departed, they made little bamboo platforms to sleep on during the night, in the branches of a large tree, one on a lower main branch, and the other on an upper large branch. During the night, the man on the lower branch was awaked by what he thought to be a tiger, but it must have been a leopard creeping up the body of the tree above him. It had passed his branch, and was climbing up to where the other slept. He called out: the man answered, and the leopard was still, not a claw moved; but the sleepy man could not rouse himself, and in a few minutes the leopard rushed up, seized the man in his sleep, and jumping down with him, devoured him at the foot of the tree, regardless of all the noise the narrator of the story could make in the tree above him.

"While the inhabitants of a Bghai village were gathered round my *zayat* (the guest house, which nearly every village in Burma possesses) one night, to preserve it from a jungle fire raging around, loud screams were heard from a few women left in the house close by, and it appeared that a leopard, taking advantage of the absence of the inmates, had come under the house, and endeavoured to effect an entrance through a hole in the floor.

"Black leopards, commonly called black tigers, are frequently met with in Tavoy province. They are dangerous beasts. A few years ago, a Burman was devoured by one, not eight miles distant from Tavoy city."

F. DIARDI, Desmoulins.

F. macroclis, Tem.

The eluded tiger-cat.

Ground colour pale greenish-brown or clay-brown, changing to tawny on the lower parts and inside the limbs, or sometimes whitish below. A double line of small cateniform spots, from the ears, diverging on the nape to make room for a smaller inner series. Large eluded spots, dark edged, and crowded together on the back and sides, and some irregular spots on the sides and belly. Throat black-banded. Tail dark ringed.

Head and body 42·0; tail 36 inches = 6½ feet, but it grows larger.

Ranges from the Himalaya through Burma to the Malayan Peninsula.

F. VIVERRINA, Bennett.

The fishing tiger-cat.

Colour mouse-grey, sometimes tinged with tawny, with large dark spots, oblong on the back and neck, but in lines more or less rounded elsewhere. Cheeks white, with a dark face stripe. Five or six dark bands on chest. Belly spotted. Tail dark-banded, and black-tipped.

Head and body 30 to 34; tail 10·5 to 12·5 inches. Weight 17lbs.

Jerdon remarks that the ears are small and blunt; the pupil circular. This last observation would indicate diurnal habits, unless it refers to an animal killed at night with expanded pupil, when of course no contraction would result. The nasal bones are narrow, giving a viverrine appearance to the face, whence its specific name. Blyth says this is a tameable species, but that a newly-caught male killed a tame young leopardess of twice his own size.

F. UNDATA, Desmarest.

Thyt-khyoung, Arakan. The leopard-cat.

Colour and markings variable. Ground colour from fulvous grey to bright fawny-yellow, rarely greenish-ash or brownish-grey. Lower parts white. Four spots on the forehead, and behind them two lines to the root of the tail, with a broader one on either side in front of the shoulders. Back and sides longitudinally spotted. Two narrow lines above the upper lip. A transverse band on the throat, and the tail spotted, and ringed towards the tip.

Head and body 24 to 26; tail 11 or 12 inches.

This is a very savage species, and quite untameable, according to both Blyth and Jerdon. It appears to take to the water readily.

F. AURATA, Tem.

F. Moormensis, Hodg.

F. Temminckii, Vigors (young).

Colour above deep bay-red, paler beneath and on the sides. Throat sometimes indistinctly spotted. Ears internally, and tip of tail black.

Head and body 31; tail 19 inches.

Blyth does not include this species in his list of Burmese mammals, but Dr. Mason writes: "There is an animal of the tiger tribe called the 'fire-tiger,' from the colour of its skin, which is of an uniform red." Dr. Mason was inclined to refer it to *F. Chaus*, but the '*Chaus*' is not red. A caged specimen I once saw in Maulmain was a uniform red, and unapproachably savage.

F. MARMORATA, Martin.

The marbled tiger-cat.

Colour dingy fulvous or yellowish-grey, with numerous wavy black spots, clouded or marbled. Some blackish lines on the head and nape, coalescing into a dorsal interrupted band. Thighs, sides, and tail black-spotted. Tail tip black. Belly yellowish-white.

Head and body 18½ to 23; tail 14 to 15½ inches.

This species is not included by Blyth in his list of Burmese mammals, but Jerdon says it is found in the hilly regions of "Assam, Burma, and Malaya, extending into the Island of Java, at all events."

F. CHAUS, Guldenstadt.

The common wild cat.

Colour yellowish-grey, dark and unspotted, inclining to rufous on the sides of the neck and belly. Below white. A dark stripe from eye to muzzle. Ears slightly tufted, rufous black externally, white within. Limbs with two or three dark stripes. Tail annulated with black.

Head and body 26; tail 9 or 10 inches.

Inhabits India, ranging into Arakan, though how far south is not clearly ascertained. Dr. Mason does not seem to have met with this species in Tenasserim, though it not improbably occurs in the Irrawaddy Valley.

A curious habit may here be noticed which all 'tom' cats have of discharging their urine backwards, and to a considerable height. This may be noticed in the case of domestic cats, who sometimes salute our walls and furniture after this fashion. I was once myself standing in front of the tiger's cage at Barackpore, in company with some ladies, when, on a sudden, the beast turned round and discharged a powerful jet of urine between the bars, which passed between the shoulders, luckily, of two of the party, and it was the merest accident that one of them did not receive the same in her face. I mention this circumstance, to put others on their guard against a similar accident happening to them.

Order PRIMATES.

Sub-order LEMURIA.

Family Nycticebidæ.

NYCTICEBUS, Geoffroy.

N. TARDIGRADUS, F. Cuv.

The monkey's conebine. Myouk-moung-mā.

Head round, with short muzzle. Ear short and hairy. Tail short. Eyes large, approximate. Colour dark ashy grey, paler below, with a dark vertebral streak. Ears and space round the eyes dark.

The slow loris, Dr. Mason remarks, is not abundant in Burma, and "the Karens say that were it to enter a town, that town would assuredly be destroyed."

Sub-order CHIROPODA.

Tribe CATARRHINI.

Dr. Mason thus prefaces his early account of the monkeys of Burma: "The Quadrumana," says Agassiz (deservedly deemed the greatest of living zoologists), "are limited on all the continents to the warmest regions, and but rarely penetrate into the temperate zone. This is a natural consequence of the distribution of the Palms, for these trees, which constitute the ruling feature of the flora of the tropics, furnish, to a great extent, the food of the monkeys." There are more than half a dozen of the quadrumana, or monkey tribe, in this country, and it will be new to European naturalists to learn that they draw a very small portion of their sustenance from the Palms. The 'Gibbons' eat the fruit of the '*ficus*,' which genus probably furnishes more fruit in this country than all the palms together. The flowers of the 'cotton trees' (*Bombax*), whose fleshy calices afford much nutriment, the large flowers of the '*Dillenia*,' and many others, are much sought by the white-eyed monkeys, while the monkeys on the streams, besides shell-fish and crabs, eat the tender shoots of reeds and bamboos. All the species eat wild plantains, which are very abundant."

Family Hylobatidæ.

Tailless arboreal apes or Gibbons.

HYLOBATES.

H. HOOLOCK, Harlan.

The white-browed gibbon. Myouk hlwai-kyan (generic).

Colour varies from sullied white, or fulvescent, to black. A broad white frontal band.

Ranges from the Brahmaputra to the Irrawaddy.

H. LAR, L.

The white-handed gibbon.

Colour much as in *H. hoolock*, but the hands and feet are invariably white, and the face is encircled with white.

Inhabits the Tenasserim Provinces and Siam.

Blyth remarks: "Both the white-browed and the white-handed gibbons vary exceedingly in shade of hue, from black to sullied white and pale fulvescent; the two sexes equally of *H. lar*, but the females only, so far as I have seen, of *H. hoolock*. The males of the latter would appear to be constantly black, the females rarely so, at least in Assam, though according to Colonel Tickell both sexes of it are always black in Arakan. A pale specimen from Sandoway has nevertheless been recorded. Whatever the rest of the colouring may be, *H. hoolock* has constantly a broad white frontal band either continuous or divided in the middle; while *H. lar* has invariably white hands and feet, less brightly so, in some, and a white ring, encircling the visage,

between the callosities, and its upper surface roughened by being sat upon, and moreover we find, when we come to examine its structure, that this bent portion contains only a few rudiments of vertebræ at its base, its greater extent being reduced to a tendinous mass. These facts seem to have only one explanation: This tail from its short size is in the monkey's way when it sits down, and frequently becomes placed under the animal while it is in this attitude, and from the circumstance that it does not extend beyond the ischial tuberosities, it seems as if the tail had been originally bent round by the will of the animal into the interspace between the callosities, to escape being pressed between them and the ground; that in time the curvature became permanent, fitting in of itself when the organ happens to be sat upon. These facts might support Lord Monboddo's theory of the gradual disappearance of tails."

From comparison of various specimens, Dr. Anderson has established the fact that these red-faced stumpy-tailed monkeys "are born with a purely uniform brown fur," but as age advances the hairs become annulated, and in the adult "the characteristic feature of the fur is the regularity and uniformity of the annulation, and the great number of annuli which occur on each individual hair," ranging as high as 14.

This monkey ranges from the Kakhyen Hills to Assam, appearing to be restricted to the hills, and not to be found in the more open ground. It has been sent by Phayre from Arakan (Proc. As. Soc. B. June, 1847). It also occurs in Tenasserim, having been procured near Malwōn by Mr. Alfred Hough, when stationed in that neighbourhood, and that gentleman observed that the same name (Myouk-lwai-gyau) was given to it by the natives as to the Gibbon, probably from the shortness of its tail, leading them to regard it as a sort of terrestrial gibbon or ape.

M. NEMESTRINUS, L.

The pig-tailed Baboon of Pennant. Myouk-pa-lhie.

General colour olive, tending to brown, the variation being due, according to Dr. Anderson, "to the relative development of the yellow and black rings on the hair. The rings occur on the exposed portion of the hair, the hidden part of which is grey." Head and back often very dark. The under part, greyish, together with the sides of the face, which are marked with blackish-grey. The face is nude, and with the ears and callosities, of a dusky flesh colour. "The tail is a little more than a third of the length of the body and head, and is rather sparsely clad, contracting somewhat rapidly to a point, and carried erect, being somewhat downwardly curved near the tip."

Inhabits Borneo and Sumatra, and ranges south of Tenasserim.

A curious habit may be noticed in those monkeys with gaudily-coloured posteriors and adjoining parts, of thrusting that part of their persons into your face, as it were, by way of welcome or conciliatory salutation. This may be seen in the common Rhesus monkey. Let a dog, or a man whom the monkey distrusts, approach, and the monkey presents a bold front, with a threatening display of its teeth. Let, however, a friend approach, or any one whom the monkey wishes to conciliate by civility, and it immediately turns round and elevates its rubicund posteriors to the gaze of the visitor, with a reverted look over its shoulder, which plainly says, "There, are you not charmed with that beautiful vision?" This charmingly naïve habit is only practised by those monkeys whose 'sacral' callosities and adjoining parts are gaudily coloured, and is not noticed in individuals belonging to other families not so provided.

M. LEONINUS, Blyth.

M. Andamanensis, Bartlett.

The long-haired pig-tailed monkey. Myouk-ni.

The long-haired pig-tail monkey was originally described from two skins, without skull or other bones attached, from Arakan. One was that of a particularly fine male, with hair on the fore-quarters from four to five inches long, and the tail-tuft of a deep ferruginous colour, which also tinged the fore-quarters. The other was that of a small young animal, rather pale in colour. It does not appear to be a common species, ranging from the North of Arakan to an undetermined distance southward, and, according to Dr. Mason (MS.), to Young-ngoo. In the Malayan Peninsula, it is

replaced by the nearly allied *I. nemestrinus*, the well-known short-haired pig-tail monkey of the Malay countries, which is a likely species to inhabit also the southern Tenasserim provinces. Both of them are highly docile, and the manifold performances of "Jenny," the so-called Andaman monkey, that lived for some time in the London Zoological Gardens, will be remembered by very many visitors. In Sumatra the short-haired species is commonly trained to gather cocoa-nuts.

Male, from muzzle to tail 23; tail 8=31 inches.

Ranges from Arakan to the Irrawaddy Valley.

Speaking of the tail of this species, Dr. Anderson remarks: "The caudal vertebrae have all the appearance, so to speak, of degradation, and look as if they were in the process of becoming reduced to the rudimentary character which they assume in the stumpy-tailed monkeys."

M. CYNOMOLGUS, L.

The crab-eating monkey. Myouk-ta-ngā.

M. carbonarius, F. Cuv.

M. aureus, Is. Geoff.

The various races of this monkey vary considerably in colour. In Burma they are generally devoid of any yellowish tinge, the face blackish in the living animal, with strongly contrasting white eyelids, and no trace of crest on the vertex. The Malayan race is much less dark about the face, and the upper parts are yellowish. The individual variety of this monkey, of an orange colour, *M. aureus*, has been sent from Mergui, by Maj. Berdmore, but there is no established race so coloured. Dr. Mason observes: "This monkey is more numerous in individuals than any other species in the Provinces. It abounds on the sea-shore, and on the banks of inland streams, especially on tide-waters, where it appears to draw a large portion of its sustenance from crabs and shell-fish found on the banks. Hence the Burmans have named it the 'Fisher Monkey,' and when the tide is out a whole troop is often seen issuing from the jungle to conchologize. Some are observed turning over stones in diligent search of shell-fish, others breaking up the shells they have found to get at the animals within, but most seem to be in search of small crabs, and wherever the trace of one appears, a monkey will thrust down his arm up to the shoulder, if necessary, to draw it out of its hole. Fruits, however, are as acceptable to them as shell-fish. On one occasion, coming down close in-shore at the mouth of the Tenasserim, a troop of them followed my boat for a considerable distance, being attracted by the plantains that we threw, which they picked up and ate with great avidity."

Inhabits Burma, south of Akyab. In S. India and Ceylon this species is replaced by *M. radiatus*, and *M. pleatus* respectively.

Dr. Anderson has pointed out that the character of a dark or a livid colour pervading the face, hands, callosities, and the presence or absence of a pale supercilium, is not of specific value, being variable, and subject to complete gradation, and he has accordingly united the *M. carbonarius*, and its golden variety, *M. aureus*, with the Linnean species. The leading features of this animal, Dr. Anderson remarks, are "its massive form, its large head closely set on the shoulders, its stout and rather short legs, its slender loins and heavy buttocks, its tail thick at the base, and its very full and prominent scrotum," which is brownish, blotched with livid blue.

M. ASSAMENSIS, MacClelland.

A female of this species obtained below Bhamo is thus described by Anderson, Colour "uniformly brown, with a rufous golden tinge over the shoulders and neck, the latter tint paling on the head, more especially over the external angle of the forehead. It is pale yellowish behind the ears and on the back part of the cheeks, where there are a few intermixed black hairs. There are a few black supraorbital hairs, and the ears are tufted with hairs of a similar colour, besides being well clad internally. The face is surrounded from behind the ears to the chin by long pale yellowish hairs, and the beard as well developed, the hair having a well-defined almost black subapical band. The limbs externally, and the upper surface of the feet, are concolorous with the hinder quarters of the animal. The under surface of the

body and limbs is of a pale yellowish. The tail is dark brown at the base, paling somewhat towards the tip, which is slightly tufted. The face and ears are dusky." This species, Dr. Anderson also remarks, "differs from all adult examples of the common monkey of the plains of India (*M. rhesus*) which have come under my observation, in the anterior half of the body, wanting the ashy tint, which is so characteristic of the adults, and in the hinder portion of the body being in no way rufous."

This monkey is found in troops along the Irrawaddy below Bhamo.

M. RHECUS, Audebert.

Above brownish-ochrey or rufous. Limbs and beneath ashy brown. Sacral callosities and adjoining parts red, seasonally very brilliant. Face of adult males also red. Length of head and body 22; tail 11 inches.

This is the common 'bandar' or red monkey of all India, and ranges according to Anderson into Hotha and Momien.

The brutal and degrading resemblance to man of this animal has always been the subject of wonder and disgust to the pride and sensibilities of all anti-Darwinians. No greater ignominy could the poet heap on the miserable Eutropius, than when, in those scathing lines, he likens him to this animal—

"Humani qualis simalator simius oris
 Quem puer arridens, pretioso stamine Serum
 Velavit, nudasque nates et terga reliquit.
 Ludibrium mensis, erecto pectore dives
 Ambulat et claro, sese deformat amictu."

(Claudian, In. Entr. Lib. I. 303).¹

But the most curious point about these 'odorous' comparisons (as Mr. Malaprop would say), lies in the fact that the Anthropoid Apes would seem to be more disgusted with their poor relations than man himself, and I have myself noticed the intense annoyance and anger displayed by an adolescent female of the Asiatic '*Orangutan*' at the presence of a Rhesus monkey. There was an unmistakable desire on her part to claim kinship with and recognition by man, and a laughable repudiation by her of her humble relative the monkey, and there could be no question that the degrading similarity of feature displayed by the Rhesus was more offensive and intolerable to the ape than even to man. This remark seems to bear on the truthfulness to nature of Shakespeare, even in such a triviality as Caliban's dislike for these animals, where he says,

"We shall lose our time and all be turned to Barnacles or to apes
 With foreheads villainous low."

A descent in the scale of nature, if slight, yet not the less dreadful in Caliban's eyes. The ape here meant is no doubt a *Rhesus* monkey, and not one of the Anthropoid apes, as would be generally understood by the term now.

Family Colabidæ.

SEMNOPIHÆCUS, *P. Cuvier*.

Long-tailed monkeys with sacculated stomachs and no cheek-pouches.

S. BARBEL, Blyth.

Colour dark fuliginous, with a silvery grey wash over the head, back, and sides. Hands, feet, and eyebrows black. Face bluish-black.

Head and body 19.5; tail 29 inches.

Inhabits the Tippera Hills, the Kakhyen Hills, and the Irrawaddy Valley above Mandalay.

¹ So looks that mimic of the human form
 An ape, whom boys with silken robes adorn
 And round the banquet lead; he stalks sedate
 The jest of all who view his borrowed state,
 While the rich vestments on his shoulders borne
 Leave bare his buttocks, to the gazer's scorn.

S. PILEATUS, Blyth.

Colour dark ashy grey, passing into black at the extremity of the tail. The whiskers before the ears long and divergent, and continued down the sides of the cheeks to the chin, forming a short but distinct ruff. Throat, chest, and part of the belly bright yellow, paling to yellowish on the remaining under parts.

This species represents *S. Entellus* of Bengal, in Burma, and ranges from Assam through Tippera to the valley of the Irrawaddy, and as far south as Tenasserim.

S. obscurus, Reid.

The dusky-leaf monkey. Myouk-hnyo.

Colour ashy or brownish-black, darkest on the face, sides, and shoulders. Hands and feet deep black, under parts paler coloured. "This animal," Blyth remarks, "is the most common species of the genus in the Malayan Peninsula, from which its range extends at least to the province of Mergui, where it was obtained by the late Major Berdmore. It has also been received from Siam, and is likewise an inhabitant of Sumatra, if not also of Borneo. The adults are blackish, with hair upon the nape lengthened and conspicuously whitish. The newly born young are of a vivid golden-ferruginous colour, which soon changes to dusky-ash, and is continued latest upon the tail."

S. CHRYGASTER, Lich.

"The mature animal has the upper parts, limbs, and tail blackish, the hairs ferruginous on the basal half; a slight band crossing the forehead, cheeks, front, throat, and front of neck, sullied white; rest of the lower parts deep and bright ferruginous, which tinges the inner side of the limbs; face colourless, or pinkish white. Young wholly pale ferruginous, somewhat darker on the hands and feet. There is a slight compressed crest on the vertex, but no distinct whisker-tufts, or lengthened hair on the nape" (Blyth).

This species was procured in Tenasserim, by Helfer.

S. CRISTATUS, Raffl.

P. Phayrei, Blyth.

The silvery-leaf monkey. Myouk-myek-gwen-hpyu.

Colour silvery dark ash, whitish below. Crested vertex and long whisker-tufts, which conceal the ears, in front. Face leaden black, except the mouth and lips, which are pinkish.

Inhabits Arakan, Tenasserim, Sumatra, Borneo.

Sub-order *BIMANA*.

Номо, *Linnaeus*.

II. *ANDAMANENSIS*.

The Mincopie.

Of all the various races living within the dominions of the Empress of India, there are none more calling for study than the race or races inhabiting the Andaman Islands, of one of which races, however, we may be said to know nothing beyond the bare fact of its presence in North and Middle Andamans, though the adjoining island has been occupied by us as a penal settlement for over a quarter of a century. Kurz made a powerful appeal, in the interests of science, for a thorough botanical survey of the Andaman group, and zoologically the islands are no less interesting than they are botanically; but the apathy of the English Government in promoting research of a purely scientific character is too ingrained to be overcome by any isolated appeal, and the islands are themselves too little known and too out of the way to fall within the sphere of private enterprise. Mr. A. O. Hume gives a few details of the inhabitants in *Stray Feathers* (vol. ii. p. 66), when describing his interesting cruise to the Andamans and Nicobars, accompanied by Stoliczka, Wood-Mason and Ball, who figure throughout under the respective characters 'Philosopher,' 'Crustacean' or

'Invertebrate,' and 'Geologist,' and a right jolly and interesting time of it they seem to have had. The following extract will give a general idea of the geographical relations of the group inhabited by these blameless Autochthones. "These islands have never yet been very accurately surveyed, indeed the chief materials for the chart for the Nicobars are derived from the very partial surveys executed by the Novara expedition, but the distances below are approximately correct. From Cape Negrals to Preparis 85 miles; Preparis to Great Cocos 50 miles; Great Cocos to the northernmost point of the Great Andaman 45 miles. Total length of the Great Andaman 135 miles. Macpherson's Straits divide the latter from Rutland Island, which is 10 miles in length. Then comes a blank of 80 miles before we reach Car Nicobar, the northernmost of this group. Tillangchong and Teressa, which are about 40 miles apart, are each distant some 60 miles from Car Nicobar, and from this latter Camorta harbour, which lies in the middle of the four central islands, Nancowry, Camorta, Katchall, and Trinkutt, is distant about 90 miles. From Katchall to the Little Nicobar is about 35 miles. The Little and Great Nicobar together are some 50 miles in length, and between 60 and 70 miles south-east of the latter, we come to Pulo Way, one of the small islands lying off Acheen Head, the north-westerly point of Sumatra." Viewed on the map, therefore, these islands form an irregular band, connecting Cape Negrals, the southern termination of the Arakan range, with Sumatra, and this deduction is doubtless true; but an examination of the Fauna of these islands indicates that such connexion must have been a remote one, "since not only are almost all the most characteristic species of the Arakan Hills, as we now find them, absent from these islands, but these latter exhibit a great number of distinct and peculiar forms, constituting, where the ornis is concerned, if we except the cosmopolitan waders and swimmers, considerably more than one-third of the whole number known."

An examination of the Flora of the islands would seem to support more strongly than their ornis, their recent connexion with the mainland of Burma, for Kurz, in referring to the subject, writes (*l.c.* p. 33): "In accordance with these indications we find the bulk of the Andamanese Flora to be Burmese, while not a few purely Malayan species find their northern limits in the Andamans. Among these Malayan forms may be mentioned *Dracontomelum*, *Irina*, *Peltophorum*, *Ternstramie Penangiana*, *Cycas Rhumphii*, *Lindsaa dactyloides*, *Ptychosperma Kuhlii*, *Ryparia*, etc. Several of these extend also to Tenasserim, a province which must be considered as having a similar extension of the Malay Flora. The Flora of the Andamans is not related to that of Hindostan and India proper, a circumstance which can be partly explained by the insular climate and difference in soil. *Dalbergia emarginata*, Roxb., which has been identified with *D. latifolia* (the black wood of the west coast), occurs in the Andamans, according to Roxburgh, and, if so, it is the only example of a purely Indian tree found in the island." In seeking a solution for the apparently more highly differentiated condition of the Andaman ornis, than the Andaman flora, it seems not improbable that a smaller amount of variation satisfies a zoologist, who is searching for new species, than a botanist; or else that animals more rapidly accommodate themselves to surrounding conditions than plants. Be this as it may, the Flora clearly supports the former connexion of the islands and the mainland, which is suggested by their physical disposition and arrangement. The climate of the Andamans is thus sketched by Mr. H. F. Blanford (*l.c.* p. 31): "The temperature of the Andamans, as might be expected in the case of tropical islands, is very uniform; the coolest month (January) has a mean temperature of 78°·9; the warmest month (April) one of 83°·9, a difference of only 4°. The highest and lowest temperatures recorded during the six years 1868-73 were 96° and 67° respectively, and the absolute range during the period has therefore not exceeded 29°. In most months of the year the average daily range is from 8° to 10°."

This mild climate doubtless renders it possible for the inhabitants to exist in the state of absolute nature and nudity that they do; but taken in connexion with the high rate of infant mortality, it shows the privations to which they are exposed. For example, if any trust can be placed in the slender data available, it would seem as if the rate of infant mortality under three years along the coast of Burma bore an

intimate relation to latitude, or in other words to the amount of range of daily temperature; a minimum mortality ruling at Mergui and stations in Southern Tenasserim, bearing a strong climatal correspondence with the Andamans, but a rate rivalling the appalling one prevalent in northern climes being reached at such stations as Akyab and Chittagong, where the range of temperature is considerable, while at the same time custom and the ignorance of the people causes them to neglect protecting their young children by sufficient clothing from the inclemency and chills of the morning air.

Returning, however, to the graphic description of the coast by Mr. Hume, the following extract will give an idea of what yachting is in these seas. "The South Andaman, which we thus coasted for some 14 miles, presented throughout the same characters, a ridge of rocks or reef, on which the surf was breaking lustily, glittering and sparkling in the bright sun, little strips of the whitest possible coral beaches, fringed and bounded by dense mangrove belts composed of trees of many species, those nearest the water low and of the brightest emerald green, those behind more lofty and of a bluer tinge, all backed up by the magnificent evergreen forest trees rising tier above tier to the summits of the low ridge of hills (from six to eight hundred feet in elevation) that run down the whole way near the coast. . . . Nothing could exceed the beauty of the scene. The straits vary from a quarter to nearly a mile in width, the water still as in some little mountain tarn, clear as crystal, here green, there blue, of an intensity known only in the tropics, everywhere paved with coral reefs and plateaux clustered over with marvellously coloured sponges, zoophytes and corallines, and haunted by innumerable shoals of still more brilliantly tinted fish; it was like looking down into a garden of another world to that in which my work-day life had passed. On either side, rising from the very bosom of the water, the mangroves stretched a broad unbroken emerald zone around the base of the hills, which overlook, in places almost overhang, the straits throughout, and on the southern shores on Rutland Island rise to an elevation of 2000 feet. Magnificent forests clothe these hills. Huge trees, amongst which the *Mimusops indica* and *Hemicyclia andamanica* are conspicuous, rise tier above tier in a luxuriance nowhere to be surpassed; the foliage is of the most varying tints everywhere, and is relieved by tall straight stems, looking like slender silver columns, supporting a multitudinous-storied hanging garden. In places enormous creepers hang in gigantic garlands and festoons from tree to tree, an almost unbroken wreath down half a hill-side. . . . We anchored for the night in mid-channel; a soft cool air sprung up, and we were soon enjoying a repast such as only native servants can concoct, *al fresco*, at half an hour's notice, with none of the means and appliances which the humblest cook in the West deems indispensable. Within five minutes of our anchoring, some of the convict crew had lines and a little net out, and in another five minutes they had pulled out a couple of large buckets full of miraculously coloured fish, things which, had I merely seen them in paintings, I should have pronounced Turneresque dreams of piscine impossibilities; such shapes, such colours, above all such incredible combinations of colours. They were mostly, I think, what are called rock cods (*Serranus*), of half a dozen different species, orange, magenta, crimson, blue, green, black, bulky, one bright colour spotted with another. . . . There were numbers of other species, but I will not try and describe them. I have not the requisite knowledge, and the majority of my readers who had not seen alive the fish that haunt the coral reefs, would fail to realize or even credit their unearthly beauty. Alas! that ichthyologists have yet to invent a process of preserving unchanged the "hues of paradise" that adorn them. The last thing I heard was our 'Geologist' enjoining silence on our 'Invertebrate.' 'Peace,' he said in a low sweet voice, 'I would fain be in the land of Nod, where Crustaceans cease from troubling, and even Stick-insects are at rest.'"

Not long after this they fell in with two large canoes full of Andamanese of the Rutland Island tribe, consisting of the chief, his wife and a number of followers, who are thus described: "They were little, square-built, very powerfully made folks, stark naked, only the ladies wore, instead of the traditional fig-leaf, a single small, narrow, linear lanceolate leaf, fixed by a thread, which descended from a ring of

heads worn round the waist. Climbing up on to the deck of the barge, these leaves got naturally a good deal displaced, some turned on one side, some cocked right up, but this put the ladies in no way out of countenance, and with easy grace, they readjusted them (just as one sees other ladies in society adjust their dorsal protuberances on rising) patting them from side to side, till they had assumed that perfectly vertical position so essential, at any rate if anything was to be veiled from public gaze. Be it however understood that in reality these poor naked monkey-men and women are virtuous to a degree: such a thing as unchastity is absolutely unheard of, and despite their utter nakedness, despite their repulsive ugliness, these women really looked and impressed one with a sense that they are modest." It is not, I presume, the intention of the writer in the above passage, so creditable alike to himself and his humble friends, to claim for them an absolute morality, in its highest sense, as understood among ourselves, but merely to testify to the utter absence among them of systematic or venal profligacy, that fungoid growth with which our own civilization is riddled. Another pleasing trait in these children of nature is their affection for one another. This is noticed by Mr. Ball (*Jungle Life in India*, p. 211), who declares that when a shindy takes place among them, with a free use of bows and arrows, a "man on either side being struck was the signal for a cessation of hostilities." Physically the indigenæ would seem therefore to be well formed, and, both mentally and corporeally, appreciably above the lowest races, such as the Fuegians. Their colour is black, when the true colour of their skin is revealed by assiduous washing, and the hair grows in woolly tufts, as in other Negrito races. The following extract from a paper by G. E. Dobson, Esq., in the *Journal of the Anthropological Institute*, gives the views held by Mr. Wallace and M. de Quatrefages of their racial affinities, which seem to exhaust all that can at present be said on the question. These conclusions, briefly stated, are:

"I. That their position on an island to which nothing attracted strangers has resulted in the preservation of a very great, if not absolute, purity of blood, so that the Mincopies of the Andamans may be taken as the type of the race to which they belong."

"II. That they belong to an original negro stock, of which the Negritos may be considered one of the branches, and the Mincopies a branchlet of the latter."

"III. That the Mincopic branchlet is found on the Andamans, Nicobars, and in the Philippines, and is still represented on the continent in the Samangs of Malacca and most probably primitively occupied all or part of India."

"IV. That the Mincopic branchlet has furnished the negro element of a portion at least of the Dravidian peoples. Further, to judge from characters afforded from the examination of skulls, some pariahs (of India) are almost pure Mincopies."

"It is impossible to account for the presence of the wild tribes of Southern India, among which the dwellers in trees certainly occupy a lower place in the scale of civilization than even the Andamanese, or of the peculiar Samangs of the interior of the Malay Peninsula, surrounded by races, with which they have no connexion whatever, except on the hypothesis that they are the few surviving descendants of a woolly-haired people, which in ages past occupied lands south of the Himalayas, when the continent of Asia included within its southern limits the Andamans, Nicobars, Sumatra, Java, Borneo, and the Philippine Islands, and that the present inhabitants of the Andamans, and the Negritos of the Philippines, are also the remnants of those ancient Negrito inhabitants of Southern Asia, which have almost disappeared before the invading Aryan and Mongolian races."

"The Negritos most probably belong to the very same original stock as the African Negroes, occupying at a very distant period a great continent in the Indian Ocean, the 'Lemuria' of Dr. Schater, which seems to have once extended from Africa or Madagascar to the Malay Archipelago. At that period the southern coast of Asia was probably formed by the Himalayas, and the high lands of the peninsula of India were islands in the Indian Ocean inhabited by people belonging to the same race as that occupying the great continent southward of them, and whose descendants are still found in the homes of their forefathers. Though this great equatorial continent has almost wholly disappeared beneath the waters of the Indian Ocean, the animals

which once inhabited it are represented by some surviving descendants, which, though long and widely separated in countries once forming its extreme limits, still preserve most of the characters of their ancestors."

An interesting account of the manners of the Andamanese is given by Surgeon Day, in the Proceedings of the Asiatic Society of Bengal, 1870, p. 153, wherein they are described as irritable, but not vindictive, acute in their perceptions, and gifted with good memories. They practise what is called 'Tattooing,' but which is rather scarring the bodies with gashes the third of an inch deep, as their skins are too black to be capable of displaying the patterns impressed in the ordinary fashion by pointed instruments, as among the New Zealanders, the Burmese, and ourselves. The hair, which naturally grows in curly woolly tufts, is closely shaved off their heads, with the exception of a narrow strip, from the crown to the nape, which is, however, kept cut very close, and this custom is regarded by Dr. Day as adopted to avoid annoyance from insects, a supposition the more probable from the habit which also obtains of plastering the skin with clay or red ochre. Formerly chips of chert were used in place of knives, but now chips of bottles are used, with greatly increased comfort and efficiency, in shaving and other surgical operations. The hardships with which they have to contend in the struggle for existence, would seem to result in a shortening of the life of the adult members of the community, and a terribly high death rate among the children, few women being able to boast of a family of more than three living children. This does not in any degree seem to depend on harshness or neglect, as both men and women are described as being fond of their offspring, and infanticide is as little known among them as prostitution, but we as yet hardly know the normal number of births among females of this race.

Their burial ceremonies are peculiar. The corpse of Jaeko, chief of the North tribe, is described as having been buried in a half-sitting attitude, facing the rising sun, each mourner gently blowing in the face of the corpse as a last farewell. The grave was shallow, being covered by not more than six inches of earth, but this was deemed sufficient where no large carnivora exist to disturb the remains. "Four months subsequently, the nearest of kin went to the place of sepulture, and brought away the lower jaw, which about that time had become divested of flesh, a month afterwards the shoulder bones and a rib were extracted, and after six months the skull, now freed from impurities. This was hung round the neck of the principal mourner, and subsequently every one had it in turn to carry about."

The burial ceremonies vary somewhat, but an essential point seems to be the disinterment of the bones by members of the family, with the object, it would seem, of conciliating, by this attention, the spirit of the dead. Dr. Day adds, "When I was at Port Mout, the Rutland chief was in mourning for his only child, and was daubed all over with olive-coloured earth (a process which is repeated daily), whilst a rather thick coating of mud covered his head. This mourning lasts for one month. During periods of deep sorrow they are very silent, entirely refraining from the use of red paint, and other decorations, from taking much food, even from eating their favourite pork, whilst honey must not pass their lips, but instead they have to throw honeycomb, if obtainable, into the fire. As soon as the period of mourning has expired, they wash off the olive-coloured earth and revert to their red paint."

According to Mr. Humfray the aborigines never touch flesh, or even vegetables, uncooked, and cannibalism is entirely unknown among them, which may be, perhaps, attributed to the supply of pork which the wild pigs afford them, for it is quite an open question if the introduction of pigs into New Zealand had not quite as much to do with the speedy extinction of cannibalism there, as the dissemination of an exotic religion.¹

The ordinary habitations used by the aborigines hardly deserve the name, being composed of a few sticks tied at the top and lightly thatched round with leaves and branches. On Little Andaman, however, beehive-shaped huts are met with, according to Capt. Duncan, resembling those on Car Nicobar, only larger, and not raised

¹ The question is clearly one eminently adapted for investigation by some learned member of the Victoria Institute.

on posts. An interesting account of the 'Kjökkenmöddings' of the islands has been given by Stoliezka (Proceedings As. Soc. Bengal, 1870, p. 13). The bulk of the materials consisted, of course, of such shells as are now common on the coast, save that a species of 'cockcomb oyster' appears to have been formerly more abundant than now, and the common oyster, so prized by ourselves, appears to have been as little esteemed formerly as it is by the living Andamanese. Perhaps the difficulty of detaching the large oyster, without the aid of iron implements, may account for the paucity of its valves, though oysters of any sort appear to be little relished among them, possibly from not being susceptible of as much chewing and mastication as a tough old limpet or cartilaginous chiton.

The long bones of the Andaman wild pig were pretty common, split as usual for the marrow, but no human bones were observed, and among numbers of chipped stone fragments a celt was found by M. Roepstorff "undistinguishable from any of the European or Indian celts of the so-called Neolithic period." The celts found and a fine arrow-head were all fashioned of a tertiary sandstone.

The only fragments of pottery found in these heaps were portions of rude eups, hand-made, and sun-dried only, and not baked, with rude lines on them both inside and out, made apparently with the obtuse point of a shell or stone.

In addition to the above-described friendly tribes of Rutland Island, South Andaman and the southern half of Middle Andaman, there are other tribes, or perhaps a distinct race, on Interview Island, North Andaman, and the northern extremity of Middle Andaman, of whom we know nothing, beyond their determined hostility to all strangers. "The Andamanese," says Hume (*l.c.* p. 67), "call them savages, cannot understand them, and are much afraid of them. Little has been seen of them. A party of them not long ago pounced upon a party of convicts working in the jungle, tied them up, and stript them of everything, but did not hurt them; on the contrary, after stripping them, hugged them, cried over them, patted them affectionately, and took their departure. These are probably the aborigines, and are similar to the jungle race, the Ourang-utan of the Nicobarese, who inhabit the dense forests of the mountainous interior of the great Nicobar. Then on the Little Andaman we have a distinct people, whom our Port Blair and Rutland Island Andamanese cannot in the smallest degree understand. Very unreclaimed savages whom it has hitherto been found impossible to conciliate in any way, and who murder all strangers the instant they can. They are not, however, cannibals, as has been asserted; the bodies of shipwrecked persons, and others killed by them, have always been found intact, lightly buried in the sand." What a mine of ethnological research do not these words suggest, within a day's steam of thriving English ports, and but little removed from the direct highway between India and China!

APPENDIX A.

MARCO POLO AND POLAR BEARS (Page xi).

A CURIOUS instance of the confusion which sometimes results from the incorrect identification of an animal mentioned by an old author, occurs in the supposed allusion to Polar bears by Marco Polo, wherein Baron Nordenskiöld (in his interesting Voyage of the Vega) bases the curious deduction that the Polar bear was known to and hunted by the subjects of Kaidu, governor and subsequently independent ruler of Turkestan. The passage alluded to occurs in Book iii. chapter xlv. (Marsden's translation in Bohn's Antiquarian Library), and runs thus: "In these Northern districts are found bears of a white colour and of prodigious size, being for the most part about 20 spans in length. There are foxes also whose furs are entirely black, *wild asses* in great numbers, and certain small animals named 'rondes,' which have most delicate furs, and by our people are called Zibelines or sables."

The first step towards the complete mystification of the meaning of Marco Polo seems to have been in the translation of the Italian 'palmo' by the word 'span,' which may be supposed the equivalent for 10 inches; though in a note, Marsden remarks that palmo is by some rendered 'a foot.' On this supposition of 'palmo' being a span, the bears in question would measure 16 feet 6 inches in length. Marsden, in the note above referred to, introduces the term 'Polar bears,' with the remark that they grow to 13 feet in length. Following this false scent, Baron Nordenskiöld attempts to meet the palpable inconsistency of *wild asses* being found in association with Polar bears, by the ingenious, but wholly hypothetical emendation of Marco Polo's text, by substituting "reindeer" for wild asses. Baron Nordenskiöld, however, uses the term 'hand' in place of 'spans' for 'palmo,' and in this he is undoubtedly correct, as, on the supposition that the palmo, or hand, is 4 inches, Marco Polo's 'white bears' would measure 6 feet 8 inches, which is what *Ursus Isabellinus* does commonly measure. The 'white bear,' so called, of Turkestan is, of course, *not* the Polar bear, nor is it strictly speaking a *white* bear, but the yellow bear of the higher Himalayas, and not usually found much away from their vicinity. The 'wild asses' of Marco Polo are, of course, the Kiangs or *Equus hemionus*, an animal specially characteristic of the Tibetan plateau, and the suggestion that the 'reindeer' was the animal alluded to is an untenable hypothesis. Baron Nordenskiöld's words are as follows: "Marco Polo also says, in his account of the country of the peace-loving nomad Tartar tribes living in the north, that there are to be found there white bears, most of them twenty hands long, large black foxes, wild asses (reindeer), and a little animal called 'rondes,' from which we get the sable fur. As the Polar bear is only to be found on the coast of the Arctic Ocean, these statements prove that in the thirteenth century the northernmost parts of Asia were inhabited or at least visited by hunters" (Voyage of the Vega, Leslie's translation, vol. i. p. 141).

NĀT-MEE, OR THE SPIRIT-FIRE (Page 6).

In connexion with the discharge of marsh gas which takes place in so many spots in Pegu, the following account of the 'Spirit-Fire' is abridged from a description of that phenomenon by Lieut. A. Duff, Deputy Commissioner of Thayet-myo, in the Journal of the Asiatic Society of Bengal, No. 3, of 1861, page 309.

I had (writes Lieut. Duff) frequently heard vague rumours of a burning hill in the Kāmā township, but believed that if such a thing had really any existence, it was situated in the Arakan hills, and was probably a volcano, similar to that near Kyouk-hpyu. In a recent tour with a friend down the valley of the Punni stream, at the village of Pun, where we bivouacked, a number of cultivators from neighbouring villages dropped in for a chat, and I overheard some villagers from Nat-mee say, in reply to a question, "Yes, it is still burning." I asked what was referred to, and was informed that it was the Spirit-Fire, whence the village derives its name, and the fire issued from a heap of stones; it was also stated that it was not always visible, but that the pilgrim had only to deposit some light inflammable substance, and make a genuflection towards the spot, saying at the same time, 'Oh great Lord! manifest thyself to me thy slave,' when the spirit would instantly send fire out of the stones and burn up the substance deposited.

Naturally some little scepticism is felt regarding so remarkable a manifestation, but a visit is arranged, and on arriving at a belt of jungle, the party has to dismount and walk to a little hillock up which they are led.

"On the top of this hillock is a large heap of stones, and going round to the opposite side of it from that we had approached by, we see the Spirit-Fire. Yes, there it is. Out of the stones in two or three places comes a bright flame, flickering and burning; at a little distance from the heap of stones, where there are some cracks in the ground, more flame. In this instance the marvel has proved true. There is nothing in the appearance of the hillock itself, or the heap of stones, differing from any other hillock, or any other heap of stones in this part of the country; no appearance of boiling lava, violent upheavals, or any of those convulsions with which one is accustomed to associate the idea of subterranean fire. The ground and the stones were not even hot, except in the places where the fire was actually burning; the soil was gravelly, and at one place where the flame was issuing from a crack, I stirred up the gravel with a stick. The effect produced I can only compare to that produced by stirring up a plum pudding in which brandy is burning. The flame spread itself and flickered about the gravel just as the burning brandy does about the pudding, but just as in that case the pudding is not burnt, so in this, the gravel did not become extremely hot, and could be handled, though some of the stones in places where the fire came steadily were all but red hot. Query, What was the substitute for brandy in this case? There was at times a slight simmering noise, but not so loud as that of a boiling kettle." After this the writer adds what is the actual truth of the matter. "The conclusion we came to regarding the phenomenon was that it was some inflammable gas issuing from the earth."

The following translation is also given of the Burmese legend connected with the manifestation. "Long, long ago, there lived in the village now called Nat-Mee, a man who gained his living as a blacksmith. When his time was come, he died, and became a Nat; but still he loved his old home and hankered after his old occupation; so he established the Spirit-Fire on a hill near the village, and there continued his old trade; hence the village came to be called Nat-Mee. Whenever a villager wanted a *dha*, or an axe, or a spade, he took the iron to the fire, and depositing it there, said, 'Oh, my Lord, make this iron into a *dha*,' or an axe, etc., as the case might be, and returning for it next day, he would find his iron fashioned into the article he wanted, whether *dha*, axe or spade, but no man ever saw the spirit at his labour.

"At last, one day, a man of the Khyen race brought a *dha*, and depositing it by the fire with a piece of iron, said, 'Oh, my Lord! weld me on an edge to this *dha*,' and went his way. Now the Khyen was a man of a curious disposition; so next morning he got up very early, and climbing the hill, hid himself in the jungle near

the fire. When it got light, he peeped out, and saw the spirit in the form of a man, wearing a red *putso*, and a red turban, working at the *dha*. So the Khyen called out, 'Oh, my Lord! have you not finished my *dha* yet? Let me have it quickly, I pray you.' But the Nat being enraged at being discovered at his labours by a prying Khyen, took the *dha* out of the fire, red hot as it was, and casting it at him, hit him on the cheek; and the Khyen in great fear fled from the spot; and so great was his fear, that he never stopped to examine his wound, nor ever felt it, till he had run about a *dein*¹ and a half; and then he stopped a little, and rubbed his cheek with his hand, whence that spot was called *Pa-Bawoot* (*cheek rub*), and is so called to this day. But the Khyen was too terrified to stop, so he ran on for about a mile further, and there sitting down, was seized with a violent fit of trembling, hence that spot was called *Toon* (*Tremble*) even unto this day. And when the trembling was over, the Khyen got up, and though his fear urged him to fly, the fatigue he had undergone and the pain of his wound rendered his steps slow and uncertain; but he struggled on for about a *dein* further, and then he was obliged to stop; and the blister on his cheek burst, and his cheek swelled up and became one great sore, and he was unable to move for many days: so he remained in that place, and hence it was called *Pook-Poo-Ga* (*burst-hot-swollen*).

"After this the Nat never again would labour for the villagers; but still his fire burns near his old home, and once in every year every fire in the village is extinguished and rekindled from the Spirit-Fire; for there is an old tradition handed down from time immemorial, that whosoever of the villagers neglects this tribute of respect to the Spirit of the Fire, his house and all that he has will inevitably perish in flames ere a year goes by."

The above myth is not only curious, but offers some valuable materials for reflection. It is often objected, to those who would challenge the historical claim of similar legends, that the authors of them must have been very dishonest people to invent mere fables and palm them off as history, and that, as there are strong grounds of presumption that the early recorders of these myths were not dishonest men, *therefore* the myths are historically true. But we are too apt to forget an inherent propensity of the human mind to self-deception, whereby the floating records of marvellous events, originating no one knows how or where, come to assume an historical consistency, and it is only to a few logical minds that the task is not only ungrateful, but to a certain extent painful, of relinquishing any tradition of the past whereon they have been wont to rely.

Now the most philosophical way for treating myths like the above of the Spirit-Fire, is neither to refer them to wilful attempts to deceive, on the part of their authors, nor attach historical importance to them, as the necessary alternative of our favourable judgment of those who first circulated them in all singleness of mind. They often, no doubt, originated among simple, credulous, loving, and imaginative people, in early times, much as dreams do with ourselves. The physiology of dreams is pretty well understood. An impression is made on a particular set of nerves, which acting on the brain, produces a dream. For example, a man in his sleep pulls the clothes over his face, and soon, under the impulse of impeded respiration, wakes in the midst of a deadly struggle, as he supposes, with a robber, who is endeavouring to suffocate him. Or again, it is not improbable that some who read these pages may have themselves experienced the instance described by Lucretius in the following rough but effective lines:

"Flumen item, sificus, aut fontem propter amœnum
 Adsidet, et totum prope faucibus obœpat amnem.
 Pueri saepe, lacum propter, seu dolia curta,
 Somno devincti, credunt se extollere vestem:
 Totius humorem saccatum corporis fundunt:
 Quum Babylonica, magnifico splendore, rigantur."

De rerum naturâ, Lib. iv. 1022.

¹ About three miles.

Now the account above given of the Spirit-Fire proves, I think, that such myths arise by a process something similar to dreams. An action in the life of a popular hero or teacher, or a natural object or phenomenon, creates a certain impression on the imaginative but untutored brain of a man in a rude or credulous age, and straightway the busy brain weaves a nexus of events round the prominent idea, just as the brain of one of ourselves does in sleep under the peculiar stimulus of some nerve or other which is stimulated into action for the time being or affected by some accidental cause.

In the present age, too, we are so accustomed to submit all questions and statements to a rigid and searching examination, that we are too apt to forget, that this critical frame of mind was wholly wanting in those early days when the bulk of myths sprang into existence.

It happens, moreover, that, from personal psychological experience, I can offer a still more circumstantial explanation of the genesis of myth, and the promulgation of absolute myth, the product of the imaginative exercise of the brain, in all good faith and honesty, for actual occurrences, and I believe that the experience I am about to describe affords a key to the origin of all marvellous, not to say incredible stories, or myths as we call them, from the mouths of men whom we know or have grounds for supposing to be veracious and trustworthy, however wild their utterances.

I was once working in the Punjab, and had devoted much and deep thought to the question of the 'erratic' blocks found along the course of the Sohan river below Rawal Pindce, and near its junction with the Indus. The point to decide was, had these blocks travelled up the valley of the Sohan from the Indus, rafted by ice during floods (as I now believe them to have done), or were they transported with 'moraines' down the course of the stream from the Murree direction? Whilst this question was occupying much of my thought, I one night dreamed that I had found a fine collection of these 'erratics' close to the trunk road in the bed of the Sohan. On rising I had no recollection of any dream, but during that day or the next, the recollection that I had *seen these erratics* came so strongly back on me, that I entered the circumstance in my note-book. Some short time afterwards, crossing the Sohan river nearer to its source, I was surprised to find no erratics in its bed, and as my efforts to remember the particular details of the arrangement of the 'erratics' lower down were futile, though I remembered the *fact of having seen them* (as I supposed), I took an early opportunity of examining the spot near the trunk road, where I believed them to occur. On visiting the spot, *no erratics* were to be seen, so that I had not only been myself deceived by a dream, but I was for a time wholly ignorant that it was a dream, and not a real observation I was relying on. That is all, and a very curious and pregnant psychological experience I consider it; for give a wide application to the principle or key here disclosed, and we are at once enabled to reconcile the veracity and good faith of the writers of many a marvellous story or myth with the supremacy and the undeviating operation of the Laws of Nature, whose suspension would otherwise seem necessary before such myths could be really believed. Had circumstances not permitted, and led to a re-examination of the ground, in the above instance, and had I not fortunately undeceived myself in time, I should have gone on believing as a fact, what was in reality the mere product of unconscious action in my own brain.

In connexion with the evolution of marsh gas, I may make a passing allusion to the phenomenon "Will of the Wisp," which is well known in Burma, and to explain which a myth has sprung up just as happened in the case of the Spirit-Fire. The following passage relating to the subject was written by myself and published in the Journal of the Asiatic Society of Bengal for 1863, page 299.

"In Burmah it is believed that there is a class of wizards whose heads become dissociated from their bodies during the night, and wander about the jungle feeding on carrion, the bodies remaining at home, and the Ignis-fatuus is supposed to proceed from the mouth of one of these wandering heads. If a head is secured whilst abroad, it loudly claims to be released, and if detained more than twelve hours from rejoining its body, both head and body perish, and it is believed that such heads have often been captured, though I need hardly add none of my informants had themselves seen one.

"This superstition calls to mind the one formerly current in Europe, that the body of a witch might remain at home, or its semblance, whilst the spirit was at its evil

practices abroad; hence the inutility of an *alibi* for the wretched beings accused of witchcraft. In India *ignis fatuus* is commonly known by the name of *Bhatni*. It usually occurs near villages, and about tanks, marshy spots, or in flat malarious country. The phenomenon is very common around the Rajmahal Hills, on the flat alluvium near the hills, and the best instance I ever witnessed, was near one of the Bungalows built by the late Mr. Pontet, near where the railway passes, but the exact name I have forgotten.

“It was a cold night in January, when, about nine o’clock, I was called by my servant (in accordance with previous directions), and told that ‘many *Bhatnis*’ had come out. Sure enough, several lights were visible moving about a little, but usually not far from one spot. I think I must have watched one at some 300 yards, for a quarter of an hour, and can only describe it, without suggesting an explanation, save that it may have possibly originated with some luminous insects collected together. The light had all the appearance of an ordinary *mussal* or oil-torch, and appeared fully as large and as bright. It had the appearance of emanating from some slowly consuming body, with the evolution of phosphorescent fumes, but this might be merely the effect of a vivid light on the dense cloudy stratum of fog at that particular spot. The night was still, but an occasional puff of air would alter the motion of the light, which however seemed to possess the power of independent motion. The light faded, or even disappeared under a stronger breeze, to re-appear on its dying away.

“The spot where this light I am describing centred was near a tank in some flat ground traversed by a small sluggish stream, and a tank margin is a common place for such light to be seen on. I can add little more regarding the mysterious appearance, save my conviction that its origin has yet to be traced out and established, my own belief in favour of its being due to a congregation of luminous insects, being provisionally adopted for want of a better, and from the fact, as I take it, of the light shifting its position independently of the wind, whose stronger force only causes its temporary extinction. I have forgotten perhaps the most important observation I made with respect to this light, viz. that it is decidedly fluctuating, like that of a revolving light of a lighthouse. After a certain period of ordinary brightness, the light increases in size and brilliancy, and rapidly attains its maximum effect, after which it slowly fades, sometimes to a mere speck, barely visible, or even disappears for a minute or two.”

It is not a little curious that the history and causes of this remarkable natural phenomenon should have so long resisted the endeavours made to ascertain them, and the question is suggested as one very worthy of attention by all favourably situated for the purpose.

SEA ANEMONES (Page 18).

Since the brief notice of these beautiful forms was printed off, a few verses have occurred to me from *Punch* which I copy chiefly for the information they contain touching the edibleness when cooked of sea anemones, which is certainly not generally known, and, if true, might under some circumstances be worth knowing.

Oh! merry is the Madrepore that sits beside the sea;
 The chery little Coralline has many charms for me;
 I love the fine Echinoderms of azure green and gray,
 That handled roughly, fling their arms impulsively away.
 Then bring me here the microscope, and let me see the cells
 Wherein the little zoophyte, like garden floweret, dwells.

We’ll take the fair anemone from off its rocky seat,
 Since Rondeletius has said, when fried, ’tis good to eat:
 Dyspeptics from ‘Sea Cucumbers’ a lesson well may win,
 Which blithely take their organs out, and then put fresh ones in:
 The Rotifer in whirling round may fairly bear the bell,
 With Oceanic Hydrozoids, that Huxley knows so well.

You've heard of the Octopus, 'tis a pleasant thing to know,
 He has a ganglion makes him blush not red, but white as snow :
 And why the strange Cercaria, to go a long way back,
 Wears ever, as some ladies do, a fashionable 'sack.'
 And how the Prawn has parasites, that in his head make holes,
 Ask Dr. Cobbold, and he'll say they're just like tiny soles.

Then study well Zoology, and add unto your store
 Tales of Biogenesis and of Protoplasmic lore :
 As Paley neatly has observed, when into life they burst,
 The Frog and the Philosopher are just the same at first.
 But, what's the *origin of life*, remains a puzzle still,
 Let Tyndall, Haeckel, Bastian, go and wrangle as they will.

WALKING CORALS (Page 18).

One of the most curious corals perhaps known is that which may be popularly designated a walking coral, from the fact that it is in the habit of moving about along the sandy bottom of the sea, or in an aquarium, where its motions may be observed, and which never fail to strike with wonder those who behold them for the first time. The above designation, however, is only applicable in a popular sense, as it is not the coral itself which originates the motion in question, but a species of worm or *Siphunculus* (as it is commonly regarded) lodged in the base of the coral, and between which and the coral a parasitic relationship would seem to exist, which is one of host and lodger rather than of 'commensals,' as it is sometimes described. So obscure, however, is the life history of the relationship between these strangely associated mates, notwithstanding the amount of study that has been bestowed on them, that I think a few remarks will not be out of place here, if only for the purpose of directing the attention of observers favourably situated for procuring the living animals and studying their history and development either in an aquarium or in their native waters; as one species is common on the Arakan Coast, and is easily procurable with a dredge in a few fathoms of water in sandy coral ground, e.g. off Corangi Island, where I have myself dredged it abundantly.

There are many species known from the Eastern seas.¹ *Heteropsammia Michelini*, Milne-Edwards et Haime; *H. cochlea*, Spengl; *H. Borbonica*, Brug.; *H. aspera*, Brug.; *H. Persica*, Brug.; *H. Australis*, Brug.; and *H. multilobata*, Moseley; but as they all are specifically differentiated by means of the characters of their framework and peculiarities of the calyces and septa, and all agree in the presence within their base of a *Siphunculus*, or lodger, it will suffice to consider the first-named species, with which alone I am personally familiar in the living state, and which is plentiful on the Arakan Coast.

It is interesting here to observe that a closely-allied coral, *Heterocyathus parasiticus*, displays a scarcely less curious relationship between itself and a *Siphunculus*, but with a difference, which seems due to the fact that whereas *Heteropsammia* is a free coral at all stages, *Heterocyathus* is fixed in its mode of growth, attaching itself to dead shells, as *Cerithium* and the like. In the case of *Heterocyathus*, however, the *Siphunculus* is said (for I cannot speak of my own knowledge) to occupy the shell whereunto the coral is attached, and its so doing would scarcely challenge any particular notice, but for the fact that in an allied and free coral, *Heteropsammia*, the *Siphunculus*, instead of occupying the shell, is found occupying a cavity in the base of the coral. Now the question of how the *Siphunculus* lodger originally obtained access to the interior of the *Heteropsammia* host, and that regarding the less intimate relation between the same, or an allied species of *Siphunculus*, and the fixed *Heterocyathus*, is of a somewhat similar though modified character, and raises so many issues,

¹ For these names and other information regarding the subject I am indebted to the courtesy of S. O. Ridley, Esq., M.A., on the Scientific Staff of the British Museum (who is, however, not responsible for the views here put forth).

that the case hardly admits of being fully stated without a certain amount of prolixity, which I would gladly avoid; and there is, moreover, the difficulty that some points in the history of these creatures, almost essential to a satisfactory verdict, have not been settled by observation, or more than barely touched by negative evidence of very limited scope. The points, therefore, I shall now draw attention to, are submitted, not with the expectation of their largely conducing to a positive conclusion, but to show that there exist certain difficulties in the way of the unreserved acceptance of the generally received notion that the parasitism of the *Siphunculus* and the *Heteropsammia* is in kind identical with that of any extraneous lodger, who takes up his abode in the body of another animal, as the *Pulex penetrans* does beneath the human integument, or the female *Stylops* within the body of the bee.

Heteropsammia Michelini is a perfectly free coral of rather less usually than three-quarters of an inch in its longest diameter and pyriform in the horizontal section of its base. The basal surface is smooth, and at the narrow end is perforated by a circular hole, which is the external opening of a curved tube lodged within the base of the coral and forming a regular curved gallery therein, occupied by the *Siphunculus*. Above, the coral is crowned by an ordinary calyx, either narrowed or constricted in the middle, or divided into two separate calices, which are ranged unsymmetrically and without reference to the elongate axis of the horizontally pyriform base. The relations and character of this gallery or tube demand careful consideration, and the following points regarding it, both negative and positive, may be dwelt on, as helping to solve the question of its origin and precise connexion with the coral wherein it is lodged.

Firstly, it would seem to be a concomitant structural character necessarily present in *Heteropsammia*, and included therefore among the characters of that genus. This would not be the case were any instance known of specimens of this genus unprovided with the gallery in question. The gallery is not formed by a shelly tube, such as invests the burrow of a *Teredo*, or is secreted by a *Spirorbis* or *Vermetus*. The wall of the gallery is composed of the naked coral skeleton, and its existence is due simply to the arrested growth of that structure, as round some foreign body. Now in considering this gallery or tube, under the conditions above described, we have three separate reasons for doubting the ordinary and accepted view of its relation to the structure which incloses it. There is the fact that without this gallery there is no *Heteropsammia*, and on the supposition that the gallery is simply bored by the *Siphunculus*, as a *Teredo* might bore into a log of wood, we have the remarkable fact to dispose of, that no *Heteropsammia* is ever discovered which has escaped attack, and the no less remarkable fact that no *Heteropsammia* is ever seen attacked by more than one *Siphunculus*, and also that the *Siphunculus* in question confines his ravages to a few species of the genus *Heteropsammia*, which is strange, if we suppose the *Siphunculus* to be possessed of the power and will of boring into the structure of living coral.

Secondly, a number of aquiferous pores or tubes, forming a ring below the calyces on the upper surface, communicate with the internal gallery, and bear, I think, strong evidence to its structural relationship to the coral wherein it is situated. For, granting that the *Siphunculus* is possessed of the power of excavating for itself the cavity where it is found lodged, yet the same organs which would serve to excavate the larger tube could hardly be so adapted as to perform the task of making the minute perforations, at right angles to the main tube, which I have termed aquiferous pores, whose function is clearly to admit the ambient sea to the internal gallery, or at least to bring it within access of its wall. Doubtless these aquiferous pores are advantageous to the *Siphunculus* occupying the gallery, but that they were formed by that creature is by no means equally clear.

Thirdly, the pyriform shape of the coral, with its evident co-relation to the growth of the *Siphunculus*, completely disposes of the idea that the adult coral is attacked and perforated by the *Siphunculus*, as in that case there is no reasonable explanation why the orifice should be lodged in the advanced portion of the coral, and in that case the *Siphunculus* having effected its entry into the viscera (speaking metaphorically) of the coral, would be compelled to turn round on itself within the narrow compass or gallery which it so completely fills. For the position of the *Siphunculus* is that of its

head exactly fitting the external or I may say terminal hole, from which it is protruded, for the purpose of hooking itself along, coral and all, much after the manner of progression of a caddis larva. We are thus forced to suppose that the young *Siphunculus* (in what precise stage, it is much to be regretted, we do not seem to know) makes its onslaught on to the equally young *Heteropsammia*, and having effected a burglarious entrance into his host's premises, to wit his host's body, lives on amicable terms with him ever after. That the union of host and lodger is a life-long one, and cemented in early infancy, cannot, I think, be questioned; but is not the generally received notion of the respective part played, rather arrived at by begging the entire question?

In view of some of the difficulties suggested above, is it not equally probable that the *Heteropsammia* is epizootic on the *Siphunculus*, as that the *Siphunculus* is a fortuitous occupant of the substance of the coral? I see no insuperable absurdity in the notion that just as *Heterocyathus parasiticus* selects dead shells for its perch, either tenanted or not by a *Siphunculus* or other creature, so the embryotic *Heteropsammia* may select the body of a *Siphunculus* whereon to perfect its development, and if, as is not unlikely, there may be a mutual advantage in this queer association, it may or may not happen that the act is acquiesced in by the *Siphunculus*, or that it may not have the power of defending itself from this unsought copartnership. The true solution of this question depends, I think, on the close observation of the living *Heteropsammia* in its earliest stage, and also on determining whether the *Siphunculus* found tenanting it, is found to occupy any other shelter; in a word, the satisfactory solution of this curious problem awaits minute observations of the animals, which have yet to be made by some one gifted with the patience as well as the opportunity of carrying them out successfully.

NEPHTHYA BURMAENSIS, Ridley (Page 18).

Since the preceding pages have been printed a species of Alcyonarian sponge, collected by myself, has been described by S. O. Ridley, Esq., in the Annals and Magazine of Natural History for March, 1882, from which paper I extract the following remarks:—

ALCYONINÆ.

NEPHTHYA, Audouin.

The only described species which can be admitted in this genus, as distinguished from *Annothæa* by the large size of its cortical spicules, from *Eunephthya* by their not projecting from the surface of the cœnenchyma, and from *Spongodes* by the polype-spicules not projecting beyond the retracted polype, are—

- N. CHABROLII, Audouin.
- N. (ALCYONIUM) AURANTIACA, Quoy et Gaim.
- N. COCCINEA, Stimpson.
- N. AURANTIACA, Verrill.
- N. NIGRA, Pourtalès.

To the above a new species is now added, *N. Burmaensis*, from the Arakan Coast, near Negrais. After describing it in detail, the author adds:

“The species is represented by a small colony of three primary lobes rising from the common base, which clasps a small calcareous mass; . . . From all the species assigned above to the genus, either the pale colour of the soft parts or the whiteness of the spicules distinguishes it; *N. Chabrolii*, which seems to have the dull general colouration, differs in its very large polypes and their green spicules. *N. niger* is, of course, black; and if the costæ assigned to it are ridges resembling the costæ of *Madreporaria*, they constitute another point of difference.”

MUSICAL FISH (Page 188).

The only account that I am aware of that has been printed, of musical sounds being produced by fish in Burmese waters, is by the Rev. C. Parisi, who has kindly

drawn my attention to several notices of this obscure phenomenon, in *Science Gossip* for 1870, including his own observations on the coast between Tavoy and Mergui, which I now quote.

“In the month of February, 1857, having waited at Tavoy a long time in vain for the arrival of the Maulmain steamer to take me on to Mergui, I determined to make the voyage in a native boat.

“The distance from Tavoy to Mergui is about one hundred miles, viz. forty down the Tavoy River to its so-called mouth, really a broad estuary, and thence sixty miles by sea. The greater portion, however, of these sixty miles is shut in from the Bay of Bengal by the northernmost islands of the Mergui Archipelago, and the sea is comparatively shallow, with a muddy bottom all the way. It is but a short night’s run for a steamer, but I was three days and three nights performing the distance.

“When about forty miles (as I suppose) from Mergui, where the breadth of the sea, between the main and the islands, is about ten or twelve miles, on the night of the 10th of February, I was overtaken by a violent storm of thunder and lightning, accompanied by strong winds and torrents of rain, which lasted nearly all night.

“The wind blew from the south, *i.e.* from Mergui; but had it been favourable, we could not have ventured to hoist a sail, on a pitch dark night, in a round-bottomed canoe, during such a storm. So we ‘dropped the stone’ as the Burmese say, or let go the wooden anchor, weighted with a stone, crouched all together (*i.e.* the two Burmese boatmen, my native servant and myself) under the covered part of the boat for shelter from the driving rain, and ‘wished for day.’ The storm was followed the next day and the succeeding night by an absolute calm. Not a breath in the sweltering air, not a ripple on the oily sea! The boat lay motionless, drifting with the sluggish tide when that was favourable, anchored when it was contrary, for it was too heavy a boat for two men to row. Nothing moved but the sun, and he, all too slowly. Not a sound reached the ear, and the haze shut out the sight of the land on either side.

“When night fell again, and the stars shone out bright and clear, the same calm continued, and we lay still and motionless as ever. But with the growing darkness there came a sound upon the ear, a strange and peculiar sound, though from what quarter it came, it was difficult to determine, for it was not *borne on* the air from a distance; had it been so, I might have fixed upon the direction whence it came, but it was above, below, and around. The air was all sound, and the sound was all of one kind and pitch, a droning, drowsy sort of sound, and unintermitting. It is difficult to convey in words a correct idea of the sound, no articulate sound would resemble it. M. de Thoron, as quoted by Mr. Spicer, compared what *he* heard, to the music of an organ listened to, outside a church, where, I suppose, all distinction between one note and another would be lost, and a confused vibration would be the result. What I heard might, somewhat fancifully, be so described. He says the noise was ‘grave and prolonged,’ so was this. The nearest approach to a true description of the sound (as, at least, it seemed to me) which I can give, is to imagine a huge drum beaten, at short and regular intervals, a long way off, and the sound coming across the water in sustained waves of varying intensity. The sound, however, can be pretty closely imitated by closing the lips, keeping the teeth apart, and then trying to utter the letter M in the deepest possible tone, and with prolonged breath, the result will be an inarticulate *Hum*.

“I could not imagine whence such an unusual sound proceeded, nor could I learn from the boatmen what it was. At that time I was not aware that fish had ‘voices,’ or that they could utter sounds of any kind. I was slow therefore to attribute the sound to them, although I felt sure, after a while, that it rose out of the sea all round me. Now, however, I am satisfied (and have been for some time) that the mysterious sound proceeded from the fish in the sea, though from fish of what kind I do not know; and that M. de Thoron and myself have witnessed the same phenomenon in two very different parts of the world there can, I think, be very little doubt.”—*Science Gossip*, 1870, p. 147.

Charles Kingsley describes the sound usually supposed to be made by fish, in the case of the Bocas Islands, off Trinidad, as follows: “The noise I heard is

a simple drumming, exactly like a steamer letting off steam, which I attributed at first to wind or to water in the caves, but I accept the native explanation. I have a specimen of the fish, which is said to make the noise, but I don't believe in its power to do so."—*Science Gossip*, 1870, p. 95.

On this Dr. Günther remarks to the following effect: "The musical fish which has been observed by Prof. Kingsley, during his visit to the West Indies, is well known under the name of *Pogonias chromis*. All writers on North American Ichthyology speak of the 'Drum,' 'Drummer,' or 'Grunts,' and speak of the peculiar noise produced by it under water. . . . It is a fish like the Maigre, growing to a length of four or five feet, found in American waters north and south of the line. Other allied species are found in the East Indies, where they have also been observed to astonish the sailor by their music. So much is certain. 1st, That the noise is produced by this fish, or similar species, which generally go about in schools or herds. 2nd, That the sound is not produced by means of the air-bladder (which is perfectly closed), as some suppose. I believe the sound is produced by the action of the enormous upper and lower pharyngeal teeth, with which three movable plates in the gullet are armed. These teeth have the form of paving stones."

After this, it may be safely assumed as beyond doubt that a dull noise is made by some species of fish, by the friction of their mandibular or pharyngeal teeth, and that this noise may be described as a prolonged droning sound, very different from the articulate utterance of any other vertebrates. Other observers have described these sounds in China, Ceylon and Bombay, to mention only some instances:

Dr. Adams describes the "Drum fish" of Macao as assembling every evening round a ship (at anchor?) and keeping up a musical humming till about midnight. The noise rises or falls or suddenly ceases at times as they quit the ship in search of food.—"*Cycl. of India*."

Sir Emerson Tennent describes the sound thus: "I distinctly heard the sounds in question. They came up from the water like the gentle thrills of a musical chord or the faint vibrations of a wine glass when its rim is rubbed by a wet finger. It was not one sustained note, but a multitude of tiny sounds, each clear and distinct in itself; the sweetest treble mingling with the lowest base."—*Science Gossip*, 1870, p. 97.

Another writer describes similar sounds, heard by him near Salsette (Bombay), and says the fish nearly resembles the European perch (*l.c. supra*).

It does not, however, follow that because it is an established fact that fish of the genus *Pogonias*, and probably others as well, can produce muffled and guttural sounds by the friction of variously disposed dental plates, that therefore all the sounds which have been referred to fish, are correctly so referred.

Kingsley's comparison of the sound he heard to the letting off steam, suggests another origin which may possibly exist in some places for these mysterious sounds. In various spots along the Burmese coast, especially in Arakan, but also down so far south certainly as Cape Negrais, a considerable evolution of marsh gas takes place, which being generally accompanied with a feebly saline spring, gives rise to the '*mud volcanos*,' so called, of that region. These outbursts of mud have no connexion with volcanic energy properly so called, but are dependent on the evolution of marsh gas, which is sometimes so copiously discharged as to simulate in a dark night by its ignition, the flames which people suppose would accompany an actual volcanic outburst. Now there is no reason to suppose that this discharge of gas, which in numerous spots in Pegu and Arakan is ceaselessly kept up, is confined to the land: on the contrary, it can hardly be doubted that in many spots, submarine points of issue must exist, identical with those we have the means of examining on shore. This being admitted, it seems probable that under favourable conditions, that is, during a perfect calm in both sea and air, a copious and uninterrupted submarine discharge of gas might give rise to an uninterrupted and muffled sound not dissimilar to that described by Mr. Parish and Mr. Kingsley. I do not venture to say that this is the origin of the sounds in question, but merely record what seems to me a possible and unsuspected origin for such sounds, as might otherwise be referred to fish.

I may in conclusion make a passing allusion to those mysterious sounds called 'Barrisal guns.' For an exhaustive account of this phenomenon reference may be

made to the Journal Asiatic Society of Bengal, 1870, pp. 289 and 243. Mr. James Rainey writes: "I have the honour to bring to your notice the occurrence in the districts of Buckergange and Jessore, and over as far north as Farreedpore, I believe, periodically during the prevalence of the S.W. Monsoon and rainy season, of certain peculiar noises, from the south and south-east directions or seaboard, resembling the report of cannons, or loud explosions, usually heard distinctly after a *heavy fall of rain or cessation of a squall, generally whilst the tide is rising.*" The generally received opinion seems to be, that these sounds, resembling a distant cannonade, really proceed from the surf breaking explosively, if I may use the term in this connexion, on the coast. But if this is so, may we not suppose that the ceaseless roll of a moderate surf, after a storm, might, to any one anchored some miles off, in a still night, so fall on the ear as to fill the air with its murmur, or, as Mr. Parish phrases it, "the air was all sound," without supposing that fish were connected with its production? The Burmese boatmen, too, were unaware of any fish capable of causing it, though in places where such is the case, the phenomenon in question is commonly understood, and the fish implicated in its production known to the inhabitants. Doubtless fish capable of producing sounds are met with on the Burmese coast, but a little more corroborative evidence to connect the phenomenon described by Mr. Parish with such an origin, would be acceptable, though Mr. Parish has himself (and who should know better?) no doubts on the subject.

A writer who signs himself W. C. P., in the same number of "Science Gossip" that contains the paper by Mr. Parish, describes the sounds referred by him to fish in the following words: "Off Ceylon we were about one hundred miles north of Colombo, eight leagues from the shore, and in a depth of water exceeding one hundred fathoms, time shortly after sunset. When the sounds were first heard, they might have been taken for faint echoes of music from the distant shore, until, after listening attentively, they were found to come up from below the surface of the sea, and fell upon the ear something like the tones of an Æolian harp, rising and falling in regular cadence, and impressed the mind with a sense of something distinct from what had ever been experienced before." The next morning some "*sucking fish*" (*echeneis*) were captured, whereon W. C. P. at once concludes that they caused the sound by means of the suctorial disk which is placed on their heads!! He goes on to add: "This supposition is strengthened by the fact that if the ear be laid upon an adjoining part of the vessel while the sounds are heard, the source of them seems to be in *contact* with the vessel, and no longer at a distance, as when the ear is detached." This sentence shows, what is too liable to be lost sight of, the difficulty of judging the precise direction whence such diffused sounds originate, and also points, I think, to an unsuspected source, namely, the rigging of the vessel. Whoever has stood beneath a post sustaining a telegraph wire, will remember the loud (or soft it may be) sound produced by a gentle air rippling over the wire, and I cannot but think that during a calm, with just perhaps a faint air in the rigging, sounds such as described above, as being in "*contact with the vessel*," may be thus produced, rather than by "*sucking fish*" fastening themselves to the sides of the ship, or any external source whatever. The following remarks, by the Rev. C. Parish, on the possible connexion of some such obscure phenomenon, with the pretty conceit of the Sirens, will be read with interest by all who delight in ancient myths and the stories which have survived from times of yore to the present, the veritable intellectual *flotsam and jetsam* of our race in its infancy.

"As it is probable that most fabulous stories have some foundations in fact, being but an exaggeration of the fact, it appears to me far from unlikely that the fable of the Sirens is traceable to the sound made by so-called musical fish.

"The ancients must have heard those sounds, though, perhaps, at some intervals—for, after all, the recorded instances even now are not numerous; and they certainly could not have understood that which, at this distance of time, is still a subject of inquiry. The Sirens were supposed to be Sea-nymphs who lured mariners to destruction by their song. It would appear that the sounds made by musical fish are only heard in the night, beginning at nightfall. It was thus on the only two occasions on which they were heard by me: once at sea, as recorded above, in the night; and

once in the river Gyne, at sunset, when the air was perfectly still, and the broad reach of the river below Damathāt was like glass. The sound heard in the river was very different from that heard at sea, evidently made by a different fish. The latter was of a *booming* nature, the former, though difficult to describe in words, was rather what I may call *crepitant*. Many times, and oft, as I have been over the same reach of the Gyne, I never heard the sound except on that single occasion. When I called the attention of the Burmese in the boat to it, they said that fish were very abundant at that particular spot. To return, then, to our subject, what more probable than that, in ancient times, sailors hearing these mysterious sounds all around them on a dark and stilly night, may have been tempted to follow on in the direction from which they fancied the sounds proceeded, and thus ran upon rocks: or, they may have drifted unconsciously into danger while listening to the strange voices? Nothing is more likely farther, than that they should have taken the sounds to be supernatural.

“It was as a calm fell—just such an one as I have described—that Ulysses and his crew heard the Sirens.

Ἀντίκ' ἔπειτ' ἄνεμος μὲν ἐπαύσατο ἠδὲ γαλήνη
Ἔπλετο νηνεμία, κοίμησε δὲ κύματα δαίμων.

Od. xii. 168-9.

‘Sunk were at once the winds, the air above,
The waves below, at once forgot to move!
Some demon calmed the air and smoothed the deep,
Hushed the loud winds, and charmed the waves to sleep.’—POPE.

More literally—

Then fell the wind at once—a breathless calm
Prevailed around—some spirit hushed the waves.

“Warned beforehand by Circe of their danger, they strove to pass the spot unnoticed, but they could not thus evade the quick-eared sea-nymphs, and soon heard the captivating sounds fall on their ears:—

τὰς δ' οὐ λάθην ὠκύαλος νηὺς,
Ἐργύθεν ὄρνυμένη, λιγυρὴν δ' ἔντυνον αἰοδῆν.

Od. xii. 182-3.”

THE MIOR OR GREAT BASKING SHARK (Page 284).

The name ‘Basking Shark’ would seem to be applied rather loosely to any large shark, but is properly applicable, as Dr. Günther has kindly informed me, to the huge but harmless *Rhinodon typicus*, Smith. Specimens of this shark are almost unknown in English museums, but the teeth are extremely minute, almost in inverse proportion to the huge dimensions of the animal, and probably when the membrane wherein they are implanted is fresh and soft, they are even less conspicuous than in the dried skin, when they scarcely attain the tenth of an inch. In fact, the risk one runs from these huge monsters is more of their upsetting the boat by scraping their backs along its side, than from their teeth. Mr. Swinburne Ward has described this species as visiting the Seychelles frequently, but as not being known north of the Equator. This probably is a too hasty generalization, but it is all the more desirable that those favourably situated for so doing, should put beyond doubt what species it is that grows to such huge dimensions (as recorded) off the coast of Kurachi.

Mr. Swinburne Ward, in a letter to myself, says that young specimens of *Rhinodon typicus* are unknown, and that, except a specimen thrown on shore at the Cape, no other locality for this species is known, except the Seychelles. This, of course, is merely another way of saying that we know nothing of these fishes, and their study is no doubt somewhat difficult in a warm climate; but a recognition of the interest that attaches to the specific identification of an Asiatic shark should lead to some successful attempts to preserve enough materials to fill up this gap in our knowledge. With reference to this question of distribution, I well remember, many years ago, Mr. Blyth’s procuring a small shark from the Sand Heads, which greatly puzzled him,

as he could detect no teeth whatever in its jaws, when the specimen was pretty fresh, and he was tempted to conclude that they must have been removed, though no traces of the operation could be detected. Could this specimen have been a young *Rhinodon*? The *Squalus maximus* is also called the Basking Shark by the whalers, and according to Mr. Swinburne Ward, it has inoffensive jaws, similar to the *Rhinodon*, "and probably feeds in much the same manner by crushing shells and sucking the contents." At a place like Kurachi, where there is an actively pursued shark fishery, it should not be difficult to find out what food these large but feebly-toothed sharks consume, and the matter should be always remembered whenever an opportunity presents itself for solving the question of the habits of the *Squalus maximus*. Mr. Swinburne Ward remarks: "They are very easily harpooned, but if, from the small size of the boat you are in, you are obliged to give them line, they roll it round their bodies, sink to the bottom, and bury themselves so deeply in the sand or mud that nothing will move them. Hold on to them, and they are easily finished with the lances."

PRISTIDE (Page 286).

A specimen of a snout of a *Pristis*, procured by me at Madras, measures four feet and three inches, and how much is missing towards the head I can't say. The 'teeth' are nearly equidistant, 16 on one side and 17 on the other, the first pair being 4 inches and the last pair 10 inches apart from each other across the snout. At its base the snout is mesially a trifle over 2 inches in thickness.

CATALOGUE OF BATRACHIA SALIENTA.

By GEORGE ALBERT BOULENGER, 1882 (Page 289).

BATRACHIA.

Order ECAUDATA.

Sub-order PHANEROGLOSSA.

Eustachian tubes separated. A tongue.

Series FIRMISTERNIA.

Family **Ranidæ**.

Maxillary teeth. Diapophyses of sacral vertebræ slightly or not at all dilated.

a. *Pupil horizontal*.

OXYGLOSSUS, Tschudi.

O. LIMA, Tschudi.

Java. Siam. Camboja. Pegu. China.

O. LEVIS, Peters.

Philippines. Pegu.

RANA, Wagler.

Tongue more or less deeply emarginate. Teeth on the vomer. *Fingers perfectly free. Toes webbed, with simple or dilated tips.* Omersternum and sternum with a bony style.

Under *Rana* Boulenger includes many species of truly arboreal frogs,¹ justifying his so doing in the following words: "The study of the numerous species included here in *Rana* shows the impossibility of dividing them into genera, or even subgenera, according to the dilatation or non-dilatation of the tips of the fingers and toes. The extreme forms, viz. *Rana hexadactyla* and *R. afghana*, show indeed a very marked difference respecting the shape and structure of the fingers and toes, the former having them pointed, the latter dilated into very large disks supported by regularly T-shaped phalanges. But when we meet with such forms as *R. Malabarica*, *R. curtipes*, *R. inguinialis*, etc., we must hesitate before referring them to the '*Platydactyla*'

¹ Has any one, I may ask, ever seen a *Rana*, as hitherto understood, in a tree?

or to the 'Oxydactyla,' and in fact they might just as well be referred to the one as to the other. Besides, the well-known *R. macrodon*, *R. Kuhlii* and others have the tips of the toes dilated into very distinct disks, much more so than several species hitherto referred to *Hylorana*.

"I have therefore come to the conclusion that, with regard to the species of this group, the difference in the shape of the fingers and toes cannot be used as a generic character, as we should be obliged to place far apart species which in all other respects are very much alike."—Cat. Bat. Sal. p. 7.

Now the difficulty here stated is not one exceptionally encountered among *Batrachia*, but one which has to be confronted in every department of Zoology, and which must be solved, I think, after a very different fashion to that adopted above, for I cannot think that naturalists in general will agree that the fact of an animal possessing a certain mixture of characters, colourably sufficient to allow of its being referred to either of two genera, is a sufficient and a proper ground for uniting these genera, otherwise sufficiently differentiated. There are two courses in such a case, which are preferable to the heroic one advocated in the case of *Rana*, either by weighing the balance of characters, so as to determine the preponderating value of one set, in a particular direction, or of modifying the characters of the genus, to the extent of meeting the requirements of the species claiming admission therein.

The development of pneumatic pads, as seen in the typical tree frogs, is, it seems to me, a clear indication of arboreal habits, and, as such, a natural and adequate reason for the at least subgeneric separation of such forms, from those not possessing that character; and it is no valid objection to this view to argue that there are forms, whose claims to be considered as essentially tree or water frogs, are not very clear. *Natura non facit saltum*, is the true reply to such an argument.

There is however, I suspect, one thing which underlies much of this desire to unite very dissimilar forms, and that is, a certain confusion which has undoubtedly prevailed regarding the dilated extremities of Batrachians. Whilst tree frogs have the extremities of their fingers enlarged into disks, which are functionally pneumatic organs of adhesion, other Batrachians, of the most helpless and grovelling habits, have their digits terminally enlarged also; for example, *Callula pulchra*: but in this case the enlarged ends are not pneumatic organs, and not improbably subserve the purpose of punching out a cavity in stiff clay, when the animal is desirous of retreating during the dry season into a subterranean burrow. In like manner, the sharp digits of a typical *Rana*, as *R. hexadactyla*, may be of use to the animal in seizing hold of, and making good its footing in soft mud; but be this as it may, the principle seems preferable of endeavouring to follow the indications afforded, regarding the natural habit of the animal, when so clearly given, as in the case of the pneumatic disks of *Polypedates*, than to dispense with such aids towards a natural classification—with the result of having to adopt so unnatural an arrangement, as I hold the union of *Rana* and *Polypedates*, in their typical forms at least, to be.

Some highly aquatic frogs, *Lymnodytes* for example, possess pneumatic pads, which are as much use to them in adhering to slippery rocks or logs, as the same organs are in enabling arboreal species to cling to the leaves; but this is only an additional reason for studying the habits of a species, if we wish to assign it its proper place in any natural system, and this aim is altogether frustrated or rendered a work of supererogation, by limiting such a genus as *Rana* by so arbitrary a character as *free fingers*, regardless of the condition they may present of being either acute, clubbed, or dilated into disks, and regardless, of course, of the co-related habits and mode of life they indicate, be it aquatic, sylvan, subterranean, or arboreal.

In the following list, those species to which an asterisk (*) is prefixed are unrepresented in the B.M. Collection.

R. HEXADACTYLA, Less.
Dactylethra Bengalensis, Less.
R. cutipora, Dum. et Bib.
R. robusta, Blyth.
R. vittata, apud Beddome.

Nipal. Ceylon.

- Pyxicephalus phurialis*, apud Jerdon.
 R. CYANOPHLECTES, Schm. Kashmir. Malabar.
R. Bengalensis, Gray. Ceylon. Pinang.
R. Leschenaultii, Dum. et Bib. Himalayas. Nilghiris.
Dicroglossus Adolphi, Günth.
R. hexadactyla, apud Cantor.
 R. KUHLLI, Schl. Java. Borneo. Celebes.
R. conspicillata, Günth. Ningpo.
 R. LATICEPS, Boulenger. Khasi Hills.
Polypedates affinis, Beddome.
 R. YUNANENSIS, Anderson. Hotha.
 R. LIEBIGI, Günth. Nipal. Sikkim.
R. Sikkimensis, Jerdon.
R. Gammii, Anderson.
R. gigas, Peters.
 R. MACRODON, Kuhl. Sarawak. Java. Tenasserim. Philippines.
R. fusca, Blyth.
Ixalus aurifasciatus, Peters.
 *R. Plicatella, Stoliczka. Pinang.
 R. TIGRINA, Daud.
R. cancrivora, Boie.
R. Brama, Less.
R. vittigera, Wiegm.
R. rugulosa, Wiegm.
R. crassa, Jerdon. Shanghai. Ningpo.
Hydrostenor pantherinus, Fitzing. Formosa. Java. Borneo.
Pyxicephalus fodiens, Peters. Philippines. Nipal. Sikkim. Pegu.
Hoplobatrachus Ceylanicus, Peters. Pinang. Ceylon.
R. latrans, David. Nilghiris.
 R. GRACILIS, Wiegm. Shanghai. Ningpo. Formosa.
R. Nilagirica, Jerdon. Java. Borneo. Sikkim.
R. agricola, Jerdon. Ceylon. Nilghiris. Siam.
R. brevipalmata, Peters.
R. lymnocharis, Boie apud Stoliczka.
 *R. KHASIANA, Anderson.
 R. (HYLORANA) MACRODACTYLA, Günth. South China. Burma.
 R. ANDERSONII, Boulenger. Yunan.
Polypedates Yunanensis, Anderson.
 *R. (HYLORANA) MARGARIANA, Anderson. Yunan.
 R. ALTICOLA, Boulenger. Khasi Hills.
Hylorana pipiens, Jerdon. Maulmain.
Hylorana Nicobariensis, Stoliczka.
 *R. (HYLORANA) TYTLERI, Theobald. Burma. Bengal.
 R. (HYLA) ERYTHREA, Schl. Sumatra. Borneo.
Limnodytes erythræus, Dum. et Bib. Philippines.
Hylorana subæarulea, Cope. Siam.
 R. (POLYPEDATES) AFGHANA, Günth. Sikkim.
Polypedates marmoratus, Blyth. (The recorded habitat of Afghanistan
Anolops Afghanus, Cope. is highly improbable.)
 R. (POLYPEDATES) FORMOSA, Günth. Sikkim. Khasi Hills.
 R. LATOPALMATA, Boulenger. Tenasserim.

RHACOPHORUS, Kuhl.

Tongue free and deeply notched behind. Teeth on the vomer. Fingers and toes more or less webbed, the tips dilated into regular disks. Omosternum and sternum with a bony style.

A. Fingers half webbed.

a. Heel without dermal appendage.

Vomerine teeth between the choanæ.

R. (HYLA) MACULATA, Gray.	Hong Kong. Sikkim.
<i>Polypedates leucomystax</i> , Tschudi.	Nilghiris.
<i>P. rugosus</i> , Dum. et Bib.	Bombay. Madras. Ceylon. Borneo.
<i>P. cruciger</i> , Blyth.	Tenasserim.
<i>P. megacephalus</i> , Hallow.	
<i>P. biscutiger</i> , Peters.	
Var. QUADRILINEATA, Wieg.	Singapore. Java.
<i>Polypedates quadrilineatus</i> , Günth.	Philippines.
<i>Limnodytes Celebensis</i> , Fitzing.	Formosa.

B. Fingers entirely webbed.

a. No dermal appendages.

Vomerine teeth in two series on a level with the front edge of the choanæ.

R. MAXIMUS, Günth.	Nipal. Sikkim. Khasi Hills.
<i>R. gigas</i> , Jerdon.	

b. Heel with a dermal appendage.

R. BIMACULATUS, Boulenger.	Assam and Khasi Hills.
<i>R. Reinwardtii</i> , Jerdon.	
<i>R. maculatus</i> , Anderson.	

IXALUS, Dumeril et Bibron.

A. Fingers free or very slightly webbed.

a. Tympanum not half the width of the eye.

*I. KAKHENSIS, Anderson.	Nampoung Valley. Yunan.
*I. LATERALIS, Anderson.	Burma.

b. *Tympanum indistinct.*

*I. CINERACEUS, Stoliczka.	Maulmain.
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Family **Engystomatidæ.**

No maxillary teeth. Diapophyses of sacral vertebræ dilated.

CALOPHRYNUS, Tschudi.

C. PLEUROSTIGMA, Tschudi.	Borneo. Pegu.
<i>Engystoma interlineatum</i> , Blyth.	

MICROHYLA, Tschudi.

M. (ENGYSTOMA) PULCHRA, Hallow.	Hong Kong. Camboja.
<i>Scalophryne labyrinthica</i> , Fitzing.	
<i>Ranina symmetrica</i> , David.	
M. (ENGYSTOMA) BERDMOREI, Blyth.	Pegu.
<i>Callula natalrix</i> , Cope.	

CALLULA, Gray.

C. (KALOUA) PULCHRA, Gray.	China. Siam.
<i>Hyladactylus bivittatus</i> , Cantor.	Camboja. Ceylon. Burma.

GLYPHOGLOSSUS, Günther.

G. MOLOSSUS, Günth.	Pegu.
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Family **Dyscophidæ.**

Maxillary teeth. Diapophyses of sacral vertebræ dilated.

CALLUELLA, Stoliczka.

C. (MEGALOPHRYS) GUTTULATA, Blyth. Pegu.

Series ARCIFERA.

Family **Bufonidæ.**

Maxillary teeth none. Diapophyses of sacral vertebræ dilated.

BUFO, Wagler.

*B. (ANSONIA) PENAGENSIS, Stoliczka. Penang.

*B. (BOMBINATOR) SIKKIMENSIS, Blyth. Sikkim.
Scutigera Sikkimensis, Theobald.

B. HIMALAYANUS, Günth. Nipal. Sikkim.

B. MELANOSTICTUS, Schm. Canton. Hong Kong.

B. Bengalensis, Daud. Sikkim. Bengal. Madras. Ceylon. Penang.

B. isos, Less. Java. Borneo. Philippines.

B. dubia, Shaw.

B. carinatus, Gray.

B. gymnancken, Bleeker.

B. spinipes, Fitzing.

B. ASPER, Gravenh. Java. Borneo. Tenasserim.

B. GALEATUS, Günth. Camboja.

Family **Hylidæ.**

Maxillary teeth. Diapophyses of sacral vertebræ dilated. Terminal phalanges claw-shaped.

HYLA, Laurenti.

H. CHINENSIS, Günth. Southern China.

H. (POLYPEDATES) ANNECTANS, Jerdon.

Family **Pelobatidæ.**

Maxillary teeth. Diapophyses of sacral vertebræ strongly dilated. Terminal phalanges simple.

LEPTOBRACHIUM, Tschudi.

Tongue heart-shaped, free behind. Fingers free; toes basally webbed, tips not dilated.

L. HASSELTII, Tschudi. Pegu.

XENOPHRYS, Günther.

Tongue subcircular, slightly nicked and free behind. Fingers free, toes nearly so, and tips not dilated into regular disks.

X. MONTICOLA, Günth. Sikkim. Pegu.

X. gigas, Jerdon.

PICUS CANICAPILLUS (Page 349).

Speaking of this bird, Dr. Mason says, "The Karens regard it as a bird of bad omen. Whenever its voice is heard, the children are charged not to go out of the house, for it is deemed to be the dog of a witch."

THE TĀL PALM (*Borassus*) (Page 383).

That there may be no mistake, I may say that I cannot remember ever seeing nests of the Baya attached to the Tāl palm—the *Phœnix* being universally selected in preference. The reason is obvious, as the leaf of the *Borassus* does not offer so convenient a basis of attachment as the leaf of the *Phœnix* does.

CISSA (PSILORHINUS) MAGNIROSTRIS (Page 387).

Of this bird Dr. Mason writes: "General Johnson had one which exhibited all the traits of the English magpie. It would take bones, hide them in a hollow bamboo, cover them up with a rag, and return to them when needed. When a bamboo could not be found, it would hide its spare food under the mat."

CORVUS SPLENDENS (Page 387).

The cases of birds attacking men in defence of their young are too numerous to need reference or quotation; but birds occasionally attack men, seemingly without provocation. For example, Judge Norman, who was assassinated on the steps of the Town Hall in Calcutta, related to me once that he was standing just outside his house in Calcutta, when suddenly a kite swooped down at his bare head, and with its claws inflicted a severe wound on the scalp. In this case there was absolutely no provocation, neither is it easy to assign any reason for the bird's behaviour. It is just possible, if Judge Norman had a handkerchief thrown over his head at the time, that the bird may have swooped at the handkerchief, supposing it to cover something to eat, but this I cannot say; anyhow, the bird inflicted a painful scalp wound, which was some days in healing.

PALÆORNIS VIBRISSA (Page 409).

In the Edinburgh Review for April, 1882, appears an article on 'The late Lord Tweeddale's Ornithological Essays,' which deserves a passing comment for the singular dishonesty it displays, in the brief allusion it indulges in of a naturalist who stands in the foremost rank of those who have made Indian Ornithology their study. The article in question is in fact a sustained eulogy of the deceased nobleman, and as such is admirable in its way; but when its author contrives by both a *suggestio falsi* and the *suppressio veri* to calumniate one of India's ablest naturalists, because, forsooth, he once wrote disparagingly of Lord Tweeddale, and in a strain (it may be admitted) of doubtful taste, it behoves all who do not wish to see the scandalous malignity which disgraces political controversy introduced into scientific discussion, to lift up their voice in protest.

The first passage which betrays the animosity of the writer to Mr. A. O. Hume is where, in alluding to his Lordship's first Memoir on Captain Beavan's collection of birds from British Burma, he says, "The birds of British Burma were not nearly so well known as they now are from the labours of Davison, Ramsay and Oates." To those familiar with Indian ornithology, the omission of the name of Mr. A. O. Hume (not to mention others) from a place among those who have worked out the ornithology of Burma, may simply excite laughter or contempt, but as the majority of readers of the Review are not versed in ornithological matters, the omission in question, all things considered, is simply dishonest, and that this omission is studied, and not accidental, is proved by the deliberate omission throughout the article of all mention of Mr. Hume's special claim to the gratitude of all interested in Indian ornithology, as editor and originator of 'Stray Feathers.'

Lord Tweeddale (as we all know) revised and edited the ornithological portion of Blyth's posthumously published Catalogue of the Mammals and Birds of Burma—good. But the reviewer adds, "This memoir (Blyth's memoir, be it remembered) is still the leading volume of reference on the birds of British Burma, though it is

likely to be superseded very shortly, we believe, by a new work on the subject by Mr. E. Oates." Now were my esteemed friend Mr. Blyth alive, I know he would be the first to disclaim all approval of this invidious praise, and the dishonesty involved, in the suppression in the above passage of even an allusion to Mr. Hume's work, *Stray Feathers*, which will ever stand as a mine of information, wherein the results of all the ornithological work done in Burma since Blyth's death are from time to time recorded. Here, again, the ornithological reader may smile, at the malice of an anonymous critic, but the omission, so far as the general reader is concerned, is an act of dishonesty injuriously directed against Mr. Hume.

Mr. Hume's name is first alluded to by the Reviewer as follows: "But about this time Lord Tweeddale's sympathies were excited by an unprovoked attack made by Mr. Allan Hume, an Indian amateur ornithologist, upon Dr. Finsch, one of the most learned and accomplished naturalists of the Fatherland." Now of all Indian ornithologists whom the reviewer mentions by name, and of the far larger number likewise of whom no mention is made, but two are not '*amateurs*.' To single out therefore Mr. Hume, and specially allude to him as an '*amateur*,' can only be done to insinuate that he is an amateur in some other sense than his colleagues, or in a word a bungler or some such term of disparagement. This I hold is a *suggestio falsi*, as I understand the meaning of that phrase. Alluding to Dr. Finsch's work on Parrots, the Reviewer goes on: "In 1874, *i.e.* six years after the publication of the second volume of the '*Mönograph*,' Mr. Hume took occasion to write a review of it, and *profiting* by the knowledge of the Indian species, which he had in the meantime acquired, and by some alleged inaccuracies of Dr. Finsch regarding them, proceeded to condemn the whole work in unmeasured terms, accusing the author of wanton and perverse ignorance, and gratuitous errors." Now the gist of this charge I hold to be absolutely false. In the opening¹ sentence of his review of "*Die Papageien*," Mr. Hume states that it was but recently that the work had come into his hands, and on the same page stands the following estimate of Dr. Finsch's work, an estimate no one would possibly suspect Mr. Hume of forming who had nothing to guide him but the garbled indications of the spiteful Reviewer: "As an Index of synonyms and a work of reference in regard to nomenclature, *Die Papageien* will always be most valuable. The minute and careful measurements and descriptions of every species, merit our cordial acknowledgment, whilst the industry and erudition, which has characterized Dr. Finsch's researches into all that has been recorded in regard to this fascinating family, compel our admiration, even if it excites a sadder feeling when we consider *how* he has utilized the materials he has thus accumulated."

With what decency can the writer of the above be charged with condemning "the whole work in unmeasured terms"?

What Mr. Hume did condemn with a righteous warmth, which no man need be ashamed to exhibit, may be gathered from the sentences immediately following the one quoted above.

"I have only, as already stated, scrutinized closely his treatment of the single well-known genus *Palæornis*; but this discloses an amount of error scarcely credible in such a work. Error, too, entirely gratuitous and created by the author himself, who never, probably, having seen a single wild bird belonging to the genus, chooses on hypothetical, and as a matter of fact, utterly untenable grounds, to disregard, nay, to pooh-pooh contemptuously, the recorded experience of men like Jerdon and Blyth, who for a long series of years observed the free living birds, shot and dissected them, and knew to a certainty, beyond all possibility of question, the facts that they stated. We are all liable to error, but for a cabinet naturalist, on the strength of half a dozen wrongly-sexed skins in some museum, to take upon himself to contradict the definite statements of trustworthy field-naturalists like those above referred to, in regard to matters of which he can personally know nothing, appears to me to indicate a tone of thought incompatible with the philosophical investigation of any branch of physical science."

¹ *Stray Feathers*, vol. ii. page 1.

This is, I think, enough to show the indefensible treatment Mr. Hume has received at the hands of his critic, but the matter is not without its humorous, as well as its graver aspect. Mr. Hume is charged with "being unacquainted with German," and with indulging himself in "a vulgar style of factiousness, which is hardly suitable to scientific writing." In this there may be a residuum of truth, but as the critic in a note gravely points out that 'Finsch' is not equivalent to 'Finch' or 'Fringilla,' we have ample warrant for regarding him as belonging to that unhappy class of persons with whom a surgical operation is necessary before they are capable of recognizing a pun.

LORICULUS VERNALIS (Page 410).

"This (writes Dr. Mason) is one of the smallest birds of the parrot-tribe. Its child-like notes are among the most familiar sounds in the interior, during the declining day. Its Burman name signifies 'headlong,' from its habit of suspending itself from the tree head-foremost like a bat."

CELTS (Page 484).

Dr. Mason thus refers to the occurrence of Celts in Burma, both of stone and copper; but his views were somewhat confused on the subject, as is proved by the following amusing diatribe against those who hold them to indicate a greater age for the human species than that which is commonly assigned to it, by the so-called Mosaic chronology.

"According to our modern Moses, so soon as the monkeys had lost their tails, they went to work chipping flints to kill each other for food. This is proved by a certain savant of Portugal, who finds evidence that man once existed in that district, in so rude a condition that he lived in caves, ate human flesh, and possessed chipped flints for his sole weapons. This is called the 'old stone age,' the stones being in the rough. As man advanced in civilization, he polished his stones, and thus introduced 'the polished stone age.' Mr. Theobald, of the Geological Survey, in the Proceedings of the Asiatic Society of Bengal, for July, 1865, and again for July, 1869, first brought to public notice the existence of stone implements in Burma."

The following extracts are from the above-mentioned paper of 1869. "Excepting a short notice in the Proceedings for July, 1865, p. 126, nothing that I am aware of has been published respecting the stone implements found in Burma. They are, however, curious, as differing materially in form and type, not only from anything found in India, but from anything hitherto described from any part of Europe, though any implement yet found in India has its precise analogue in Europe.

"The material of which the Burmese implements are fashioned is either basalt, or some schistose rock, quite unlike anything to be met with in the district where the implements themselves occur; a fact pointing, in my opinion, to their having been brought down from Upper Burma (where these implements are said to be common) by the original settlers in the country. They are called '*mo-jio*,' or thunder-bolt, by the Burmese, and are believed to accompany the lightning. The popular idea is that, if a flash of lightning is seen to strike, and an earthen *chattie*, or other vessel, is inverted over the spot, in the course of a year or so, the *mo-jio* will be found in it, having worked its way back again to the surface by its own recoil.

"To the true '*mo-jio*,' the Burmese attach much value from the properties they believe it to possess, but they subject the articles to many tests, as, no doubt, from experience, they have discovered that many of them are in circulation, which, from *not possessing* the characteristic powers of the *mo-jio*, must therefore be spurious. I have not, however, myself seen more than one stone *mo-jio*, whose authenticity I doubted, and that mainly from its being made of jade; but though rare down here, authentic jade implements may be found in Upper Burma.

"One test of authenticity, the Burmese say, is that, if wrapped in a cloth and fired at, no effect will be produced on either the cloth, or its contents, however near the gun

may be held, and the true *mo-jio* is mainly valued from this belief in its presence producing invulnerability in the wearer. Another test is, placing the *mo-jio* on a mat with a quantity of rice. If a genuine stone from heaven, no fowls, or other creatures, will venture near the rice. Again, another test is cutting a rainbow in half; a feat quite within the power of any one possessing the real *mo-jio*. Or if he cuts down a plantain tree with one, the tree will be killed, and not, as is usually the case when cut down, send up a new shoot. It also guards from fire, which leaves untouched any house containing one. Its medicinal virtues too are believed to be very great, and a small chip reduced to powder and administered internally is considered as a cure against inflammation of the viscera and of the liver.

"The universal testimony of the Burmese goes to prove that these implements are picked up on the surface of the hills, in the fields or clearings made for cultivation, and I never heard of their being found in the plains or anywhere, save on the hill-sides, by the peasants engaged in clearing and cultivating them. This, I think, points to their accidental loss or abandonment by their original owners, in spots which supplied the wants of a long-passed generation, as they do the present race. Supposing, however, that the men who wrought these implements were ignorant of metal, or I may say iron, it is not easy to comprehend, how they were able to effect clearances, as the present race does, in the gigantic forests of Pegu; assuredly heavier and more difficult to cope with by feeble men then, than now, and without clearing the forest, no cultivation would be possible in its umbrageous recesses.

"On the question, then, whether the makers of these stone implements possessed iron also, depends, I think, the right determination of their use. If in possession of the means for clearing the hill-sides sufficiently for the cultivation of cereals, then I should incline to regard these stone relics as agricultural implements, used in hand agriculture, at the end of a stick, as a spade, to form the shallow holes in which the 'hill rice' is even now sown by the Karens and Burmese in their hill clearings. If not explained in this manner, we must then regard them as weapons of the chase and war, though this use is, I think, negatived by their thoroughly inefficient character for such purposes."

Since the above extract was written, Mr. Ball has discovered stone weapons of the 'shouldered' or Burmese type in India, near Jabalpur, and the Central Provinces.¹

In the Indian Antiquary, November 1st, 1872, Dr. Mason thus describes some copper celts from Toung ngoo.

"In the Toung-ngoo district copper celts are not uncommon. They are sometimes little wedges of the same size and shape as the most common of the stone celts. One is 1·8 inches long by 1·7 broad, and 0·6 thick at the end; and weighs 10 tolas. It is bevelled down on both sides at the edge, and has evidently been cast in a mould, with, I think, some admixture of metal not copper.

"Another, but rarer form, is that of a small spade, cast with a hollow socket in which to insert a wooden handle, such as are used in cultivation by both Burmese and Karens, and other tribes of the present day, but made of iron. It is 3·2 inches long, by 1·7 wide at the broadest part.

"A third form is that of the hollow spearheads. The length is 4·4 inches hollow with a depth of 3·9, leaving 0·5 solid at the margin. The width of the broadest part is 3·2. Another spearhead of the same general outline, but smaller, with sharper barbs, and one larger than the other, was brought me by a Shán, who said it came from the borders of China. It was 3·4 inches long, by 2·6 broad at the blade.

"Besides the form usually recognized as celts, the Karens associate with them a miscellaneous collection of circular articles both of stone and bronze. The most notable among them is a stone quoit, 4·3 inches in diameter, with a hollow in the centre 2·2 across, leaving the stone circle 1·1 broad; and which is 0·5 thick on the inner side, but is bevelled off to a sharp edge on the margin. I have heard of several specimens, but the one I examined is a fine polished instrument made of striped jasper."

¹ Ball's Jungle Life in India, Appendix B.

This 'quoit' is really an 'anklet' or 'bangle,' like that figured in *Memoirs Geological Survey of India*, vol. x. pl. vii. Dr. Mason goes on to add:

"It will not be disputed but the celts of Burma have the *form* of pre-historic implements, but all I have seen appear to me of comparatively modern manufacture, and I think Mr. Theobald, who knows most about them, is of the same opinion. The natives say they are picked up in the streams, or found on the mountain sides, or dug out of the ground, but their representations are utterly untrustworthy and deserve no more credence than their assertions that they came down originally from heaven with the lightning, or that they have power to cure disease."

To avoid misconception here, I may say that I told Dr. Mason that not improbably 'celts' were still manufactured, especially from jade, in Upper Burma, for sale; but I nowise intended to convey any doubt of the genuine and archaic character of the models which these modern celts were intended to imitate. As for Dr. Mason's very disparaging estimate of native testimony, it is, to say truth, based on prejudice. I can only say that the very large weapon figured in pl. iii. vol. x. *Memoirs Geological Survey of India*, was picked up in a wild mountain stream by a servant of mine, in my presence, and such is no doubt the way that all genuine celts are now-a-days found. Dr. Mason goes on to add:

"But supposing, for the sake of argument, that these spades and hoes were formerly used in Burma for agricultural purposes, their use necessitated the existence of means to cut down trees, and clear the forest, and, therefore, of iron instruments, for all the celts in Burma would not cut down a single teak tree; so we are forced to the conclusion that these stone and copper implements co-existed with iron, when we may suppose iron was scarce, and not sufficiently abundant for all purposes; a state of things which it is not necessary to go down to below zero in the Mosaic chronology to find.

"Not many days' walk from Balmoral, where the Queen eats off gold and silver, I have seen, in the latter half of the nineteenth century people dining on wooden dishes. Now were these people, with their wooden platters in the pantry, sunk by a sudden catastrophe into the mud of the lake by which they dwell, they might, before the century closes, be dug up again a veritable 'cran-'nog,' and by the reasoning now applied to celts, it might be proven that they lived in a 'wooden age' before crockery was known.

"Many people stand masticating the truths of the Bible as an ox does his fodder, lest they should incontinently swallow a myth, but at sight of such trumpery shams as these Hindu and Chinese 'Brummagem' wares, they instantly read us marvellous dissertations on pre-historic times, long before Moses was born or thought of, on this wise—'These stone instruments clearly prove that there was a period in pre-historic times when the Burmese or the inhabitants of Burma, of whatever race they were, were wholly unacquainted with the arts of fabricating iron, steel, and metal instruments for cutting, and they resorted to the more difficult work of fashioning stone into adzes and axes, and other cutting instruments.'—*Credat Judæus Apella, non ego.*"

It is needless, however, to pursue the subject, or point out how untenable Dr. Mason's views are, as the authenticity of stone weapons as a class is quite beyond challenge, though the particular uses to which many of them were put may be open to question. Equally certain is it, that although stone weapons may still be used by barbarous tribes in out-of-the-way nooks and corners of the world even at the present day, yet identical or similar weapons were used by our savage forefathers in war and the chase, and in their domestic life, at a period long before the dawn of history, either sacred or profane, and when the Mammoth and Cave-bear, and other extinct contemporaries of those animals still wandered over Europe (England included), and shared the dominion of the wild with man himself.

APPENDIX B.

LIST OF BURMESE VERNACULAR NAMES.

THE present list of vernacular names is compiled mainly from Dr. Mason's list, with numerous additions from other sources; but for its accuracy I must disclaim any responsibility, from the fact that I have an extremely slender acquaintance, even colloquially, with the Burmese language. In compiling it, however, I have been most efficiently aided by Mr. Alfred Hough, of the Burmese Commission, to whom is really due whatever credit attaches to the work. But the difficulty in preparing a trustworthy list is after all not so much in finding a competent translator as in the subject-matter itself.

For certain well-known species of animals and plants there are no doubt names as fixed in the vernacular as in scientific language, but these are few compared with the host of species differentiated by science; and to affect to find out and bestow vernacular names on the numberless species due to modern scientific research, is to simply perpetrate a sham. The idea that every species, or even the majority of species, possesses a vernacular name, is an absurdity. As an instance of the length to which this hankering after vernacular names is carried, there are actually given in the earlier edition (of 1860, p. 734) distinct vernacular names for the six varieties of Tourmaline enumerated, *white, red, yellow, green, black,* and the *decoloured* stone; though it may safely be affirmed that there are not half a dozen Burmese-speaking men of any race throughout the world who could discriminate by their properties one Tourmaline from another, or from similarly coloured stones. This is an extreme instance and example of manufacturing vernacular names by translating the English word into Burmese, when the idea which the word represents has no existence in the minds of the men speaking the language. Excising then all the misbegotten vernacular names of this stamp, we have still a large number to deal with which are objectionable on other grounds. In Burmese, as in English, there are many names which are applied loosely (so to say) to many different animals—some which apply generically, and some which apply more loosely still. For example, Ngā-sin-hpyu is applied to *Systomus, Leuciscus,* and *Opsarion* (i.e. p. 698), and is clearly applicable to any white-looking little fish resembling the members of those genera, and has really no proper reference to any one particular species; and this comprehensive vagueness in the application of a vernacular name may be said to be the rule, in a greater or less degree, with the majority of them. An equally pregnant example is afforded by the vernacular name for a Snipe, Mye-wöt, which also stands for a bird utterly dissimilar and unlike in appearance, the Goatsucker, the idea attaching in the mind of a Burman being that of "crouching on the earth," which both the Snipe and the Goatsucker habitually do, and hence go by one and the same name.

The list now given is divided into columns, the first giving the Burmese name in the Roman character, and the second column its scientific equivalent.

The names in the first column are spelt phonetically, and are not transliterations of the Burmese words. To pronounce them, therefore, properly, attention must be paid to the simple rules which have been adopted; but, unfortunately, where the names have been copied from Kurz or other authors, who give neither the name in the vernacular character, nor a standard whereby it can be pronounced, it is not

possible, from the variable and inconstant practice of English spelling and pronunciation, to tell, where the word is not known or familiar, what is the pronunciation intended. The name 'Tenasserim' may be instanced as a case in point, how vernacular names become metamorphosed when transliterated or otherwise rendered into English by men unacquainted with Burmese, as the familiar 'Tenasserim' is no other, properly speaking, than 'Ta-myen-tha-ra-kyēn,' or Ta-nen-tha-ri-kyeing, a species of calamus common in that Province. Many of the names, therefore, are open to correction, and the list is merely given for what it is worth, and invites correction from those in a position to do so.

I have intentionally eschewed the solecism (which so mars the appearance of the British Burma Gazetteer) of spelling Burmese words with an "r" in place of a "y," though the inability of the Burmese to pronounce the letter 'r' is well known, and is a veritable '*shibboleth*' to the people of Burma (exclusive of Arakan), as it is with the Chinese. However convinced scholars may be that the Burmese *should* pronounce their 'r's, that letter can find no place in any attempt to reproduce phonetically the language as spoken.

The following simple rules must be attended to in pronouncing the name in the Roman character:—

The vowels *a*, *e* and *o* are always short, save where marked as long. The vowels *i* and *u* are always long: *y* stands in place of the short *i*: *g* is always hard, and *j* like a soft *g*. For example:

ā in maji	as <i>a</i> in <i>america</i> .	y in thyt as <i>y</i> in <i>syncope</i> or
ā ,, ngā	,, <i>a</i> ,, <i>father</i> .	<i>i</i> in <i>sîn</i> .
e ,, hnet	,, <i>e</i> ,, <i>net</i> .	o ,, tor ,, <i>o</i> ,, <i>pot</i> .
ē ,, yē	,, <i>a</i> ,, <i>same</i> .	ō ,, bōk ,, <i>o</i> ,, <i>popc</i> .
i ,, mijongg	,, <i>i</i> ,, <i>piano</i> .	u ,, lu ,, <i>u</i> ,, <i>supreme</i> .

The following words being in frequent use in composition, are given together with their signification.

Ben or Byn, a tree.	Khyoung, a stream.	Myouk, a monkey.	Shor, slide.
Bō, male.	Kyoung, a cat.	Ngā, fish.	Thyt, wood.
Mā, female.	Kha-u, a shell.	Ngo, a cry.	Tanyet, sugar.
Hmā, hard.	Khwē, a dog.	Ngu, a green pigeon.	Tor, wild.
Goung, head.	Kyn-weh, a buffalo.	Nadoung, an earring.	Toung, hill.
Galē, small.	Kyan, a rhinoceros.	Nyo, blue.	Thwē, blood.
Gyi, large.	Kyān, sugar-cane.	Nī, red.	Thamen, the Panolia.
Net, black.	Kyē, a parrot.	Nweh, a creeper.	Tsēk, a goat.
Hnet, a bird.	Kyet, a hen.	Pyn or byn, a tree.	Wā, { yellow, or a
Hpyu, white.	Kyouk, a stone.	Pōk or bōk, stinking.	{ bamboo.
Hpā, a frog.	Lēk or } a tortoise.	Pyn-leh, sea.	Wet, a hog.
Hsyn, an elephant.	Leik, }	Pyān or byān, flying.	Wūn, a bear.
Jio, a dove.	Lu, a man.	Sēng, green.	Yō, a bone.
Kyā, a tiger.	Myē, earth.	Sā, food.	Yē, water.
Khoung, hollow.	Mywē, a snake.	Shwē, gold.	
A-pyaik-net	<i>Schorl</i>		Black tourmaline.
Aw-yaw	<i>Graculus</i>		Cormorant.
Ba-shu-ngā	<i>Alosa toli</i>		Malay shad.
Bōk	<i>Centropus intermedius</i>		Crow-pheasant.
Bahān-kyouk			Iron pyrites.
Bōng-ma-dī	<i>Carpophaga</i>		Fruit pigeon.
Bu-yit	<i>Dolium</i>		Tun shell.
By-aing	<i>Ardea</i>		Heron.
By-aing-hpyu	<i>Herodias</i>		Egret, or white paddy bird.
By-aing-ouk	<i>Ardeola Grayi</i>		Brown paddy bird.
Chā	<i>Termes</i>		White ant.
Chā-bō	<i>Cimex lectularius</i>		Bed bug.
Chyn, or Khyen			Mosquito.

Darch	<i>Hogelaphus porcinus</i>	Hog deer.
Den-gyi	<i>Plotus</i>	Snake bird.
Di-dök	<i>Bubo</i>	Eagle owl.
Dōng-sāt	<i>Leptoptilos argkala</i>	Adjutant.
Dōng-mye-kwet	<i>Leptoptilos Javanica</i>	Lesser adjutant.
Doung	<i>Paro muticus</i>	Burmese pea-fowl.
Doung-ka-lā	<i>Polyplectron chinquis</i>	Argus-pheasant.
Doung-tswōn	<i>Spilornis cheela</i> .	
Doung-u-lmouk	<i>Hirax caerulescens</i>	Pigmy falcon.
Eyng-lmyoung	<i>Hemidactylus</i>	House lizard.
Eyng-sā	<i>Passer</i>	House sparrow.
Ganān }		Crab (generic).
Ganān-lteb }		
Ganān-miyen zaing	<i>Ocyropa ceratophthalma</i> .	
Gor-dan		Quartz.
Gyen	<i>Arca</i>	
Gyi	<i>Cervulus</i>	Barking deer.
Heng-thā	<i>Casarca rutila</i>	Brahminee duck.
Hmwā }		Tick.
Hmwā-goung }		
Hmyaw	<i>Hirudo</i>	Water leech.
Hnān-boung	<i>Mantis</i>	Leaf-insect.
Hnān-pyi-sök	<i>Orthotomus</i>	Tailor bird.
Hnet-daw	<i>Dicrurus</i>	King-crow.
Hnet-kā	<i>Coracias affinis</i>	Burmese roller.
Hnet-men-thā	<i>Perichrotus</i> (male)	The Cardinal.
Hnet-men-thā mi	<i>Perichrotus</i> (female).	
Hnet-nwā	<i>Nycticorax griseus</i>	Night heron.
Hnet-pa-dēng	<i>Megalaima haemacephala</i>	Barbet.
Hnet-pa-zin-lto	<i>Merops</i>	Bee-eater.
Hnet-sēng	<i>Phyllornis</i>	Green orioles.
Hnet-wā	<i>Oriolus</i>	Mango birds.
Hpā	<i>Rana</i>	Frog.
Hpā-pyök	<i>Bufo</i>	Toad.
Hpa-lu-klā	<i>Leuciscus</i>	Tavoy white-fish.
Hpan-kyouk		Rock crystal.
Hpwōt-ini-joung	<i>Hydrosaurus salvator</i>	Monitor.
Hpwōt	<i>Varanus</i>	Scavenger lizard.
Hpyök		Sand fly.
Hpyu	<i>Hystrie</i>	Poreupine.
Hypu-yōng	<i>Lepus</i>	Hare. Rabbit.
Hsāt (see Tsāt)		
Hsyn	<i>Euclephas indicus</i>	Indian elephant.
Hsyn-lmyaw	<i>Holothuria</i>	Sea slug. Trepang.
Hsyn-pēng-nyin	<i>Pelargopsis amauroptera</i> .	
Hsyn-pō		Locust.
Htök-tā-ra	<i>Harpactes</i> .	
Jio	<i>Turtur</i>	Dove.
Jio-nyo	<i>Chaleophaps</i>	Bronze-winged dove.
Jio-jiyā	<i>Grus antigone</i>	Crane.
Jyat-long	<i>Hydrophis</i>	Sea-snake.
Jio-thēng	<i>Tinnunculus</i> .	
Jyat-byā	<i>Hydrophis</i>	Sea-snake.
Kā-bōng-thā	<i>Modiola</i> .	
Ka-ku-yān	<i>Polynemus indicus</i>	King-fish.
Ka-lā-gouk	<i>Ibis melanocephalus</i> .	
Ka-loung-boung	<i>Sciæna miles</i> .	
Ka-lu-kwet	<i>Gallinula phanicura</i>	Water-hen.

Ka-mā	<i>Ostrea</i>	Oyster.
Ka-mā-kha-yen	<i>Perna</i> .	
Ka-meh	<i>Solecurtus</i> .	
Kān-gu	<i>Steatite</i>	Burmese pencil stone.
Kā-tha-bō	<i>Gobius kokius</i> .	
Kā-tha-boung	<i>Eutropichthys iacha</i> .	
Khai-tha-đā }	<i>Loriculus vernalis</i>	Parrakeet or Lory.
Kcwn-to }		
Khā	<i>Perdix coturnix</i>	Quail. Partridge.
Khā-yu-sōk	<i>Anastomus oscitans</i>	Shell-eater.
Kha-yu-ganān	<i>Pteroceras</i>	Scorpion shells.
Kha-yu-hnā-moung laing	<i>Spirula</i> .	
Kha-yu-hsen hnā-moung	<i>Hiatula diphos</i>	Purple diphos.
Kha-yu-ka-dōng	<i>Cerithium obtusum</i> .	
Kha-yu-kyouk-mouk	<i>Pholas Lithodomus</i>	Boring shells.
Kha-yu-ka-wet-toung	<i>Pyrula</i>	Fig shells.
Kha-yu-myek-lōng	<i>Natica</i>	Natica.
Kha-yu-men-sā	<i>Tellina</i>	Tellens.
Kha-yu-ō-zi	<i>Melania</i>	Melantias.
Kha-yu-nāt-sā	<i>Nucula</i>	Nucula.
Kha-yu-pōk	<i>Planorbis</i>	Coiled pond snail.
Kha-yu-tha-pi	<i>Nautilus</i>	Nautilus.
Kha-yu-thān-gyi	<i>Pyrula</i>	Fig shells.
Kha-yu-thah-pa-hto	<i>Olivia</i>	Olive shells.
Kha-yu-thyt-pen-tet	<i>Columbella</i>	Columbella.
Kha-yu-yā	<i>Paludina</i>	Operculated pond snail.
Kha-yu-yā-gyi	<i>Ampullaria</i>	Apple shell.
Kha-yu-yā-pen-lē	<i>Natica, Rotella</i> .	
Kha-yu-zi-zyn	<i>Melania</i> .	
Kha-yen	<i>Balanus</i>	Barnacle.
Kheh-nct	<i>Plumbago</i>	Black-lead.
Kheh-mā-hpyu		Tin.
Khen-pōk }	<i>Ninox hirsutus</i> .	
Khin-bōk }		
Khen-chyē-myē	<i>Scolopendra</i>	Centipede.
Khen-myi-kouk	<i>Scorpio</i>	Scorpion.
Khō	<i>Alsocomus, Columba</i>	Pigeons.
Khu	<i>Medusa</i>	Jelly fish.
Khwē	<i>Canis</i>	Dog.
Khwē-ta-wet-wet-ta-wet	<i>Arctonyx collaris</i> .	
Khwē-lē		Dog flea.
Khwē-lē-pyā	<i>Tabanus</i>	Dog-flea-bce.
Kōk-kha loung	<i>Megalaima</i>	Barbets.
Kun-shāt	<i>Cymbium guttatum</i> .	
Kweh	<i>Trigona laticeps</i>	Dammar bee.
Kyā	<i>Felis tigris</i>	Tiger.
Kyā-let-thch	<i>Iridacna</i>	Giant clam.
Kyā-thyt	<i>Felis pardus</i>	Leopard or tree tiger.
Kyan	<i>Rhinoceros Sumatrensis</i>	Two-horned rhinoceros.
Kyan-goung }	<i>Rhinoceros Sondaicus</i>	{ Lesser one-horned
Kyan-hsyn }		rhinoceros.
Kyet-daw }	<i>Palaeornis cupatrius</i>	Green parrot.
Kyē-hpoung-khā }		
Kyē-gyōk	<i>Palaeornis torquatus</i>	Ring-necked parrot.
Kyē-kalā }	<i>Palaeornis cyanocephus</i>	Blue-headed parrot.
Kay-tamā }		
Kyet-hsyn	<i>Meleagris gallo-pavo</i>	Domestic turkey.
Kyet-tu-ywē	<i>Palaeornis</i>	Parrots.

Kyet or Tor-kyet	<i>Gallus ferrugineus</i>	Jungle fowl.
Kyi-gan	<i>Corvus</i>	Crow.
Kyok-mā-lu } Kyok-ngā-lu }	<i>Labeo boga</i> .	
Kyok-mi-thwē . . . . .	. . . . .	Coal.
Kyok-ni . . . . .	. . . . .	Ruby.
Kyok-pyn-wun	<i>Mytilus</i>	Mussel.
Kyok-than-sweh . . . . .	. . . . .	Loadstone.
Kyweh	<i>Bubalus</i>	Buffalo.
Kyweh-zā-yet	<i>Sturnopastor contra</i>	Buffalo. Mynah.
Ky-wē-pōk	<i>Olua</i>	Olive shell.
Kyoung	<i>Felis domestica</i>	House cat.
Kyoung-ka-dō	<i>Viverra Malaccensis</i>	Malacca civet.
Kyoung ma-sā	<i>Ambassis nalu</i> .	
Kyoung-myin	<i>Viverra zibotha</i>	Civet cat.
Kyoung-na-ywet-hpyu	<i>Paradoxurus leucotis</i> .	
Kyoung-baik	<i>Paradoxurus musanga</i> .	
Kyoung-pyan	<i>Helictis Nipalensis</i> .	
Kyoung-thyt	<i>Felis undata</i>	Leopard cats.
Kywet-sōk	<i>Sorex</i>	Musk-shrew.
Kywōt . . . . .	. . . . .	Land leech.
Kywōt-wun-hpyu	<i>Mus</i>	White-bellied rats.
Lak-wā (?) } Kweh-yen (Tavoy) }	<i>Polynemus indicus</i>	King fish
Lch-jiā	<i>Pratincola caprata</i> .	
Lch-pyā	<i>Papilio</i>	Butterfly.
Lān	<i>Limulus</i>	King-crab.
Lē-khye	<i>Mica</i>	Muscovy glass.
Lch-pazwōn . . . . .	. . . . .
Lch-kha-yu	<i>Ampullaria</i>	Apple shell.
Lēk-goung-gyi	<i>Testudo platynotus</i>	Pegu land-tortoise.
Lēk-pyin-wun	<i>Chelonia virgata</i>	Sea turtle.
Lyn-mýwe	<i>Ptyas mucosus</i>	Paddy field snake.
Lyn-baing	<i>Orcella</i>	Porpoises.
Lyn-tsweh	<i>Pteropus medius</i>	Flying fox.
Lyn-wet	<i>Nycticorax</i>	Night heron.
Lyn-ta	<i>Gyps</i>	Vulture.
Mēn-doung	<i>Polyplectron chinquis</i>	Argus pheasant.
Mēn-mā-let-thieh	<i>Numenius phaeopus</i>	Whimbrel.
Mi-joung	<i>Crocodylus</i>	Crocodile.
Mō-goung-hnet	<i>Eurystomus orientalis</i>	Broad-bill.
Mōk-sōk-hnet	<i>Hirundo</i>	Swallow.
Myain-sēng . . . . .	. . . . .	Rock crystal.
Myē-kōng } Myē-ngong } Myai-young }	<i>Pitta</i>	Ground thrush.
Myē-kywet	<i>Mus</i>	Ground rats.
Myē-ngonk } Myē-nyoung }	<i>Budytes Motacellis</i>	Wagtails.
Myē-wōt	<i>Caprimulgus. Scolopax</i>	Goatsucker. Snipe.
Myin	<i>Equus</i>	Horse.
Myit-twē	<i>Sterna</i>	Sea-swallows.
Myouk-hlweh-kyaw	<i>Hyllobates</i>	Gibbon.
Myouk-kyā	<i>Arctictis Binturong</i>	Monkey-tiger.
Myouk-moung-mā	<i>Nycticebus tardigradus</i>	Moukey's concubine.
Myouk-myet-kwyn-hpyu	<i>Semnopithecus obscurus</i> .	
Myouk-ni	<i>Macacus leoninus</i> .	
Myouk-pa-di	<i>Macacus nemestrinus</i> .	

Myouk-ta-ngā	<i>Macacus cynomolgus.</i>	
Mywē-houk	<i>Naja tripudians.</i>	
Mywē-hsü-pyat	<i>Typhlops</i>	Blind worm.
Mywē-pā	<i>Urva cancrivora.</i>	
Mywē-seing	<i>Trimeresurus.</i>	
Nā-gā-goung	<i>Murex.</i>	
Nat-ka-dor	<i>Johnias chaptis.</i>	
Ngā-aik	<i>Macrones microphthalmus.</i>	
Ngā-ain (Arakan)	<i>Ophiocephalus punctatus.</i>	
Ngā-bāt	<i>Wallago atta.</i>	
Ngā-hpyu-reng-gyi (Arakan)	<i>Platycephalus insidiator.</i>	
Ngā-bu-dyn	<i>Xenopterus naritus.</i>	
Ngā-byā	{ <i>Platygaster affinis.</i> <i>Ambassis nalu.</i>	
Ngā-byē-mā	<i>Anabas scandens</i>	Climbing perch.
Ngā-byit	<i>Sciænoides pama.</i>	
Ngā-chong	<i>Barbus sarara.</i>	
Ngā-chyu-myēt-si-ni	<i>Gobius.</i>	
Ngā-dān	<i>Siluridæ</i>	Cat-fish.
Ngā-dēng)	<i>Labeo gonius.</i>	
Ngā-dyn)		
Ngā-doung-zi	<i>Rasbora daniconius</i>	
Ngā-zin-hpyu	{ <i>Luciscus.</i> <i>Systomus.</i> <i>Opsarion.</i>	
Ngā-young)	<i>Arius Burmanicus.</i>	
Ngā-goung)		
Ngā-goung-gyi	<i>Scomber microlepidotus.</i>	
Ngā-gyn	<i>Cirrhinna mrigala.</i>	
Ngā-gyeng-kyouk	<i>Chatodon pictus.</i>	
Ngā-gyi	<i>Saccobranchus fossilis.</i>	
Ngā-gyoung	<i>Macrones aor.</i>	
Ngā-hpā-kheh	<i>Chatodon melanotus.</i>	
Ngā-hpān-mā	<i>Amblypharyngodon Atkinsonii.</i>	
Ngā-hpeh oung	<i>Rohtee Belangeri.</i>	
Ngā-hpeh	<i>Notopterus kafirat.</i>	
Ngā-hpen-bn	<i>Aspidoparia morar.</i>	
Ngā-hpoung-yo	<i>Belonc cancella.</i>	
Ngā-hpyin-gyau	<i>Perilampus atpar.</i>	
Ngā-hpyu reng-gyi	<i>Platycephalus insidiator.</i>	
Ngā-hsyn	<i>Balanoptera</i>	Whale.
Ngā-hsyn-nē	<i>Drepane punctata.</i>	
Ngā-htwē	<i>Rita Buchanani.</i>	
Ngā-hu	<i>Labeo gonius.</i>	
Ngā-jyu-souk	<i>Lystomus.</i>	
Ngā-kā-ba-lu	<i>Mugilis.</i>	
Ngā-khā-ka-dyt)	<i>Lates calcarifer</i>	'Cockup.' 'Bhekti.'
Ngā-ka-tha-boung)		
Ngā-ka-tha myin)		
Ngā-khong	<i>Barbus chola.</i>	
Ngā-khong-mā	{ <i>Ambassis baculis.</i> <i>Barbus stigma.</i>	
Ngā-khōng-mā-gyi	<i>Barbus sarara.</i>	
Ngā-khōng-bik-thā)	<i>Systomus.</i>	
Ngā-khong-kyān-ywet)		
Ngā-khwē-thū	<i>Synaptura Commersoniana.</i>	
Ngā-khwē-thā-pyin-wet	<i>Rhombus maximus.</i>	
Ngā-kn	<i>Clarias magar.</i>	
Ngā-kwon-hnyat	<i>Chela sardinella.</i>	

Ngā-kyā	<i>Datnioides polota.</i>	
Ngā-kyā-mā	<i>Torotes microl-pis.</i>	
Ngā-kyin	<i>Cirrhinna mrigula.</i>	
Ngā-kyouk-hpā	<i>Eretistes kara.</i>	
Ngā-kyoung-mā-sā	<i>Ambassis nalu.</i>	
Ngā-la-wā	<i>Barilius guttatus.</i>	
Ngā-lh	<i>Osteochilus chalybeatus.</i>	
Ngā-leh-hpyu	<i>Amblypharyngodon mola.</i>	
Ngā-lē-toung	<i>Barbus apogon.</i>	
Ngā-lu	<i>Labeo angra.</i>	
Ngā-lēk-kyouk	<i>Rhinobates granulatus.</i>	
Ngā-lēk-pyā	<i>Holacanthus annularis.</i>	
Ngā-lōn-bān	<i>Anguilla bicolor.</i>	
Ngā-lōng	<i>Mogil subviridis.</i>	
Ngā-lowah	<i>Barbus chola.</i>	
Ngā-lēk-pyā	<i>Holacanthus annularis.</i>	
Ngā-mān-haing	<i>Rhinobates granulatus.</i>	
Ngā-mān-dor	<i>Perilampas alpar.</i>	
Ngā-mān-kyor	<i>Squalus tigrinus.</i>	
Ngā-mān-kyweh	<i>Zugana Blockii.</i>	
Ngā-mi-loung	{ <i>Perilampas lambuca.</i> <i>Badis Buchananii.</i>	
Ngā-mu	<i>Stromateus sinensis.</i>	
Ngā-mye-n-kōn-bān	<i>Eutropiichthys vacha.</i>	
Ngā-myi-meh	<i>Systomus.</i>	
Ngā-myit-chyn }	<i>Labeo ruhita.</i>	
Ngā-myit-tsan-mi }		
Ngā-mywē-do	<i>Rhynchobdella aculeata.</i>	
Ngā-mywē-do-wet-toung	<i>Mastacimbalus zebrius.</i>	
Ngān	<i>Naja elaps</i>	Hamadryad.
Ngā-nan-gyounge	<i>Gagata cernia.</i>	
Ngā-na-thān	<i>Callichrous macrophthalmus.</i>	
Ngān-dor gya }	<i>Bungarus fasciatus.</i>	
Ngān-wā }		
Ngā-nek-kyā	<i>Rohiv Brangeri.</i>	
Ngā-nek-pyā	<i>Labeo calbasu.</i>	
Ngā-ni-pyā	<i>Labeo nandina.</i>	
Ngā-nouk-thwā	<i>Macrones leucophasis.</i>	
Ngān-pōk	<i>Naja elaps.</i>	
Ngān-thān-gwyn-zōk	<i>Bungarus fasciatus.</i>	
Ngā-ong-dōng	{ <i>Labeo calbasu.</i> <i>L. nandina.</i>	
Ngā-pa-ni	<i>Lutianus Johnii.</i>	
Ngā-pe (?)	<i>Labeo gonius.</i>	
Ngā-pā-moung	<i>Stromateus niger.</i>	Pomfret.
Ngā-pā-thwōn	<i>Scatophagus Argus.</i>	
Ngā-pā-zwōn	<i>Psillus argenteus.</i>	
Ngā-pan-ma	<i>Amblypharyngodon Atkinsonii.</i>	
Ngā-phoung-yo	<i>Hemiramphus ectunctio.</i>	
Ngā-pi-mā	<i>Equula edentula.</i>	
Ngā-pong-nā	<i>Polynemus paradiseus</i>	Mango-fish.
Ngā-pet-lek	<i>Macrones leucophasis.</i>	
Ngā-pēng-neh-sē	<i>Clupea longipes.</i>	
Ngā-pōk-thyn	<i>Sciæna coitor.</i>	
Ngā-poung-yo	<i>Belone cancila.</i>	
Ngā-prōn-ka (Arakan)	<i>Teuthis.</i>	
Ngā-pu-zwōn	<i>Psillus argenteus.</i>	
Ngā-pyān	<i>Exocetus nigripinnis</i>	Flying fish.

Ngā-pyek	{	<i>Caranx lysan.</i>	
		<i>Sciaenoides pama</i>	Whiting.
Ngā-pyn-thaik-kouk		<i>Trichogaster fasciatus.</i>	
Ngā-rui (?) (Arakan)		<i>Sillago sihama.</i>	
Ngā-sa-bā-sā		<i>Therapon jarbua.</i>	
Ngā-sa-ki (Arakan)		<i>Haplochromis panchar.</i>	
Ngā-shin		<i>Pneumobranchus.</i>	
Ngā-shin-ni		<i>Amphipneus euchia.</i>	
Ngā-shu-gyi		<i>Platycephalus insidiator.</i>	
Ngā-shyn-ni		<i>Drepane punctata.</i>	
Ngā-ta-dum		<i>Sciæna coitor.</i>	
Ngā-tau-ywet		<i>Megalops cyprinoides.</i>	
Ngā-ta-khwōn-khā		<i>Trichinurus haumcla.</i>	
Ngā-ta-si		<i>Barbus apogon.</i>	
Ngā-tat-weh		<i>Pristis</i>	Saw-fish.
Ngā-ta-yaw		<i>Polynemus tetradactylus.</i>	
Ngā-tha-bōk		<i>Gobius giuris.</i>	
Ngā-thaing		<i>Cutta Buchananii.</i>	
Ngā-tha-leh-tō	{	<i>Lepidocephalichthys Bermmorei.</i>	
		<i>Acanthopsis choïrrhynchus.</i>	
Ngā-tha-louk		<i>Clupea ilisha</i>	Hilsa.
Ngā-theh-tō		<i>Erethistes conta.</i>	
Ngā-then-bor-pouk		<i>Muriceon telabon.</i>	
Ngā-yat-ni		<i>Barbus.</i>	
Ngā-yen-bonng-zā		<i>Aspidoparia morar.</i>	
Ngā-young	{	<i>Arius julius.</i>	
		<i>A. Burmannicus.</i>	
Ngā-zyn		<i>Perilampus.</i>	
Ngā-zyn-hpyu		<i>Systemus.</i>	
Ngā-zyn		<i>Mugil corsula.</i>	
Ngā-zyn-byun		<i>Nuria daurica.</i>	
Ngā-touk-tu		<i>Serranus Malabaricus.</i>	
Ngā-tsān-hlā		<i>Geryes filamentosus.</i>	
Ngā-wā		<i>Chrysophrys berda.</i>	
Ngā-wet-sāt		<i>Datnioides filamentosus.</i>	
Ngā-wun		<i>Halicornes dugong</i>	Sea-cow.
Ngā-yān		<i>Ophiocephalus striatus.</i>	
Ngā-yān-daing		<i>O. marulius.</i>	
Ngā-yān-goung-tō		<i>O. striatus.</i>	
Ngā-yān-pa-naw		<i>O. gachua.</i>	
Ngā-yān-thēng-ōng		<i>O. punctatus.</i>	
Ngā-young		<i>Arius Burmanicus</i> or <i>julius.</i>	
Ngā-yeng-bho (Tavoy) . . .		<i>Mastacembalus zebrainus.</i>	
Ngā-zyn		<i>Mugil corsula.</i>	
Ngā-zyn-yaing		<i>Macrones vittatus.</i>	
Ngā-zyn-zāt		<i>Ambassis baculis.</i>	
Ngā-zyn-zēng		<i>Macrones cavasius.</i>	
Ngā-zyn-zat		<i>Amblypharyngodon mola.</i>	
Ngā-yeng-boung-sā		<i>Aspidoparia morar.</i>	
Ngān		<i>Anser</i>	Goose.
Ngā-wā		<i>Chrysophrys berda.</i>	
Ngā-wet-mā		<i>Datnioides polita.</i>	
Ngā-wet-sāt		<i>Gerres filamentosus.</i>	
Ngu		<i>Osmotreron</i>	Green pigeon.
Ngong		<i>Turnix</i>	Quail.
Ngwē			Silver.
Ni-lā			Sapphire.
Oo-suf-foo (Arakan)		<i>Eleotris caperata.</i>	

Onk-chyn	<i>Buceros</i>	Hornbill.
Pa-dāt	<i>Liolepis guttatus</i>	Herbivorous lizard.
Pa-dōng . . . . .	. . . . .	Carpenter Bee.
Pa-lōk	<i>Teredo</i>	Ship-worm.
Pān-bwen-sōk	<i>Nectarinia</i>	Honey-sucker.
Pān-sōk	<i>Pagurus</i>	Hermit-crab.
Pattā-myā . . . . .	. . . . .	Ruby.
Payen . . . . .	. . . . .	Amber.
Pa-ywet-hsək . . . . .	. . . . .	Ant.
Pazyu	<i>Libellula</i>	Dragon fly.
Pyn-ku . . . . .	. . . . .	Spider.
Pēng-nyen . . . . .	. . . . .	King-fisher.
Peng-dān-theh	<i>Phyllornis Hardwickii</i> .	
Phyan	<i>Lutra</i>	Otter.
Phō-goung }	<i>Megalaima Hodysoni</i> .	
Pō-goung }		
Pō-hāt	<i>Blatta</i>	Cock roach.
Pō-louk-lan }		Mosquito or Gnat larva.
Pō-souk-ltō }		
Pōk-thēn	<i>Calotes</i>	Blood-sucker.
Pōk-thēn-byān	<i>Draeo</i>	Flying lizard.
Pōk-wā	<i>Ixos</i>	Yellow bulbul.
Pwē	<i>Rhizomys civereus</i>	Bamboo rat.
Pyā-goung	<i>Apis</i>	Wild Bee.
Pyān-hlwā	<i>Chelidon urbica</i>	Martin.
Pyān thwā	<i>Cypselus butussiensis</i>	Palm swift.
Pyā-tu }		Mason wasp.
Pyā-du }		
Pyā-twē-hnet }	<i>Nyctiornis Athertoni</i> .	
Pyā-tu-hnet }		
Pyn-leh-kyet-tu-yuē	<i>Larus brunneicephalus</i>	Gull.
Pyn-leh-ngā-lhpoung-yō	<i>Hemiramphus</i>	Gar fish.
Pyn-leh-ngā-zyn-zāt	<i>Equula ruconius</i> .	
Pyn-leh-ngā-byē-mā	<i>Badis Buchananii</i> .	
Pyn-leh-paw-linet	<i>Rhynchops albicollis</i>	Scissors bill.
Pyn-leh-pō	<i>Holothuria</i>	Sea cucumber.
Pyn-leh-ngā-hpyu-thōk	<i>Equula ruconius</i> .	
Pyoung	<i>Bos gaurus</i>	Gour.
Sā . . . . .	. . . . .	Sparrows and Finches.
Sain	<i>Bos Sondaicus</i>	Banting.
Sa-pa-gyi	<i>Python</i>	Rock snake.
Shāt	<i>Venus. Cardinus</i> .	
Shwē . . . . .	. . . . .	Gold.
Shwē-hpyn . . . . .	. . . . .	Platinum.
Shyn	<i>Sciurus</i>	Squirrel.
Shyn-pyān	<i>Pteromys</i>	Flying squirrel.
Swōn-goung-lpyu	<i>Haliastur Indus</i>	Brahmince kite.
Swōn-pōk	<i>Milvus</i>	Kite.
Syt-sa-li	<i>Dendrocygna Awauree</i>	Whistling teal.
Ta-ngāt	<i>Donax</i> .	
Ta-ngō . . . . .	. . . . .	Chiton.
Ta-ra-shu	<i>Tapirus Malayanus</i> .	
Tē-lē-kyouk . . . . .	. . . . .	Antimony.
Ti-ti-dwōt	<i>Hoplopterus ventralis</i>	'Teet-tee-ree.'
Tha-bēk-lweh	<i>Copsychus saularis</i>	The 'Diāl.'
Tha-byā	<i>Placuna</i> .	
Tha-li-gā	<i>Eulabes Javanensis</i> .	
Tha-men	<i>Panolia Eldi</i>	Munipur stag.

Tha-mi	<i>Calyptrea</i>	Cup and saucer limpets.
Thān		Intestinal worm.
Tha-ngō		Chiton.
Thān-kyouk		Ironstone.
Thān-laik-kyouk		Loadstone.
Thān-taik-kyouk		Iron pyrites.
Thēng-kyā	<i>Circus melanoleucus.</i>	
Thēng-kyet-mā	<i>Astur badius.</i>	
Then-twōn	<i>Trochus.</i>	
Then-khwē-jyat	<i>Manis</i>	Pangolin.
Tho	<i>Ovis</i>	Sheep.
Thwē-shi	<i>Pomatorrhinus olivaceus.</i>	
Thyt-tonk		Wood-peeker.
Ti		Earth-worm.
Tor-ji-len	<i>Compsosoma radiatum</i>	Rat snake.
Tor-hsyn	<i>Elephas Indicus</i> (wild).	
Tor-khiwē	<i>Canis rutilans.</i>	
Tor-kyet	<i>Gallus ferrugineus.</i>	
Tor-lèk }	<i>Manouria emys.</i>	
Toung-leik }		
Tor-tsèk	<i>Nemorhædus</i>	Goat antelope.
Tor-wet	<i>Sus cristatus</i>	Wild boar.
Tor-wūn-beh }	<i>Sarkidiornis melanotis.</i>	
Tor-wūn-bai }		
Touk-teh	<i>Gecko guttatus</i>	The Gecko.
Toung-pi-sōk	<i>Upupa longirostris</i>	Hoopoe.
Tsèk	<i>Capra</i>	Goat.
Tsāt	<i>Rusa Aristotelis</i>	Sambur.
Tsweh	<i>Tupaia.</i>	
U-doung	<i>Pavo muticus.</i>	
Wā-lpa-lē	<i>Phenicophaus tristis.</i>	
Wā-goung-hnet	<i>Garrular</i>	Babbling thrush.
Wet-wun	<i>Ursus Tibetanus</i>	Bear.
Wun-bō	<i>Pelecanus.</i>	Pelican.
Wun-lek	<i>Haliaeetus</i>	Fishing Eagle.
Wun-lō	<i>Aquila</i>	Eagle.
Yē-kyet	<i>Octopus</i>	Cuttle-fish.
Yē-kyet-mā	<i>Rallus indicus</i>	Rail.
Yē-bō	<i>Gerris.</i>	
Yē-lmō		Sponge.
Yē-kywet		Water rats.
Yē-nan		Petroleum.
Yen-boung zā	<i>Aspidoparia morar.</i>	
Yē-paw-ngā	<i>Perilampas atpar.</i>	
Yōng	<i>Tragulus. Lepus</i>	Mouse-deer. Hare.
Yonk-thwā	<i>Unio</i>	Freshwater mussels.
Young-yin		Hornbills (large).
Young-yin-net	<i>Aceros subruficollis.</i>	
Yyt	<i>Eupoamus.</i>	
Za-yet	<i>Acridotheres ginginianus.</i>	Bank mynah.
Za-yet-mouk-tyñ	<i>A. fuscus</i>	Mynah.
Za-yet-kye zā	<i>Sturnopastor contra</i>	Pied mynah.
Zi-kwet	<i>Glaucidium cuculoïdes.</i>	Cuckoo owl.
Zyn-yaw	<i>Limosa agocephala.</i>	

APPENDIX C.

A SHORT GLOSSARY OF ZOOLOGICAL TERMS.

Acephalous.	Having no head.
Acetabula.	The suckers on the arms of <i>Cephalopods</i> .
Acerodont.	Teeth are so called when attached by their base to the edge of the jaw.
Actinula.	The polypoid embryo into which the eggs of some <i>Hydroïda</i> are developed.
Agamic.	Non-sexual reproduction, as <i>budding</i> , or <i>fissuring</i> .
Alternation of generations.	Where an animal produces a progeny not resembling itself, but which resemblance returns in two, three, or four generations. So that two, three, or four lives go to form a species, each intermediate form being the result of <i>development</i> , as distinguished from <i>reproduction</i> .
Amphicœlous.	Vertebrae are so called, when concave at both ends.
Analogy.	Similarity of function without correspondence of parts. For example, the functions of the stomach of an animal are in part analogous to those of the roots of a plant.
Anchylosis.	The union of two or more bones.
Antennæ.	Jointed organs of sensation, before or between the eyes of the Arthropoda.
Anus.	The external termination of the intestines.
Astragalus.	A tarsal bone articulating with the <i>tibia</i> .
Atavism.	Reversion, or the appearance in an individual of a character derived not from the parents, but from a remote ancestor.
Atlas.	The first vertebra of the neck.
Axis.	The next vertebra to the <i>Atlas</i> .
Biology.	The science of living beings, animal or vegetable.
Branchiæ.	Organs analogous to the lungs of mammals, wherein the blood is oxygenized.
Bronchi.	The branches of the windpipe.
Byssus.	The filaments by which some molluscs secure themselves to fixed objects.
Cæcum.	A blind sac opening into the <i>duodenum</i> .
Cainozoic.	The Tertiary period of geology.
Calcaneum.	The heel bone or <i>os calcis</i> .
Carapace.	The dorsal shield of <i>Crustacea</i> and <i>Chelonia</i> .
Ceratode.	The horny substance of sponges.
Cercariæ.	The tadpole-like larvæ of <i>Trematode</i> worms.
Cere.	The naked skin at the base of the bill of some birds.
Cerebellum.	The posterior portion of the brain.

Cheke.	The anterior thoracic legs or claws of <i>Crustacea</i> .
Chitine.	The substance composing the elytra of beetles.
Chlorophyll.	The green colouring matter of leaves, and found also in the <i>Infusoria</i> and <i>Turbellaria</i> .
Chyle.	The nutrient portion of the chyme, absorbed into the blood.
Chyme.	The digested food as it passes from the stomach.
Clavicle.	The collar-bone.
Cloaca.	The common excretory opening of birds and reptiles.
Coceyx.	The anchylosed tail bones in some birds and mammals.
Cœlenterata.	Sponges, Hydrozoa and Corals.
Colon.	The large intestine opening into the <i>rectum</i> .
Columella.	The axis of a spiral univalve.
Commensal.	An animal that lives with, but does not feed on, its host.
Condyle.	The articulating surface of a bone.
Ctenoid.	Scales of fish are so called which have a toothed hinder margin.
Cyeloid.	Scales of fish are so called which have entire margins.
Diastema.	An interval in the line of the teeth.
Digitigrade.	An animal that walks on its toes, as a cat.
Dioecious.	Animals or plants in which the sexes are separate individuals.
Dolicocephalous.	When the length of the cranium exceeds its breadth.
Duodenum.	The first portion of the small intestine.
Elytra.	The wing-covers of beetles.
Embryo.	A young animal or plant before it is released from the egg, womb, or seed.
Eocene.	The earliest Tertiary period.
Epiglottis.	A cartilaginous valve protecting the <i>larynx</i> .
Epiphragm.	The hardened secretion which closes the shell of dormant snails.
Epithelium.	A thin membrane investing mucous surfaces.
Evolution.	The descent by modification of species from a common ancestor.
Ganglion.	A thickening of a nerve, or a nervous centre.
Gemmation.	Reproduction by means of a bud.
Gland.	An organ that secretes its peculiar fluid from the blood, as the liver does gall. Some advanced thinkers regard the action of the brain as analogous to that of a gland, its product being the phenomena, comprehended under the term ' <i>mind</i> '; hence the relation subsisting between the brain and the mental power of an individual, and the dependence of mental and moral disease, on the physical disease or degeneracy of the mental organ or <i>brain</i> .
Glottis.	The opening of the <i>larynx</i> .
Hallux.	The great toe.
Haustellum.	The suctorial proboscis of insects.
Hectocotylus.	An arm of a cuttle-fish modified into a free reproductive organ, and once regarded as a parasitical worm, residing on the female cuttle-fish.
Hermaphrodite.	Having the sexes united in the same individual.
Heterocercal.	The tail of a fish is so called when its lobes are unequal, as in a shark.
Homocercal.	A tail of a fish is so called when its lobes are equal, as in most fishes.
Homology.	Identity of structure, notwithstanding diversity of form or function; for example, analogy there is none, but a strong homology, between the horn of a rhinoceros and the hair of a man's head.
Hydatid.	A watery sac produced by <i>entozoa</i> .
Hyoid.	The bone of the tongue.
Ileum.	The small intestine opening into the <i>colon</i> .
Imago.	The perfect insect, as a butterfly.
Ingluvies.	The ' <i>crop</i> ' of birds, a dilatation of the <i>œsophagus</i> .
Instinct.	The unconscious cause of action as distinguished from the reflective cause.

Larva.	An indefinite term for an early stage of animals which undergo metamorphosis after quitting the egg.
Larynx.	The upper part of the windpipe.
Life.	The coordination of the organized tissues, the disturbance of which means disease, and the arrest or disruption of which is death.
Lores.	A stripe between the bill and eye in birds.
Materialist.	One who, rejecting the supernatural intervention, or <i>Deus ex machina</i> of the poets, refers all natural effects to natural causes.
Maxilla.	The upper jaw of vertebrates.
Mesentery.	The membrane connecting the small intestines.
Mesozoic.	The secondary period of Geology, from the Trias to the Chalk inclusive.
Metatarsal.	The bones which intervene between the <i>tarsus</i> and toes.
Micropyle.	An aperture in the ovum by which fertilization is effected.
Mimetic.	The resemblance borne by one group of animals to another.
Miocene.	The middle Tertiary epoch.
Molecule.	The smallest and ultimate division of matter.
Monœcious.	An animal or plant in which the sexes are united in the same individual.
Monomyary.	A bivalve shell, provided with a single muscle, as an oyster.
Morphology.	The history of the modification of form of an organ, independent of function.
Muffle.	The naked part of the nose in ruminants.
Nauplius.	The earliest larval stage of <i>Crustacea</i> .
Nectocalyx.	The swimming-bell of a <i>Medusa</i> .
Notochord.	The embryonic precursor of the spinal marrow.
Nymph.	The active pupa of some insects.
Odontophore.	The <i>radula</i> , or teeth-bearing band of the mollusca.
Œsophagus.	The gullet, connecting mouth and stomach.
Opisthocelous.	Vertebræ which are concave behind only.
Orthognathous.	When the jaws do not project, and the teeth are perpendicular; used in opposition to Prognathous.
Oscula.	The large exhalent orifices of a sponge.
Ostioles.	The smaller inhalent orifices of a sponge.
Otoliths.	The internal ear-bones of fishes. Also calcareous bodies, of auditory function, among the lower animals.
Ovary.	The organ wherein the <i>ova</i> are produced.
Ovipositor.	A tubular organ possessed by many insects for placing their egg in security.
Ovoviviparous.	Animals are so called which hatch their eggs within their own bodies, as some snakes and fishes.
Palæozoic.	The oldest division of fossiliferous rocks, from the Laurentian to the Permian inclusive.
Pallium.	The mantle of mollusca.
Pallial sinus.	The impression on the shell which marks the extent and position of the siphonal tubes.
Parthenogenesis.	Non-sexual reproduction, including budding and like methods.
Peritreme	The mouth of a univalve shell.
Phalanges.	The bones of the digits.
Phragmacone.	The conical endoskeleton of a Belemnite.
Placoid.	The name given to fishes having bony plates, grains or spines for scales.
Plantigrade.	Animals which walk on the soles of the hind feet, like a bear.
Plasma.	The part of the blood wherein the corpuscles float.
Plastron.	The ventral shield of <i>Chelonia</i> .
Proœcœlous.	Vertebræ are so called which are concave in front only.
Proscœlex.	The earliest larval stage of a <i>Cestode</i> .
Protoplasm.	The material basis of life. A compound of hydrogen, oxygen, nitrogen and carbon, and very similar to <i>protein</i> and <i>albumen</i> .

Protozoa.	The lowest forms of animal life.
Proventriculus.	The inferior dilated portion of the œsophagus in birds.
Pupa.	The stage in insect development which precedes the final or imago state.
Quadrate bone.	A bone connecting the upper and lower jaws of reptiles and birds.
Radius.	One of the bones of the forearm.
Remiges.	The quill feathers of a bird's wing.
Sacrum.	Anchylosed vertebrae to which the pelvic bones are attached.
Sarcodæ.	Protoplasm of the <i>Protozoa</i> .
Seolæx.	The second larval stage of a <i>Cestodæ</i> .
Scutes.	The bony dermal scales of crocodiles.
Segmentation.	Yolk-division, the breaking up of the yolk into cells as a result of fecundation.
Sesamoid bones.	Small bones developed in the tendons.
Sessile.	With a broad base, as opposed to 'stalked.'
Swim bladder.	The air-bladder present in some fish, the homologue of the lungs of a mammal, but not analogous in function.
Tarsal.	The small bones of the feet of mammals.
Teleology.	The doctrine of design as evinced by structure.
Tibia.	The shin-bone of mammals, birds, and reptiles.
Ulna.	One of the bones of the forearm.
Umbo.	The boss or beak near the hinge of a bivalve.
Wallace's line.	The division between the Malayan and Austro-Malayan regions. It passes between Bali and Lombok through the Macassar Straits dividing Borneo from Celebes to the North End, between Mindanao and Gilolo.
Zoëa.	A larval stage in the higher <i>Crustacea</i> .

Si qua videbuntur chartis tibi, Lector, in illis,
 Sive obscura nimis, sive Latina parum ;
 Non meus est error ; nocuit librarius illis,
 Dum properat versus annumerare tibi.
 Quod si non illum, sed me peccasse putabis ;
 Tunc ego Te credam, cordis habere nihil.

Mart. Lib. I. VIII.



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BURMA,
ITS
PEOPLE AND PRODUCTIONS.

VOL. II.
BOTANY.

BURMA,

ITS

PEOPLE AND PRODUCTIONS;

OR,

NOTES ON THE FAUNA, FLORA AND MINERALS

OF

TENASSERIM, PEGU AND BURMA.

BY

REV. F. MASON, D.D., M.R.A.S.,

CORRESPONDING MEMBER OF THE AMERICAN ORIENTAL SOCIETY, OF THE BOSTON SOCIETY OF
NATURAL HISTORY, AND OF THE LYCEUM OF NATURAL HISTORY, NEW YORK.

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REWRITTEN AND ENLARGED

BY

W. THEOBALD,

LATE DEPUTY-SUPERINTENDENT GEOLOGICAL SURVEY OF INDIA.

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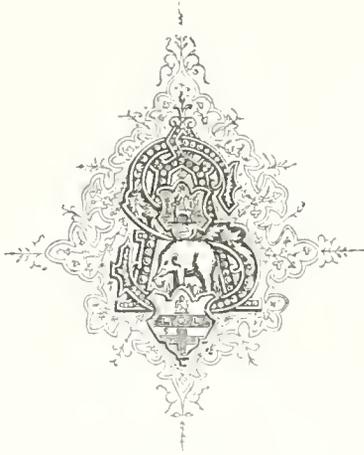
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PREFACE TO THE SECOND VOLUME.

In the Preface to the First Volume I briefly alluded to the different arrangement of the present from previous editions of this work, one reason for which being the much larger number of species of animals and plants now enumerated. The difference in this respect, between the edition of 1860 and the present, may be thus contrasted :

	Edition of 1860.	1883.
ANIMALS—Invertebrata	237	3694
.. Vertebrata	786	1799
Animals	1023	5493
PLANTS—Cryptogams	130	793
.. Monocotyledons	291	880
.. Dicotyledons	1207	3370
Plants	1631	5043
Total Animals and Plants	2654	10,536

The above figures will serve to explain the great inequality in the treatment of some Classes of animals and plants. It would have been wholly out of the question within the limits at my disposal to have attempted the same amount of detail in all cases, that I have ventured on in some. With the Invertebrata for example, little has been attempted, beyond a list of species, and their distribution, without any attempt at descriptive notices. The number of species of Invertebrata now given is alone sufficient to show how impossible, in a work of this character, any attempt at

specific description would have been. On the other hand, in the matter of Fish, from the importance of the subject, an attempt has been made to give the more salient characters of the species hitherto recorded from Burma, though such abbreviated descriptions are never very satisfactory. To those, however, who have not access to the valuable works of Dr. Day on the Fish of Burma, it is hoped that even these scanty extracts may be of service.

In Botany, likewise, it will be noticed that some orders are very incomplete; but on the whole our knowledge of the Flora of Burma is more advanced than of its Fauna, except perhaps as regards the Vertebrata; and foremost among local workers, to whom we are indebted for a systematized knowledge of the Burmese Flora, stands out the name of the late S. Kurz, whose papers on the Burmese Flora in the Journal of the Asiatic Society of Bengal constitute the groundwork of the present volume.

Since writing the Preface of the First Volume, I have received a work which, as I have quoted it occasionally, I may as well here refer to: 'A Manual of Indian Timbers, by J. S. Gamble. Calcutta, 1881.' The manifest ability of this work needs no testimony from me, and it will doubtless be hailed as an acceptable contribution to Burmese botany from the forester's point of view. The names of Kurz and Brandis are of course prominent in it; but if a candid critic may venture to say so, its main defect seems to be its departmental character, as we are told that the descriptions were mostly "dictated by Dr. Brandis." This may, perhaps, have the recommendation of recording the experience and ideas of that veteran forester, but it is a plan destructive of originality, and by no means calculated to promote independent research, or that exposure of past errors, either scientific or departmental, which one not unreasonably looks for in a new work of this sort. To give a single instance, I may point out that though the rate of growth of Teak is treated at great length (I had nigh said *ad nauseam*), yet the important question of girdling, and its pernicious effect on the timber of trees so treated, is not so much as referred to. Naturally this view of the results of girdling is not likely to be prominently set forth in a work

largely dictated by the head of a Department which persists in maintaining that pernicious practice.¹

Another work which all interested in the development of the industrial products of Burma would do well to peruse is entitled 'New Commercial Plants and Drugs,' Christy & Co., 155, Fenchurch Street, London, but the Botany has already reached to too great a length to permit more than a passing allusion to a topic which might almost claim a volume to itself.

I do not think I can better close than by quoting some remarks of Dr. Prior, in his introduction to the 'Popular Names of British Plants,' since, *mutatis mutandis*, they are doubtless as true of many of the plants of Asia, as those of Europe. After glancing at the neglect of the popular names of plants by scientific Botanists, Dr. Prior² goes on: "Besides, admitting to the full all that can be urged against them (popular names) from a purely botanical point of view, we still may derive both pleasure and instruction from tracing them back to their origin, and reading in them the habits and opinions of former ages. In following up such an analysis, we soon find that we are travelling far away from the humble occupation of the herbalist, and are entering upon a higher region of literature, the history of man's progress, and the gradual development of his civilization. Some of the plants that were familiar to our ancestors in Central Asia bear with us to this day the very names they bore there, and as distinctly intimate by them the uses to which they were applied, and the degree of culture which prevailed where they were given, as do those of the domestic affinities the various occupations of the primeval family. . . . The most interesting, in this respect, of the names that have come down to us, are those which date from a time antecedent to the settlement of the German race in England, names which are deducible from Anglo-Saxon roots, and identical, with allowance for dialectic peculiarities, in all the High and Low German and Scandinavian languages, and, what is particularly

¹ For further remarks on this subject, see Appendix A, Part II. p. 682.

² Introduction, *l. c.* p. x.

worthy of our attention, each of them expressive of some distinct meaning. These will prove, what with many readers is a fact ascertained upon other evidence, such as the contents of sepulchral mounds, traditional laws, and various parallel researches, that the tribes which descended upon Britain had entered Europe, not as a set of savages, or wandering pastoral tribes, or mere pirates and warriors, but as colonists, who, rude as they may have been in dress and manners, yet, in essential points, were already a civilized people. It will be seen at the same time that they must have come from a colder country; for while these names comprehend the Oak, Beech, Birch, Hawthorn, and Sloe trees, that extend far into Northern Asia, they do not comprise the Elm, Chestnut, Maple, Walnut, Sycamore, Holly, or any evergreen, except of the Fir tribe, or Plum, Pear, Peach, or Cherry, or any other fruit-tree except the Apple. For all these latter they adopted Latin names, a proof that at the time when they first came in contact with the Roman provincials on the Lower Rhine, they were not the settled inhabitants of the country they were then occupying, but foreigners newly arrived there as colonists or conquerors, from a country where those trees were unknown. It is remarkable that the early Greek writers make no mention of any German tribes, but represent the Scythians as the next neighbours of the Celts, and this difference in the names of one set of trees and the other, and the names which they adopted being Roman and not Celtic, suggests that the Germans had come down from the north-east not long before the Christian era, and intruded themselves, as a wedge between those two more anciently recorded nations.

“There seems to be much misapprehension in respect to this great movement of the Eastern races which broke up the Roman empire. The subject is one into which it would here be out of place to enter fully, and it has been largely treated by J. Grimm in his admirable *Geschichte der Deutschen Sprache*. But even in the following vocabulary we shall see evidence of the continuous advance of a civilized race from the confines of India to these islands, and nothing indicative of a great rush from the North of wild hordes bent upon robbery and destruction, as it has been

usually represented to have been. The gradual drying of the Caspian Sea left the interior of Asia more and more barren, the knowledge of the useful metals facilitated the conquest of the savages of the West, and it is likely that predatory bands of Huns and Turks, and allied nomadic nations, accelerated the movement by rendering the labours of agriculture less remunerative. Thus the migration, being one that proceeded from constantly acting causes, extended over many centuries. Let us lay aside all prepossessions, and inquire what light is thrown by the following vocabulary upon the real state of the Germanic tribes at that period.

“In these mere names of plants, setting aside all other sources of information, we discover that these people came from their homes in the East with a knowledge of letters, and the useful metals, and with nearly all the domestic animals; that they cultivated Oats, Barley, Wheat, Rye, and Beans; built houses of timber, and thatched them, and, what is more important, as showing that their pasture and arable land was intermixed and acknowledged as private property, they hedged their fields, and fenced their gardens. Cæsar denies this; but the frontier tribes, with whom he was acquainted, were living under certain peculiar Mark laws, and were in fact little else than an army on its march. The unquestionable native, and not Latin or Celtic origin of such names as Beech and Hawthorn, or Oats and Wheat, proves that although our ancestors may have been indebted to the provincials of the empire for their fruit-trees, and some other luxuries, for a knowledge of the fine arts, and the Latin literature, and a debased Christianity, the more essential acquirements upon which their prosperity and progress as a nation depended were already in their possession.

“Like the scattered lights that a traveller from the wilderness sees here and there in a town that lies shrouded in the darkness of night in a valley beneath him, and the occasional indistinct and solitary voice of some domestic animal, that for a moment breaks the silence, these distant echoes of the past, these specks that glimmer from its obscurity, faint as they are, and few and far between, assure us that we are contemplating a scene of human industry, and peace, and civilization.

“In this respect the inquiry is one of the highest interest. In another it is probable that some who consult these pages will be disappointed. The names have usually been given to the plants from some use to which they were applied, and very few of them bear any trace of poetry or romance. In short our Sweet Alisons¹ and Herb True-loves,² our Heartseases,³ Sweet Cicelies,⁴ and Sweet Williams,⁵ resolve themselves into sadly matter-of-fact terms, which arose from causes very different from the pretty thoughts with which they are now associated, and sometimes, as in the case of the Forget-me-not,⁶ were suggestive of very disagreeable qualities.”

The above remarks are sufficient to indicate what a vast field is open to the industrious etymologist in Burma, though the Editor's ignorance of Burmese entirely forbids his following up the subject, but it is to be hoped that sufficient has been said to induce many properly qualified students to trace out and illustrate the origin and significance of the numerous curious Burmese names of plants, which seem so sadly to want explanation, as, for example, such names as ‘Myouk-meng-thwē-gay’ or ‘Po-theng-mā-myet-chouk.’

I must here also (in addition to my remarks elsewhere) record my grateful acknowledgments to the Rev. C. Parish, for the valuable assistance he has so ungrudgingly rendered, not only in preparing and revising the lists of Algæ, Mosses, Ferns, and Orchids, which would otherwise have been far less satisfactory, but also for much information and advice of a more general character, though I may add that for any errors or opinions expressed in any other parts of the work I am alone responsible, since, though my friend and coadjutor is a clergyman of a breadth and liberality of view, worthy of his scientific and literary attainments, he may justly claim not

¹ *Alison*, a corruption of *Alyssum (maritimum)*, L., a plant smelling of honey.

² True-love, properly Tru-love, *Paris quadrifolia*, L., from the Danish *tro* faith and *love* promise, and not from faith in love, with which it has no etymological connexion.

³ Heart's-ease, *Viola tricolor*, L. Originally the clove (*Caryophyllum*), a warm cardiac medicine, therefore called ‘heart's ease,’ but subsequently transferred to the indigenous ‘gilliflower,’ *Dianthus caryophyllus*, L., and by a still wider deviation to the Wallflower, Pansy and Violet.

⁴ Sweet Cicely, *Myrrhis odorata*, Scop., a corruption of the Greek name of the plant *σεσελι*, *Seseli*!

⁵ Sweet William, *Dianthus barbatus*, L., from the French *willet*, corrupted to *Willy* and thence to William.

⁶ Forget-me-not, originally applied to *Ajuga Chamæpitys*, from the nauseous taste which it leaves in the mouth. For about fifty years, however, the name has been applied to *Myosotis palustris*, L., with the pretty legend of a drowned lover invented in association with this curious transfer.

to be identified with, nor held to approve of, all the sentiments and opinions expressed by myself in sundry passages throughout the work.

Sunt delicta tamen quibus ignovisse velimus:
 Nam neque chorda sonum reddit quem volt manus et mens
 Poscentique gravem, persæpe remittit acutum.

Horace ad Pisones.

Capital letters following a name are abbreviations: *C.* Creeper, *E.S.* Evergreen shrub, *E.T.* Evergreen tree, *S.* Shrub, *W.C.* Woody creeper, *S.S.* Scandent shrub, *S.P.* Scandent palm, *T.* Tree, meaning a leaf-shedding, as opposed to an evergreen tree. * before a plant signifies that it is cultivated or introduced and exotic.

A tolerably full list of vernacular names of plants is given in the Appendix, but many of these are somewhat doubtful, for the reasons adduced in the case of the vernacular names of animals, more especially from the variable and inconsistent modes of spelling and pronunciation adopted by different writers.

W. THEOBALD.

BEDFORD, 1883

The remark on page 147 of *Agave Americana* producing 'Socotrine aloes' is, of course, an error, and refers to 'Aloe Socotrina' on p. 128. The *Agave* is often called 'the Aloe' in India.

BURMA, ITS PEOPLE AND PRODUCTIONS.

BOTANY.

INTRODUCTORY REMARKS.

IN a work professing to follow a natural arrangement, commencing with the lowest forms of life and terminating with the highest, it might at first sight seem as though Botany should precede Zoology; but in reality this is not so, as the two sister kingdoms occupy more of a twin relationship to each other than a merely sequential one, and it has been observed touching this parallelism: "Hence the ingenious comparison of the Animal and Vegetable Kingdoms to two trees, of which the tops are far apart, while their roots interlace; or to two cones, the tops of which are occupied by the most perfect beings, while the juxtaposed bases are represented by a commingling of inferior organisms"; or, in the words of Linnaeus, "*Natura sociat plantas et animalia; hoc faciendo, non connectit perfectissimas plantas cum animalibus maxime imperfectis, sed imperfecta animalia et imperfectas plantas consociat. Naturæ regna conjunguntur in minimis.*" The above sentence is the verdict of science.

The more popular view is of course that the world was first clothed with vegetation, thereby becoming fitted for the support of animal life. This is the view set forth in the impressive record of Creation attributed to Moses, and of which the following paraphrase by Vincent Bourne is worth quoting for the delectation of the classical reader:—

*“Obductas sed adhuc celabant æquora terras,
Omnia pontus erant, jussit eum cedere fluctus
Omnipotens Opifex, undisque immensa profunda
Porrexit: jussæ subito, velut agmine facto,
Conglomerantur aquæ, madidum caput exerit undis
Fundus, et in valles hinc se submittit apertas,
Aërios illinc tollens ad sidera montes.
Inclusus sævit minitanti murmure pontus
Attollitque iras, et montes volvit aquarum.
Frustra! perpetuas Naturæ providus auctor
Opposuit moles, atque insuperabile litus,
Sed sparsim latis errabant flumina campis,
Manabant gelidi vario sinuamine fontes,
Dulci per pronas trepidantes murmure ripas;
Ne sitiens terra informes aperiret hiatus,
Ne sterilis foret, atque ignavæ campus arenae.”*

¹ Descriptive and Analytical Botany, by Le Maout and Decaisne, p. 981. Translated by Mrs. Hooker, and edited by J. D. Hooker, C.B.

Ecce! jubente Deo, flores et gramina terræ
 Induitur facies, rident vernantia prata,
 Arvaque parturiunt nullos experta labores.
 Exultat tellus, variâque ornata coronâ
 Ridet, et ambrosios circum diffundit odores.
 Scandunt umbrosæ suprema cacumina sylvæ,
 Montisque ascensum superant funesta cupressus,
 Et querens tectis, et pinus navibus aptæ.
 Interea zephyri, et spirantes molliter auræ
 Ludunt; dum rivi serpunt ad marginis oras,
 Pinguia qui circum glebis alimenta ministrant.
 Tunc hilares primum rubuerunt vitibus uvæ;
 Tempora tunc diversa anni confusa videres:
 Quicquid frugiferis profert auctumnus in horis,
 Quicquid promittunt renovati tempora veris
 Fructusque, et flores, fructus spes pulchra futuri,
 Ornabant gemino curvatos pondere ramos.”¹

Dr. Mason prefaces his account of the Botany of Burma by the following remarks:—

“Half a century ago. Dr. Buchanan, who accompanied Symes in his embassy to Ava, made a large collection of plants from the banks of the Irrawaddy. A dozen years afterwards Felix Carey, an English missionary, collected many curious and new plants indigenous to Burma, and sent them up to Roxburgh, at the Botanical Garden near Calcutta, who described them in his ‘Flora Indica.’

“After the first Burmese war Dr. Wallich went with Craufurd in his embassy to Ava, and his catalogue of plants, collected on this visit, contains 1650 species. Eight or ten years subsequent to Dr. Wallich’s visit, Dr. Griffith came to the

¹ Till now the waters hid the buried Earth,
 And all was Sea, when He, th’ Omnipotent
 Creator, gave command they should yield place,
 And in their midst the plains of Earth outspread.
 At once like serried ranks of ordered host
 The seas together draw, whilst from their depth
 Profound, the reeking Earth its bulk uprears,
 And spreading wide, with vallies fair between,
 The towering hills their rugged forms disclose.
 The Ocean now with angry murmur chafes,
 And gathering wrath, its billows onward rolls,
 In mountains piled. In vain, forsooth! since He,
 Th’ All-Provident, its certain barriers raised,
 And fixed the limits of its utmost shore.
 Now see! through spreading plains the rivers wind,
 And streamlets murmur o’er their pebbly beds,
 And many a grot its cooling tont distills,
 So no fell drought might parch that smiling scene,
 Nor Earth display a waste of barren sand.
 Again behold, at God’s creative word
 The meads with flowers, with trees the mountains clothed:
 Whilst joyous Nature seems around to smile,
 And many a flower exhales ambrosial store.
 The mournful eypress on the mountain side
 Its foliage dark displays, nor far removed
 The sturdy Oaks their foodful shade extend,
 And Pines, to serve the future Shipwright’s skill.
 Meanwhile around the circling Zephyrs play,
 Where grapes in swelling clusters load the vines.
 No varying seasons then demarked the year,
 But spring with autumn strove their gifts to blend.
 Whate’er a renovated spring can show,
 Whate’er rich autumn’s wont it is to yield,
 Of flower or fruit, fair earnest yet of more,
 In union strange combine to load the trees.

Tenasserim coast, and during a residence of fourteen months collected specimens of 1700 species of indigenous plants.

“Soon after the close of the second Burmese war, Dr. MacClelland was appointed Superintendent of Forests in Pegu, and in his Report on the Teak, notices all the principal timber trees in the country. More recently the Rev. C. Parish, Chaplain, Maulmain, has paid considerable attention to the botany of the country, and many of his collection have been described by Sir J. D. Hooker. He has given special attention to the ferns and mosses, which had previously been almost neglected.” Thus wrote Dr. Mason in 1860, but since then, giant strides have been made in digesting and extending the labours of the earlier pioneers. Dr. MacClelland was followed by Dr. Brandis as Conservator of Forests of Burma, and in 1862 that officer published a “List of specimens of some of the woods of British Burma,” embracing 113 species, of which about two-thirds were alone specifically determined. This, of course, was a hastily compiled list for the international exhibition, but it shows how little was known in those days of the resources of the Burmese forests, since the above number is only attained by including therein worthless woods such as Mōmakhā (*Salix*), Lapan (*Bombax*), Letkoh (*Stereulia*), Thapōn (*Ficus*), and some others, utterly without claim to rank among the useful timbers of the Province.

I refer therefore to them merely to show how vast and unexplored was the field that presented itself to the predecessors of the present race of Forest Officers, and how great was the task before them, of coping with the exuberant wealth of botanical products in that favoured region. This is no place to pass in review the labours of these men, but one among them, whose place knows him no longer, may be specified, as to him we owe, not only a full and well-digested account of the general Botany of Burma, but also the production of a work specially designed for use by Forest officers, and treating of the branch of botany more specially interesting to them. That man was Sulpiz Kurz, and the last-mentioned work was his “Forest Flora of British Burma,” which, with his numerous contributions to the pages of the Journal of the Asiatic Society of Bengal, constitutes the source wherefrom the present account of the botany of Burma is mainly drawn.

Dr. Mason thus concludes his preparatory remarks on the Botany of Burma: “When more attention has been paid to the geographical distribution of plants, the Burmese flora will probably show that the climate of the plains on this coast corresponds to one on the hills several thousand feet high on the other coast (*i.e.* of continental India).

“Roxburgh says that a species of oak, *Quercus fenestra*, is a native of the mountains in the vicinity of Silhet; on this coast the same species grows indigenous not fifty feet above the level of the sea. A gamboge tree, *Garcinia pictoria*, grows, he says, ‘on the highest parts of Wynaad,’ but the same tree grows at the foot of the hills in Tavoy, which border on tide waters. A species of willow he describes as ‘a native of banks of rivulets and moist places among the Circular mountains’; but we have a species of willow on this coast which is met on every stream before the influence of the tide ceases to be felt. The chestnut, *Castanea Indica*, he writes, ‘is a native of the hilly frontier of Bengal,’ but the chestnut of this country, *Castanea Martabanica*, grows nearly down to the sea-shore. Speaking of the wood-oil trees, Dr. Wright remarks: ‘In this neighbourhood, Madras, several species are found, but all are natives of hilly tracts forming the Balaghaut. In Pegu, where they abound, they occupy the plains.’ He refers all the species of *Fatua* to the mountains, but we have one that drops its curious winged fruit from cliffs that overhang the sea. *Ardisia humilis* is a common shrub at Tavoy, growing down to the plains, but its habitat on the other coast is ‘the Eastern slopes of the Neilgherries in subalpine jungle.’

“*Wrightea Walllichii*, Wright states, is found ‘on the slopes of the Neilgherries from about the middle of the ascent to the elevation of between 4000 and 5000 feet,’ but ‘the original specimens of this species were collected in the Tenasserim Province.’ A species of whortleberry is found from Tavoy to Toung-ngeng, while all the other species in India are found on the mountains. The rhododendrons are peculiarly extra-tropical plants, yet Mr. Parish found one in Tavoy, Mr. Lobb

another in Maulmain, and a third abounds between Toung-ngoo and the Red Karen table land. The pine is nowhere found at high temperatures, yet it is a common denizen of our forests from Maulmain to Toung-ngoo. The common English brake has been found by Mr. Parish as low as one thousand feet above the sea. The silver fern of Kamptschatka grows on the fort walls of Toung-ngoo, and a moss that Mr. Parish gathered from a tree in Maulmain has been found on mountains four thousand feet high in New Grenada."

No doubt the reason of the difference here indicated between the altitudinal range of the same or cognate species of plants in Burma and continental India, is due mainly to the superior humidity of the former province, the heated and dry low lands of the latter country not sufficing for many plants, which are not therefore met with before a considerable rise above the sea-level has been made, with a corresponding increase of humidity in the atmosphere. Increased moisture is naturally correlated with an increase in the vegetable garb of the land, and both vegetation and moisture react on and promote each other.

I have been myself wonderfully struck with the illustration of this fact, and its bearings on the climate of the country, afforded by the strip of hilly country east of the Tsittoung, below the frontier. All the hills here, over a thousand feet in height or thereabouts, are covered with the familiar 'bracken,' and a glorious thing it is to tramp through this familiar plant of our childhood, in the distant East. The climate, of course, is found to correspond to the indication the presence of this fern gives, and at night I have felt none too warm under a blanket in the month of April, when not 20 miles off, a sheet was as much as could be comfortably borne, the difference in altitude at either place being not more say than 1500 feet. At first sight the reason of this wondrous change in climate directly we cross the Tsittoung is not obvious, but it really depends on the geological structure of the country, or, at all events, in those places where the contrast is most marked. West of the Tsittoung is the broad alluvial plain traversed by the river, bounded by the system of hills of the Pegu range, composed of Tertiary sandstone very little disturbed. East of the Tsittoung the hills are composed of crystalline rocks, traversed by many trap dykes. Now these dykes cut the subterranean drainage, and thereby throw up numerous springs, which irrigate the surface naturally and diffuse abundant moisture, with a corresponding increase in the density of the vegetation and decrease in the mean temperature. The quality of the soil produced by the decomposition of these crystalline rocks may, no doubt, have a share in the result I have described, but it is most largely due, I feel convinced, to increased humidity. Take, for example, a section of the same sandstone range—the Pegu range—across the valley. A London square does not offer a greater contrast to the "Palm house" at Kew (*mutatis mutandis*) than do the arid outer slopes of the range, for years scathed by jungle fires, clearings and cultivation, to similar hills towards the central ranges, which have escaped the axe of the nomad cultivator, and are still clad with virgin forest, with its perennial springs, unimpaired by ruthless clearance over vast areas of Nature's kindly garb. To pass out of the arid region of these outer hills, in the hot season, into the cool and moist retreats of the inner hills, is like passing from purgatory into paradise, and if the trees cannot say as much in words, they indubitably demonstrate the fact by their looks, growth, and development, and Dr. Mason was therefore enunciating a simple axiom when he wrote: "The Flora reads a lesson on the climate of the country, which cannot be mistaken; and, in accordance with it, where pines and rhododendrons are found in Toung-ngoo, hoar frost is seen in January."

The present is an appropriate place for reviewing the various descriptions of Forest, as recognised by the Forest Department, and the trees which characterise them, as so ably described by Kurz in his Forest Flora,¹ and I can only regret that so much doubt should attach to so many of the Burmese names enumerated therein.

¹ Forest Flora of British Burma, by S. Kurz. Calcutta, 1877.

BURMESE FORESTS.

The forests of Burma are divided by Kurz into two classes, Evergreen and Deciduous, which again are subdivided as follows:

A.—EVERGREEN FORESTS.

I. LITTORAL FORESTS.

II. SWAMP FORESTS.

III. TROPICAL FORESTS.

IV. HILL FORESTS.

B.—DECIDUOUS FORESTS.

V. OPEN FORESTS.

VI. DRY FORESTS.

VII. MIXED FORESTS.

VIII. SAND DUNE FORESTS.

IX. BAMBOO JUNGLES AND SAVANNAHS.

X. DESERTED CLEARINGS.

Kurz's description of the above is as follows, the spelling of the vernacular names being slightly altered, in accordance with the spelling adopted in this edition, in cases where the intended pronunciation is known:

A.—EVERGREEN FORESTS.

The evergreen forests consist of trees which are green all the year round, although a few of them shed their leaves after a certain number of years. In higher elevations of the Martaban and Tenasserim hills, they become intermixed with winter deciduous trees, but these latter are so scanty as not to affect the aspect.

I. LITTORAL FORESTS.

These are low-land forests growing on the silty alluvial lands bordering the sea, but they ascend also the larger rivers as far as the tidal waves. Salt water is the modifying agent of these forests, and they differ in their aspect according to the saltness of the water, as affected by the influx of fresh water from the rivers or from rain. Along the sea itself, and often far extending into it, occur Mangrove Forests, consisting chiefly of rhizophora, such as Pyu (*Rhizophora*, *Bruguiera*, etc.), Kambala (*Sonneratia apetala*), La-mu (*Sonneratia acida* and *S. Griffithii*), Butayat (*Aegiceras corniculata*), Pyn-leh-ka-nā-zo (*Carapa obovata*), and other small trees, like *Kandelia Rhoeberi*, *Ceriops*, *Lumnitzera racemosa*, *Scyphiphora hydrophyllacea*, and sometimes *Brownlowia lanceolata*. The ground is muddy in the extreme, and more or less destitute of vegetation.

Further inland, where the ground is inundated only during spring-tides, these mangrove forests pass into the so-called tidal forests, in which most of the above-named trees become more subordinate, while Kambala trees (*Sonneratia apetala*) and Tha-mē (*Ariceenia tomentosa*) prevail, and with these are mingled Thym-bān (*Hibiscus tiliaceus*), *Thespesia populnea*, Pyn-leh-ka-nā-zo (*Heritiera minor*), Thyn-wyn (*Pongamia glabra*), *Tamarix Indica*, Ta-yor (*Erecaccaria agallocha*), Kyn-ba-lyu (*Antidesma diandrum*), Kōn-ka-thyt (*Erythrina oratifolia*), Yē-chin-yā (*Dalbergia spinosa*), Ka-lwa (*Cerbera odallam*), Tha-nāt (*Cordia myra*), Then-houng (*Phanis paludosa*), and several other conspicuous trees. Shrubs become much developed, of which the following may be mentioned: Ka-ya (*Acanthus ilicifolius*), Pyn-leh-kyoung (*Clerodendron inerme*), Ka-yu (*Pluchea Indica*), Ta-mā-zōk (*Glochidion multiloculare*), *Egialitis annulata*, etc. These are often intertwined by Mi-joung-nweh (*Derris scandens*), *Derris uliginosa*, Myouk-goung-nyin (*Derris sinuata*), *Acanthus volubilis*, Shway-nweh-pan (*Cassipoua filiformis*), asclepiads such as *Finlaysonia*, *Sarcolobus*, *Hoya*, etc., and some others. A fern (*Acrostichum aureum*) forms dense patches, and so do locally some coarse grasses, chiefly *Cyperus incurvatus*, and other species; Pan-yen (*Andropogon muricatus*), *Lepochloa Wrightii*, *Eragrostis procera*, *Scirpus pectinatus*, etc., along with a few herbs which spring up in more open localities. Da-ni (*Nipa fruticans*) and Tha-kyet (*Pandanus fatidus*) form locally dense bushes, especially the first named.

II. SWAMP FORESTS.

These are inland forests which occupy the low-lands and depressions of the alluvial plains. They are usually situated along river-courses, or border the numerous lakes or 'engs.' The ground is nearly as muddy as in the mangrove swamps, but it is fresh water that influences the tree growth here. During the rains they are more or less inundated, often up to 4-5 feet, and possibly more. The trees are mostly different from those of the other forests near or around them, but many of them, if not all, are again found along marshy river-sides, or around jungle swamps in the midst of other forests. They are chiefly small-leaved kinds, such as Yōng (*Anogeissus acuminatus*, var.), Tha-γēt (*Mangifera longipes*), Thyt-hpyu (*Xanthophyllum glaucum*), further *Memecylon plebeium*, *Elaeocarpus hygrophilus*, *Leora parviflora* and *L. nigricans*, *Gonocaryum Lobbianum*, Dhay-lay-ben (*Symplocos leucantha*), a species of *Xylosma* (probably *X. longifolium*), Yē-tha-byay (*Eugenia operculata*), Yē-gain (*Hymenocardium Wallichii* and *H. plicata*), *Morindopsis capillaris*, *Weberia myrtifolia*, Kych-ni (*Barringtonia acutangula*), *Garcinia succifolia*, and many kinds of shrubs, climbing as well as erect, are found here, e.g. *Capparis disticha*, Yē-ka-dat (*Cratæra hygrophila*), *Jasminum scandens*, *Gmelina Asiatica*, Ngā-hpyu (*Pachygone odorifera* and *Roydsia obtusifolia*), *Sphenodesma grossum*, a *Tetracera*, Ban-bwē-nweh (*Aneistrocladus Griffithii*), Sow-pein-nweh (*Combretum trifoliatum* and *C. tetragonocarpum*), *Derris elegans*, *uliginosa* and *scandens*, Su-yit (*Acacia pennata*) Herbage is scanty, but Thin-pen or Pin-pwā (*Phrynium dichotomum*) is abundant, and so are in places Za-yap (*Lasia*), and several kinds of sedge-gasses.

Palms or bamboos are absent. Orchids and ferns abound more or less on the trees.

III. TROPICAL FORESTS.

A characteristic dense mass of trees covers the shady valleys and shady slopes of the hilly country, and, indeed, wherever shelter and a perennial supply of fresh water allows their development. These forests are highly developed from Martaban down to Tenasserim and the Andamans, and the Arakan Yo-mā and the mountainous parts of Ava show a preponderance of tropical forests. But in the lower Chittagong hills, and all along the Pegu Yo-mā, they retreat to the deep valleys; while they are almost absent in the drier districts of Prome and Ava. The variety of trees in these forests is so great as not to allow a comprehensively correct picture; for its constituents vary greatly in forest tracts close to each other. The lofty trees towering above the dense forest mass are chiefly leaf-shedders, especially Thyt-hpyu (*Sterculia scaphigera*), Let-kok (*Sterculia foetida*) and *Sterculia campanulata*, Thyt-pouk (*Tetraneles nudiflora*), Myouk-tan-γēt (*Parkia leiophylla*), Maya-nheng (*Arcocarpus fraxinifolius*), Kō-kō (*Albizia Lebbek*) and Bon-me-zā (*Albizia stipulata*), Pyen-ka-do (*Xylia dolabriformis*), Thayet-san (*Swintonia Schwenckii*), Pa-douk (*Pterocarpus Indicus*), Myouk-gnō (*Duabanga sonneratioides*), Toung-peing-neh (*Artocarpus chaplasha* and *Art. rigida*), Myouk-lōk (*Artocarpus Lacoocha*), Ka-thyt-kū (*Pentace Burmanica*), also a good many of lofty wood-oil trees, such as Kau-yin-hpyu (*Dipterocarpus alatus*), Kan-yin-ni (*Dipterocarpus laris* and *D. turbinatus*), Thyn-ga-du (*Parashorea stellata*), Thyn-gān (*Hopea odorata*), Koung-nhu (*Anisoptera glabra*), further *Payena paralleloneura*, Hmya-sait (*Antiaris toxicaria*), Htaip-kouk-pen (*Gualteria lateriflora*), and many others.

The number of less lofty trees is considerable, and includes such trees as Nyoung-ben (*Ficus luccifera*, and other species), *Mitrephora vandaflorea*, Ta-di (*Bursera serrata*), Khwē-douk (*Kurrimia robusta*), Chē-ben (*Semecarpus albescens*), *Marlea*, *Stereospermum fimbriatum*, Kyo-ben (*Vitex peduncularis*), Yawwē-gyi (*Adenanthera pavonina*), Thyt-ka-do (*Cadrela toona*), Pyen-mā-hpyu (*Lagerstramia calyculata*), Zoung-ka-lē (*Lagerstr. villosa*), Ley-zā (*Lagerstr. tomentosa*), Thayet (*Mangifera Indica*), Thyt-myn (*Podocarpus polystachya*), Thyt-tō (*Semecarpus allicum*), Myoung-kyap (*Ficus obtusifolia*), Myoung-chin (*Ficus infectoria*), Myoung-peinē (*Ficus nervosa*), Tha-lhān (*Ficus glomerata*), especially along Choungs, Than-that (*Albizia lucida*), Ta-nyein (*Pithecolobium angulatum*), Thyt-ni (*Amoora Rokātuka*), *Dysoxylon*, and other

Meliaceæ, *Diplospora singularis*, Yē-hmyot (*Treulia nudiflora*), Yuē-wun (*Hibiscus macrophyllus*), Shā-wā (*Stereulia ornata*, *Elaeocarpus*, etc.

A host of small trees vegetate in the shade of the loftier trees, but I can mention only a few of them, such as Na-ji (*Pterospermum*, 2-3 species), Ma-dor (*Garcinia xanthochymus*), *Dalbergia cana*, several species of *Diospyros*, *Phoebe pubescens*, Na-lyn-kyor (*Cinnamomum*), several kinds of Ong-dōng (*Tetranthera*), and numerous other *Laurineæ*, Kar-lo-hsō (*Hydnocarpus heterophyllus*), Myonk-ok-shit (*Siphonodon celastrinus*), Ka-nā-zō (*Baccaurea sapida*), *Micromelum pubescens*, Touk-shā-mā (*Turpinia pomifera*), Sa-kwē (*Webera oppositifolia*), *Aglaiia*, *Heligarna Helferi*, *Masa ramentacea*, Se-than-ya (*Gelonium multiflorum*), Gyeng-ma-ōk (*Ardisia humilis* and *A. anceps*); numerous fig-trees like Hsen-tha-hpan (*Ficus regia* and *F. Rorburghii*), Khwē-tan-yin (*Millettia atropurpurea*), Yē-ka-thyt (*Erythrina lithosperma*) and along open choungs, *Eugenia formosa*, and numerous other species, *Mecycylon celastrinum*, Thyt-sat (*Aporosa villosula*) *Cypania*, *Cleistanthus myrianthus*, *Sambaria macrophylla*, *Cleidion Javanicum*, Toung-hpeh-wun (*Macaouanga gummiiflua*), Lē-lun-ben (*Erycacia baccata*), Thyt-chē (*Castanea Javanica*), *Cyathocalyx Martabanicus*, Toung-tha-leh (*Garcinia kydia*), *Garcinia cornea*, Tha-nāt-tor (*Garcinia heterandra*), Ts'ik-chē (*Pancovia rubiginosa*), *Glycomis*, Tha-nāt-khā (*Murraya exotica*), *Picrasma Javanica*, Yō-da-yāh (*Ocuba Wallichii*), *Hezeya trijuga*, *Eryonymus*; several species of *Diospyros*, e.g. *D. oleifolia*, *variegata*, etc., Kyet-mouk (*Nephelium hypoleucum*), *Limociera terniflora*, Kin-ha-lyn (*Antidesma pubescens*, etc., *Kya-thā* (*Barringtonia racemosa* and *B. pterocarpa*), *Vitex heterophylla*, several nutmegs like Za-deip-hpyu (*Myristica longifolia*), Thyt-tan (*Myristica corticosa*), *Myristica Irya*, *Lepisanthes Burmanica*, etc. Numerous other trees occur in this sort of forest on the Andamans, which are not found, or are very rare, on the continent, like Kap-pa-li-thyt (*Momusops littoralis*) restricted to the coasts, *Hemicyclia Andamanica*, *Dipterocarpus Griffithii*, Gān-gor (*Mesua ferrea*) *Terminalia procerca*, *Lagerstræmia hypoleuca*, Pa-gā-nyet-su (*Pometia tomentosa*), *Dracontomelon sylvestris*, Pān-ta-gū (*Calophyllum spratabile*), *Fagraea racemosa*, *Pandanus Andamanensium*, etc. As a rule, those tropical forests which grow on metamorphic rocks are richest in species, while those occurring on the soft sandstones and other sedimentary rocks are poorest in this respect.

The shrubby vegetation is densest along open water-courses in cleared spots and along the outskirts of the forest, and often disappears entirely in the depth of the damp interior. It consists of such a large variety that I cannot undertake to sum up the species. Not a few of them are very powerful climbers, ascending into the crowns of the loftiest trees and depending from them in various festoons, or intertwined, or creeping from tree to tree. Amongst these climbers occur numerous rattans like Yan-ma-hitē (*Calamus latifolius*), Yan-ma-hitē kyen (*Calamus paradoxus*), *Calamus tigrinus*, etc., and also a bamboo called Wā-nwel (*Diuvelhoa Maclellandii*, on the Andamans replaced by *Diu. Andamanica*). Bamboo often forms a conspicuous undergrowth, consisting of Wā-hpyu-gyi (*Gigantochloa macrostachya*), Wā-yā (*Dendrocalamus longispallus*), Kyā-thoung-wā (*Bambusa polymorpha*), and Wā-tha-hpwōt (*Pseudostachyum Helferi*); the gigantic Wā-hō (*Bambusa Brandisii*) grows up to a height of 90 to 100 feet. Palms and screw pines are dispersed through the forest, and sometimes form almost impenetrable thickets, especially Toung-ong (*Arenga saccharifera*), Kwam-thi (1 or 2 species of *Areca*), Yen-kān (*Zalacca Wallichii*), Min-bu (*Caryota sobolifera*), Tsā-lu-ben (*Licuala peltata*), and more especially Dha-noung (*Calamus arborescens*) and Thēn-thieing (*Calamus erectus*). Ferns of various sorts and *Scitamiæ*, and numerous other herbs, but hardly any grasses, mat the ground in places where the jungle is less dense and not so dark.

In some tracts, especially in the larger valleys of the Eastern slopes of the Pegu Yō-mā, tropical and mixed forests become to a certain degree fused, and form a more open but high grown forest. Owing to the free access of light, the ground becomes overrun with *Acanthaceæ*, *Clerodendron*, Ka-du (*Blumea*), and other Composite, Kat-se-nē (*Sida*), in short, with such herbage as we find again in the lower mixed forests. This sort of forest, which I distinguished as Open Tropical Forest, is merely a slight variety of the tropical forests, produced by the influence of light and by a more open terrain.

IV. HILL FORESTS.

The Drier Hill Forests differ considerably from the damp ones, being composed of low grown, and higher up, often crooked trees, while the pines which here appear in force, remove our thoughts from tropical scenery. According to the prevalence of pines we might classify these hill forests thus:

A.—LEAVED FORESTS.

1. *Damp Hill Forests.*
2. *Dry Hill Forests.*

B.—CONIFEROUS FORESTS.

3. *Pine Forests.*

Further study of the hill forests may possibly cause a further subdivision, but, for the present purpose, I may restrict them to these three classes only.

Damp Hill Forests.

At higher elevations, say from 3000 or 3500 feet and upwards, the tropical forest becomes greatly influenced, not only by greater dampness, but also by a lower temperature. Tree growth is here prodigiously developed, and numerous trees appear which are not represented at lower levels, such as diverse species of oak (*Quercus*) and chestnuts, Kyan-zā (*Castanea tribuloides*, etc.), and other eupuliferous trees, *Trnstramia Japonica*, *Bucklandia populnea*; kinds of Tha-byē (*Eugenia*) different from those of the plains, temperate *Laurineæ*, *Ostodes paniculata*, Thyt-m̄yū (*Podocarpus*), etc. Palms become less conspicuous, and there appear numerous small trees peculiar to this region. On the other hand, many trees numerously represented in the hot lowlands disappear now altogether, or become very scarce. These are principally members of *Dipterocarpeæ*, *Meliaceæ*, *Sapindaceæ* (except *Acer*), *Dilleniaceæ*, *Sterculiaceæ*, *Anacardiaceæ*, *Lythæareæ*, and *Sapotaceæ*. These forests, distinguished as the Damp Hill Forests, in contradistinction to the Drier Hill Forests, are the least explored in Burma, but they may be considered to form a transition from the true tropical forests to the Dry Hill Forests, which occupy the exposed ridges and sunny slopes of the hills.

Dry Hill Forests.

These drier hill forests form the nearest approach to the temperate forests of our northern zone, and many an old acquaintance (although specifically different) is met with in them. The trees are for the greatest part still evergreens, in which respect they differ greatly from the true temperate forests (which occur also on the Higher Alps of India, as on the Himalaya above 8000 to 9000 feet elevation). In aspect they agree with the forests found on the hills of Southern Europe, but are much more damp, and consist of a far greater variety of trees, much clothed with epiphytical plants. The demarcation, however, of this kind of forest from the neighbouring damp hill forests, and of this last class from the tropical forests, is often rather arbitrary.

The trees here represented are chiefly oaks and chestnuts, Kyan-zā or Thyt-chā, *Myrica sapida*, *Rhododendron* and *Vaccinia*, *Turpinia Nepalensis*, *Bucklandia populnea*, several species of *Symplocos*. Tor-let-pet (species of *Eurya*), *Ameslea monticola*, Pān-mā (*Schinus Noronhæ*), two species of *Pyrenaria*, *Echinocarpus*, *Cornus oblonga*, *Diospyros mollis*, *Andromeda ovalifolia*, *Daphnidium caudatum*, *Aporosa*, and several other laurels, *Helicia*, *Garcinia anomala*, *Pithecolobium montanum*. Bon-mē-zā (*Albizzia stipulata* ascended from below) *Dillenia aurea*, *Wendlandia ligustrina*, a few araliaceous trees, chiefly *Heptapleurum*, etc. A fan-palm (*Chamarops khasiana*) looks rather strange in such a society, and a climbing *Plectocomia* ascends upwards to

7000 feet elevation. Bamboo is still represented by a berry-bearing half-scandent kind (*Pseudostachyum glomeriflorum*), and higher up a small *Arundinaria* forms a very dense undergrowth, especially above 6000 feet elevation. The ground is clothed with grass and herbs wherever light has free access. Brackes (*Pteris aquilina*) *Rubus*, *Gentiana*, *Galium Saussurea*, *Gnaphalium* and *Anaphalis*, Sun-dew, *Lobelia Senecio*, *Bupleurum*, and some other umbellifers are some of the European plants which grow rather profusely on the pastures that occupy the exposed slopes. One or two violets, too, are frequently met with along streams in the valleys. Epiphytes, orchids, as well as ferns, *Cyrtandraceæ*, etc., interwoven with mosses and lichens, clothe the branches.

Along the more exposed ridges and unfavourably exposed slopes these forests become quite stunted, and the tree stems gnarled, and form then the class called Stunted Hill Forests. They form the upper limit of the hill forests in Burma, where (for example, below the top of the Nattoung) the *Arundinarias* and *Rhododendrons* become quite dwarfed and reduced.

Pine Forests.

The pine forests are either quite or nearly free of leafed trees, but the gullies and valleys that intersect them are usually more or less taken up by drier hill forests, or both pines and leafed trees are intermixed. They consist entirely of *Tyn-yu* (*Pinus Kasya*), and occupy the hilly parts of the Lushai country, Upper Ava and Martaban. The lowest limit to which they descend is about 3500 feet. In Upper Tenasserim another pine makes its appearance, viz. *Pinus Merkusii*, which occurs chiefly on the sandstone hills of the Thong-gyeen, in Upper Tenasserim, and reappears again on the hills of Sumatra. Forests of this pine are found at such low levels as 1500 feet, and single trees are locally found at only 500 feet elevation.

B.—DECIDUOUS OR LEAF-SHEDDING FORESTS.

From a general point of view the deciduous forests divide into two large classes. The first one consists of trees which shed their leaves by the influence of cold, and are therefore leafless during the winter or cold season. But here again we have to distinguish between winter deciduous trees, *ie.* trees which grow in regions or zones where snow falls, and cold season shedders, which are not subjected to the influence of a severe winter cold, but, for some reason or other, shed their leaves after the rains instead at the beginning of the hot season. This latter sort of tree occurs also in Burma, but these are here very subordinately dispersed through the forests. The second principal class of deciduous forests is composed of trees that shed their leaves on account of the dryness and excessive summer heat. It is with this class of forest that the forester in Burma has chiefly to do, for the most important timber trees are found in them. The variety of trees in all these forests is so much less than in the evergreen forests that it is more easy to master their constituents and to define their peculiarities.

V. OPEN FORESTS.

The open forests are restricted to the newer and low level or older and high level alluvium, and occur more especially on laterite, or soil of a lateritic character. Those growing in the hills show a transition to the drier hill forest; indeed, grow sometimes intermixed with them, especially when occupying the debris of metamorphic rocks, as is the case on the Martaban hills. Those growing on stiff clay and loam similarly blend with the lower mixed forests along the line of their contact. In their typical form, as Eng forest they occupy a lateritic or sandy area, and form a very marked vegetation. I distinguish therefore three varieties.

1. *Eng or Laterite Forests.*

The principal constituents of this forest are Byn (*Dillenia pulcherrima*), Thi yā (*Shorea obtusa*), Eng-jyn (*Pentacme Siamensis*), Jio-bō (*Walsura villosa*), Muu-deing

(*Lophopetalum Wallichii*), Myouk-zī (*Zizyphus jujuba*), Lam-bō (*Buchanania latifolia*), Thyt-sī (*Melanorrhæa usitata*), Dan-yat (*Symplocos racemosa*), Tē (*Diospyros Birmanica*), Tā-shā (*Emblia officinalis*), Zi-hpyu (*Emblia macrocarpa*), En-gyen (*Aporosa macrophylla*), Ye-ma-nch (*Aporosa villosa*), Yin-daik (*Dalbergia cultrata*), *Wendlandia tinctoria*, Htoug-kyān (*Terminalia macrocarpa*), Bān-bwe (*Careya arborea*), Kōn-pyeng-mā (*Lagerstræmia macrocarpa*), Kha-boung (*Strychnos nux-vomica*), Na-bhē (*Odina wodier*), Yin-gāt (*Gardenia obtusifolia*), Tha-men-sā-ni (*Gardenia turgida*), Tha-byē-hpyu (*Eugenia jambolana*), *Sideroxylon parvifolium*, Nē-u-weh (*Flacourtia sapida*) and others. The Eng (*Dipterocarpus tuberculatus*) is the characteristic tree of this forest. Mu-daing (*Cycas Siamensis*) is plentiful in the Prome Forests. Palms are represented only by a stemless date palm (*Phoenix acaulis*), called Then-boung, and here and there by an erect much reduced rattan, called Kyen-khā (*Calamus gracilis*). Of bamboo are seen only My-in-wā (*Dendrocalamus strictus*), and less so Hti-wā (*Bambusa tulda*) along the outskirts of the forest. Climbing vegetation has almost disappeared. Ferns are rare, but orchids and some asclepiads are plentiful. The shrubs here are meagre and sparse, but still exhibit great variety of species, and the same may be said of the clothing of the ground. The display of gaudy flowers during the hot season on the trees, as well as on the ground, is often very striking. Where depressions occur, they are usually filled up with stiff clay inundated during the rains, and such places are more or less densely covered by thin dry grass and sedges.

2. Hill Eng Forests.

These forests occupy the ridges of the outer hill ranges of Martaban and Upper Tenasserim, where they luxuriate, either on laterite formed by decomposition of the underlying rock, or on debris of metamorphic rock. In general aspect they agree with the Eng forests of the plains, but numerous trees occur in them which are peculiar to them, or very rare in those of the plains. The Eng (*Dipterocarpus tuberculatus*) is still represented here; but is often replaced by, or intermixed with, two other wood-oil trees, viz. *Dipterocarpus costatus* and *D. obtusifolius*. Other conspicuous trees are *Engelhardtia villosa*, *Quercus Brandisiana* and *Q. Bancana*, Pan-mā (*Schima Bancana*), Thyt-sī (*Melanorrhæa glabra*), *Castanea tribuloides*, *Tristania Burmanica*, *Anneslea fragrans*, etc. Various trees of the true Eng forests, and of the drier hill forests sometimes associate, like Doung-tsat-pya (*Callicarpa arborea*), *Dillenia aurea*, *Rhus Javanica*, *Vernonia acuminata*, etc.

3. Low Forests.

These are only a modification of the true Eng forest, being, so to say, a mixture of trees from the lower mixed forests with Eng forest trees. The stiff clay on which they grow does not allow the Eng tree to flourish, and, indeed, all the laterite-loving trees, such as Thi-yā, Eng-jyn, and the like, disappear, while certain trees like Yen-daik (*Dalbergia cultrata*), Htoug-kyān (*Terminalia macrocarpa*), Kha-boung (*Strychnos nux-vomica*), and such like, often become very prevalent.

VI. DRY FORESTS.

Travelling northwards, and leaving the alluvial and sandstone tracts, we enter in Prome peculiar forests, growing chiefly on calcareous sandstone, but often intermixed with, or passing into Eng forests, where gravelly or ferruginous deposits constitute the surface. These are the dry forests, characterized by a number of trees that are not found elsewhere, except on calcareous sub-strata, and many of which reappear in Hindustan. They are chiefly formed of Shā (*Acacia catechu*), Ta-noung (*Acacia leucophlea*), Eng-jyn (*Pentacme Siamensis*), *Sterculia versicolor* *Hiptage albicans*, Ta-pu-ben (*Harrisonia Bennettii*), Ta-ma-kha (*Melia Azedarach*), on the hills Yeng-mā or Yim-mā (*Chickrassia velutina*), Zi-ben (*Zizyphus jujuba*), Chōp-ben (*Diospyros montana*), Na-bu (*Combretum apetalum*),

Tha-leh (*Ulmus lancifolia*), on the hills Than tat (*Albizia lucida*), Bē-lyā (*Cratogeomys meriifolium*), Ta-nāt (*Tectona Hamiltonii*), locally Klu-sān (*Hymenodictyon thyriflorum*), Ta-pouk-ben (*Dalbergia paniculata*), Thyt-sa-nweng (*Dalbergia nigrescens*), Let-khōk-gyi (*Holarrhena antidyenterica*), Kha-boung (*Strychnos potatorum* and *S. nux-tomica*), Hpa-lān (*Bauhinia racemosa*), Bwē-cheng (*Bauhinia variegata*), Ne-u-wch (*Flacourtia sapida*), *Ehretia laevis*, *Rhus paniculata*, *Morinda tomentosa*, Nab-hē (*Olinia vodier*), Ta-shā (*Emblia officinalis*), Tha-byē-hpyu (*Eugenia jambolana*), Kyet-yō (*Vitex alata* and *V. limoniifolia*), *Vitex canescens*, Koung-khwā (*Capparis auricoma*), *Premna viburnoides*, Tha-khwōt-mā (*Spatholea Rheedii*), etc. With these associate numerous other trees from the Eng forests, as Eng (*Dipterocarpus tuberculatus*), here and there Thi-yā (*Shorea obtusa*), Lam-bo (*Buchanania latifolia*), Tē (*Diospyros Birmanica*), and such like: also from the mixed forests, Jio (*Schleichera trijuga*), Byn-gā (*Nauveola rotundifolia*), Pyn-ka-dō or Pyn-ka-dō (*Xylia dolabriformis*), Kō-kō (*Albizia Lebbek*), Thyt-pok (*Dalbergia purpurea*), Kywon-na-lyn (*Premna tomentosa*), Teak of inferior growth, Yong (*Anogeissus acuminatus*), Di-du or Let-pān (*Bombax*), Chin-yōk (*Garuga pinnata*), etc.

The shrubs are scanty and similar to those of the Eng forests, but of a more thorny or prickly nature. Several species of arboreal *Euphorbiae* (*E. nivalis* and *E. antiquorum*), called Shā-zoung, attract the eye on account of their curious shape and growth. Palms and bamboos are the same as those observed in the Eng forests. The Shā (*Acacia catechu*) often gets the supremacy, and there are not a few almost pure Shā-forests in the Prome district. Higher on the ridges, above 2000 feet elevation, a small crooked tree (*Hiptage albicans*) appears in force, associating with similarly crooked low trees of Yen-daik (*Dalbergia cultrata*), Bwē-cheng (*Bauhinia variegata*), Di-du (*Bombax insigne*), Ta-shā (*Emblia officinalis*), Zyn-bwōn (*Dillenia pentagyna*) and others, and these form the Upper Dry Forest. Here also some temperate forms appear for the first time, such as a beautiful epiphytic *Vaccinium* (*V. verticillatum*), a large *Huraeum*, an epiphytic *Hymenopogon*, and a few others.

VII. MIXED FORESTS.

These forests are, no doubt, the most important ones to the forester in Burma, and occupy at least two-thirds of the whole area of Pegu proper, Chittagong, and Arakan, while they are less developed in Martaban, Tenasserim, and the Andamans. I have adopted (with slight alterations) the divisions of these forests, as distinguished by Dr. Brandis, in his report on the Attaran Forests in 1860. They are, as a whole, well demarcated in all the tracts from Chittagong and Prome southwards as far as the Tsittoung; but east of that river, on the metamorphic strata, they become much masked by the surrounding forests. This is no doubt partially owing to the influence of the substratum, which is here so favourable to most kinds of trees, while alluvium and the soft sandstone excludes many kinds that are common enough on a substratum of metamorphic rocks. On the Andamans they are also less demarcated, although here growing on the same sandstone as that of Pegu; but here the more southerly latitude, and more especially the insular climate, has a share in this modification.

1. Upper Mixed Forests.

These are restricted to rocky and hilly situations, but differ somewhat in aspect accordingly as they grow on soft siliceous sandstone, or on metamorphic rocks. On the latter substratum, the trees are not so straight, neither do they grow so tall, and are accompanied by such trees as Pa-douk (*Pterocarpus*), several *Ternstroemiaceae*, and certain *Meliaceae*. The chief trees are here Pyn-ka-dō (*Xylia dolabriformis*), Teak or Kywōn-ben (*Tectona grandis*), Tha-byē-hpyu (*Eugenia jambolana*), Di-du or Let-pān (*Bombax insigne*), with white and scarlet flowers, Shā-hpyu (*Sterculia versicolor*), *Sterculia foetida*, Shā-mi (*Sterculia villosa*), Na-ji (*Pterospermum semisagittatum*), Chyn-yōk (*Garuga pinnata*), Ta-di (*Bursera serrata*), Chē

(*Senecarpus panduratus*), Gwē (*Spondias mangifera*), Hpān-gā (*Terminalia tomentella*), Htouk-kyān (*Terminalia crenulata*), Lēn (*Terminalia pyrifolia*), Thyt-sein (*Terminalia bellerica*), Yōng (*Anogeissus acuminatus*), Pyeng-mā or Pi-mā (*Lagerstræmia regina*), Leh-zā (*Lagerstræmia tomentosa*), M̄yok-shor (*Homalium tomentosum*), Tscik-gyi (*Briedelia retusa*), Thyt-pa-gān (*Millettia Brandisii*), Tha-nāt (*Cordia grandis*), Yem-a-nē (*Gmelina arborea*), Thyt-pōk (*Dalbergia purpurea*), Ilnor (*Nauclea cordifolia*), Byn-gā (*Nauclea rotundifolia*), K̄yet-yō (*Vitex alata*), Thyn-wyn (*Millettia leucantha*), Ouk-chyn-zā (*Diospyros ebrtioides*), Kywōn-na-leng (*Premna tomentosa*), Bē-byā (*Cratogeomys nervifolium*), Wet-shor (*Sterculia colorata*), Meh-za-li or Toung-meh-za-li (*Cassia siamea*), Ngu-theing (*Cassia nodosa*), Kha-boung (*Strychnos nux-vomica*), Nab-hē (*Ocotea woderi*), Dwā-ni (*Eriolaena Candollei*), Thyt-yin (*Croton oblongifolium*), Nē-u-weh (*Flacourtia cataphracta*), Ka-dwōt (*Ficus hispida*), Yē-kha-ōng (*Ficus cumia*), Khā-ōng (*Ficus conglomerata*), and others. Large-sized bamboo, Kyā-thoung-wā (*Bambusa polymorpha*), Tyn-wā (*Cephalostachyum pergracile*), and in drier situations M̄yin-wā (*Dendrocalamus strictus*), form the chief undergrowth, intermixed with such trees as Lyn-kyor (*Dillenia parviflora*), Lyn-bywōn (*Dillenia Pentagyma*), Ma-da-mā (*Dalbergia orate* and *D. glauca*), Pyn-tē-yor (*Grewia elastica*), Pyi-zin (*Antidesma Ghæsemilla*), Let-khōk-thein (*Holarrhena pubescens*), Khyoung-ya (*Calosanthus Indica*), Shā-mā (*Emblia albizzioides*), Ta-shā (*Emblia officinalis*), etc.

Palms are represented by Za-noung (*Wallichia*), Min-bu (*Caryota urens*), and a few Rattans. Shrubs are here few and meagre. Climbers, although mostly powerful ones, and therefore injurious to tree growth, play a subordinate rôle. The herbage is scattered, and the grey or yellowish soil is everywhere exposed during the dry season. The greater moisture and shade along favourably exposed slopes, and of deep valleys, permits the growth of wood-oil trees, as Kam-yin-hpyu (*Dipterocarpus alatus*), Kōk-kō (*Albizia Lebbek*), Shor-ltu (*Beilschæmidia Roxburghii*), K̄yong-touk (*Pajanelia multijuga*), Ma-ni-okkā (*Corallia integerrima*), Yē-thē-hpan (*Ficus glomerata*), Wā-yā (*Dendrocalamus longispatus*), and other shade-loving trees.

2. Lower Mixed Forests.

These forests occupy the alluvium and lowlands of the country, and principally consist of the same kind of trees that grow in the upper mixed forests. But their growth is much lower, and the undergrowth is, moreover, a different one. To those trees already mentioned as growing in the upper mixed forests must be added chiefly Htōuk-shā (*Vitex leucocylon*), Dwā-bōk (*Kydia calycina*), Di-du (*Bombax malabaricum*), Ma-lwā (*Spathodea stipulata*), Thu-kwot-mā (*Spathodea Rheedii*), Hpet-thān (*Heterophragma adenophylla*), Thyt-ma ji (*Albizia odoratissima*), Syt (*Albizia procera*), Htein (*Nauclea diversifolia*), a few species of the section of *Urostigma*, of *Ficus*, especially *Ficus geniculata*, Ngu-gyi (*Casia fistula*), Chē-ni (*Barringtonia acutangula*), Hmān-hpyu (*Randia uliginosa*), Hsay-than-payā (*Randia longispina*), Hmān-ni (*Gardenia erythroclada*), Ma-ji-bok (*Gardenia sessiflora*), Ta-bwōt-gyi (*Miluisa velutina*), Dwā-ni (*Eriolaena Candollei*), Myat-yā or Myaiyā (*Grewia microcos*), *Grewia laevigata*, Casaria canziana, Tā-chan-zā (*Heteropanax fragrans*), Thyt-hswē-lē (*Schrebera swietenoides*), K̄yet-yō (*Vitex pubescens*), several kinds of Ta-mā-sōk (*Glochidion*), Na-lin-jyo (*Cinnamomum*), Bwē-zyn (*Bauhinia Malabarica*), Thyt-pyong (*Nauclea sessifolia*), Anam or Anan-bo (*Crypteronia paniculata*), and there Ka-nā-zo (*Baccaurea sapida*), *Derris robusta* and others. The bamboo here is chiefly Tyn-wā (*Cephalostachyum pergracile*), Wā-hpyu-ga-lē (*Gigantochloa albociliata*), and Ti-wā (*Bambusa Tulda*), but these are scattered in patches and do not form such an uninterrupted undergrowth as the bamboos on the hills. Climbers are numerous and of various descriptions, and I will mention only the more powerful or more common ones. These are Pouk-nweh (*Butea superba* and *B. parviflora*), Kon-yin-nweh (*Entada scandens*), Tha-bwōt-nweh (*Uraria macrophylla*), Tor-zi-nweh (*Zizyphus exoniata*), K̄hwē-nweh (*Colubrina pubescens*), several vines, but chiefly Yen-hnoung-nweh (*Vitis Linnæi*), Chyn-douk-nweh-zouk (*Vitis latifolia*) Wun-u-nweh or Mych-zu-nweh (*Vitis erythroclada*), Yen-hnoung-peing-nweh (*Vitis awiculata*) Kyi-ni or Kyi-che-nweh (*Vitis lanceolaria*), further Da-mā-ngch-nweh (*Millettia extensa*),

Nweh-bōk (*Pederia lanuginosa*), Kyoung-chet (*Mezoneuron cucullatum*), Kyoung-gyet-nweh (*Pterolobium macropterum*), Su-yit (*Acacia pinnata*), Su-pwōt-ka-lā-nweh (*Acacia glaucescens*), Douk-ta-long (*Dalbergia stipularia*), Pueraria (*Candollei*), Kwē-leh-nweh (*Mucuna pruri*), Kwe-leh-bwōt-nweh (*Cassipouira lucens*), Balu-let-wā (*Heptapleurum renulosum*), Hsen-ma-no-pyin (*Briedelia stipularis*), Naleng-bō (*Mallotus repandus*), Tha-mā-khā-nweh (*C. ngea tomentosa*), Nweh-sat-nweh (*Symphoricarpha involucreatum*), Kā nweh (*Symphoricarpha unguiculata*), several species of *Combretum*, like Kyet-tet-nweh (*Comb. squamosum*), Mo-ma-klā-nweh (*C. retensum*) and Tha-ma-ka-nway (*C. decandrum*), Kwōt-ne-nweh (*Calycopteris Roeburghii*), several Cucurbitacea, Nweh-chō (*Thubergia laurifolia*), Na-shā gyi (*Cryptolepis Buchananii*), *Pagraa obovata*, some very showy flowered *Convolvulacea* like U-myu (*Ipomoea Xanthanthea*), Kya-hin-ka-lē-nweh (*Ipomoea vitifolia*), Toung-ka-zun (*Argyrea capitata*), O-hmōn-nweh (*Argyrea barbigera*), O-nā-kōp-nweh (*Argyrea populifolia*) and others.

Herbage and shrubbery, although not dense, is more conspicuous, and in places even luxuriant, especially along choungs. Parasitic *Loranthacea*, all called Kyi-poung, and mistletoes, Thyt-long, of the Burmese, are here more plentiful than in any other forest, except in the Savannah forests, and in the cultivated plains. As might be expected, Teak is of inferior growth and more dispersed through the forest.

Towards the banks of the larger rivers coarse grasses (usually called elephant grass) overrun the ground, and the trees become here very scattered. The subsoil seems often to be here waterlogged more or less, and hence the trees become very short stemmed and stunted, for a subterranean sheet of water acts upon the roots like an impermeable stratum. The trees that can withstand such a condition are not numerous, and are chiefly Ok-neh (*Streblus asper*), Pouk (*Butea frondosa*), Htein (*Nauclera parvifolia*) Thyt-peong or Thy-ka-lā (*Nauclera sessilifolia*), Byn-gā (*Nauclera rotundifolia*) Tha-hpān (*Ficus Chittagonga*), Njoung hpyn (*Ficus Rumphii*), Yen-daik (*Dalbergia cultrata*), Thyt-pōk (*Dalbergia purpurea*), Bām-bwē (*Careya arborea*), Pyeng-mā or Pī mā (*Lagrostis flos-reginae*), Lōn (*Terminalia pyrifolia*), Kha-houng (*Strychnos nuc-romica*), Tonk-shā (*Vitex leucocylon*), Shā (*Acacia catechu*), Kywōn or Teak, Zi-ben (*Zizyphus jujuba*), Pyi-zyn (*Antidesma ahasembilla*), Nab-hē (*Odina iodior*), Hmān-hpyu (*Randia uliginosa*), Tamin-tsā-hpyu (*Gardenia sessiliflora*), Syt (*Albizia elata*), Ong-dong (*Tetranthera Roeburghii*), and others. Often only one or a few trees mentioned here are found scattered over large tracts of these Savannahs. The only bamboo occurring here is Kyā-khat-wā (*Bambusa arundinacea*).

VIII. DUNE FORESTS.

These forests offer many peculiarities, which make it desirable that they should be separated from the other forests. They partake, now more of an evergreen, now of a deciduous forest, and grow exclusively on the calcareous sand, consisting of the fine fragments of shells and corals thrown up on the sea-shore. Forests growing along the actual beach may be termed Beach Forests, but they only constitute a very slight variety of the true Dune Forest. This latter grows on the sand-dunes along the shore, formed by the calcareous sand blown inwards from the sea, and which Dunes are on many islands of the Malay Archipelago as extensive as are those of Holland. In Burma, only Beach Forests are found, except possibly in Tenasserim, West of Tavoy, where apparently extensive dunes, with typical dune forests (consisting mainly of *Casuarina*), seem to occur. They are greatly intersected by outrunning ridges and the silty debouchures of rivers. The cocoa-palm seems restricted to those of the Cocos Islands, and to a few places along the western coast of North Andaman. In those of Burma we find chiefly Thyn-wyn (*Pongamia glabra*), Pyn-leh-ka-thyt (*Erythrina Indica*), Di-du (*Bombax Malabaricum*), Thym-bān (*Hibiscus tiliaceus*), Tsāt-thah-hpyu (*Pandanus odoratissimus*), Myu-gā or Myeng-kā (*Cynometra bijuga*), *Guttarda speciosa*, Mong-taing (*Cycas Rumphii*), *Thespesia populnea*, Pyn-leh-tān (*Scaevola Kienigi*), *Terminalia catappa*, Tha-byē-hpyu (*Eugenia javanica*), *Azelia bijuga*, Kych-gyi (*Barringtonia speciosa*), Pōng-nyet (*Calophyllum inophyllum*), *Atalantia macrophylla*, *Desmodium umbellatum*,

Hernandia peltata, *Sophora tomentosa*, Nab-hē (*Odina wodier*), *Ochrosia salubris*, *Cerbera odallum*, *Briodekia glauca*, and such-like trees. These forests are open and pretty sunny, and shrubs are here plentiful and often entangled with twiners, while creeping grasses (chiefly *Ischaemum muticum*) and *Ipomæas*, especially Pynleh-ka-zūn (*Ipomæa pes-caprae*) cover the loose sand.

In addition to Forests, properly so called, may be further enumerated :

IX. BAMBOO JUNGLES AND SAVANNAHS.

These two varieties can hardly be reckoned amongst forests, although they certainly may be claimed as forest land, and as being the undergrowth of forests.

The Bamboo Jungles are characterized by the great uniformity of their aspect and by the poorness of their undergrowth, no doubt caused by the dense and injurious shade which the bamboo spreads all around. Seldom do we find more than two different kinds of bamboo in the same jungle; they may therefore be distinguished by the kind of bamboo of which they consist. So we have in Burma jungles of Myin-wā (*Dendrocalamus strictus*), Tyn-wā (*Cephalostachyum pergracile*), Kyā-thoung-wā (*Bambusa polymorpha*), Wā-hpyu-galē (*Gigantochloa albo-ciliata*) or Wā-ta-bwōt (*Pseudostachyum Hedyoti*), and others. Kyā-kāt-wā (*Bambusa arundinacea*) jungles are found often in the alluvial plains near large rivers. These bamboos flower all simultaneously, after a lapse of years, and then die off. Then numerous light-loving plants and shrubs and also tree seedlings spring up, and it is at such periods that one cannot predict with any certainty whether the next generation will be again a pure bamboo jungle, or whether the saplings of the trees will not get the supremacy, keeping down the young bamboos as undergrowth.

The Savannahs are the undergrowth of the Savannah forests and as such do not differ from these in any point except that they are void, or nearly so, of trees. They seem to owe their existence chiefly to inundation, at least their distribution along the rivers pretty well coincides with the area of regular inundation during the rains. The grasses are all coarse ones, so coarse indeed that the haulms of some become as woody as those of certain bamboos (*Arundinaria*) and grow up from 6 to 10 feet in height. By far the greater part consists of the Thekay-gyi (*Saccharum spontaneum*), Hponn-gā (*Saccharum procerum*), Myet-yā (*Polytoca heteroclita*), Kyu-na-byñ (*Arundo Roxburghii*) and Kyu (*Arundo Madagascariensis*). Sometimes Thet-keh-nyin (*Imperata cylindrica*), a low grass, covers larger tracts. Towards the tidal zone Pan-yin (*Andropogon muricatus*) and wild sugar cane (*Saccharum spontaneum*) are the principal constituents intermixed with *Eragrostis procer*, *Cyper*, etc.

X. DESERTED CLEARINGS.

Large tracts of forest are yearly felled by the natives for the cultivation of rice. As soon as the harvest of the first, second, or third year is over, these lands are deserted and form *toungya pinzoh* or briefly *pinzohs*, i.e. deserted culture land. Weak herbs of cultivation, chiefly light-loving *Compositæ*, *Malvaceæ*, etc., spring up in dense masses, which soon must give way to coarse grasses and shrubs, amongst which tree seedlings struggle for existence. Often (especially on the hills) coarse grasses soon occupy the whole surface and form a sort of hill savannah consisting usually of Ta-ma-zaing or Tamyn-sain-ben (*Panicum acarifolium*), and Myet-ya (*Polytoca heteroclita*), rarely of Thet-keh-nyin (*Imperata cylindrica*). In other localities, where bamboos around such clearings flowered, bamboo-seedlings spring up and choke all other vegetation except light-loving quick-growing sapling trees. Local relations chiefly regulate the nature of the coming jungle, but, as a rule, such deserted clearings revert into forests similar to, or identical with those that pre-existed on them."

BOTANY.

ERRATA TO ALGÆ, MUSCI, FILICES, AND ORCHIDEÆ.

VOL. II.

- Page 19, line 1, for *CHETOPTORACEÆ*, read *CHETOPHORACEÆ*.
 „ 19, „ 6, for *CHELOPHORA*, read *CHELOPHORA*.
 „ 33, „ 25, for *CINNABARINUS*, read *CINNABARINUS*.
 „ 34, „ 35, for *BRASILIENSI*, read *BRASILIENSE*.
 „ 34, „ 39, for *ARCYNA*, read *ARCYRIA*.
 „ 35, line third from foot, for *USNIA*, read *USNEA*.
 „ 37, „ 5, for *Stereodon*, read *Stereodon*.
 „ 37, „ 15, for *ophylla*, read *aphylla*.
 „ 39, line fifth from foot, for *σῆξις*, read *σχιξις*.
 „ 71, „ 34, for *TENUIFRONS*, read *TENERIFRONS*.
 „ 81, „ 15, for *PILOSEDOIDES*, read *PILOSELLOIDES*.
 „ 157, „ 34, for 5-8 feet, read 5-8-flowered.
 „ 161, „ 46, for *VESTILA*, read *VESTITA*.
 „ 162, „ 9, for *VESTILA*, read *VESTITA*.
 „ 186, „ 13, for flowered, read fruited.

or 'Cohorts,' and much general information are directly derived from that work. The generic characters, however (where given), are based on descriptions by Kurz, and for the bulk of the specific determinations and habitats Kurz is also the principal authority, and as he had before him all Dr. Mason's materials, no further special acknowledgment is necessary, save in the few instances where a species is given by Mason, but not included by Kurz in his list. The valuable assistance so freely given by the Rev. C. Parish has been already elsewhere acknowledged. The initials *K.*, *M.*, *P.*, respectively stand for Kurz, Mason, Parish.

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B O T A N Y .

Plants are divided into two great divisions: PHANEROGAMS or plants bearing more or less complete flowers and producing perfect seeds wherein an embryo is contained; and CRYPTOGRAMS or flowerless plants, which have no true seed, but are propagated by spores consisting of minute or microscopic cells.¹

Sub-Kingdom I. CRYPTOGRAMS, ACOTYLEDONOUS, OR FLOWERLESS PLANTS.

Stamens and ovaries none. Propagation by means of homogeneous spores, consisting of a single cell.

CLASS I. THALLOGENS.

AXIS OF GROWTH INDETERMINATE, GROWTH TAKING PLACE CHIEFLY PERIPHERICALLY AND HORIZONTALLY. PLANTS WHOLLY COMPOSED OF CELLULAR TISSUE. REPRODUCTIVE ORGANS VARIOUS. SPORES NOT DEVELOPING A PROTHALLUS IN GERMINATION.

Thallogens are divided into Algæ, Fungi, and Lichens.

ALGALES.

Usually highly-coloured plants, aquatic, or natives of damp rocks, walls, etc., sometimes frondose, at others reduced to a few cells or a single cell. Fructification monoëcious or diëcious, sometimes of special cells of two sexes, sometimes of simple mobile spores, sometimes of antheridia and sporangia, which are free or inclosed in capsules.

The lists of the Burmese Algæ, Fungi, and Lichens are thus given by the Rev. C. Parish.

¹ The arrangement of the Botanical portion of this work is generally that of 'Maout and Decaisne' (Descriptive and Analytical Botany, Longmans, Green and Co., 1876), modified to suit the English student by Sir J. D. Hooker, and the brief characters appended to the Group of Orders or 'Cohorts,' and much general information are directly derived from that work. The generic characters, however (where given), are based on descriptions by Kurz, and for the bulk of the specific determinations and habitats Kurz is also the principal authority, and as he had before him all Dr. Mason's materials, no further special acknowledgment is necessary, save in the few instances where a species is given by Mason, but not included by Kurz in his list. The valuable assistance so freely given by the Rev. C. Parish has been already elsewhere acknowledged. The initials *K.*, *M.*, *P.*, respectively stand for Kurz, Mason, Parish.

ALGÆ, OR THE ALGAL ALLIANCE.

The term *Alga* is one of very wide signification, including not only those plants commonly known as *seaweeds*, but also a large number of aquatic cryptogams, among which are to be found the lowest and most minute forms of vegetable life.

The following remarks are from Mr. Berkeley, in *Treasury of Botany*:—

“There is no English word which will comprise the whole. Algæ are divided into three great classes, each of which contains a number of very distinct groups. These three classes are characterized by the colour of their seeds, which correspond for the greater part with the general tint of the plants.

“ I. Melanospermeæ, or Olive-spored.

“ II. Rhodospermeæ, or Rose-spored.

“ III. Chlorospermeæ, or Green-spored.

“The first of these comprises the olive-coloured species, which, from their size and abundance, are so conspicuous on the sea-shore, or which float in dense masses, sometimes many leagues in extent, on the surface of the ocean. On the coasts of Great Britain they attain the length of twenty feet or more, and in the genus *Laminaria* individuals are sometimes large enough to be a load for a man. But this is nothing to the size they attain in the Southern Seas, or even in some parts of the Northern hemisphere. Individuals of the genus *Macrocystis* attain a length of a hundred feet or more; and *Lessonia* forms submarine forests, the stems resembling trunks of trees. Some of the lower species have nothing like leaves, and are reduced to mere inarticulated threads, or a shapeless mass.

“The second class comprises those charming seaweeds, remarkable for their elegance of form, delicacy of texture, and brilliancy of colour, which attract the attention of all wanderers along the coast. These are often very abundant, but they seldom attain any considerable size, and some of them are as delicate as moulds.

“The third class contains most of the smaller species, in which the frond seldom assumes the form of a membrane, but is more frequently reduced to a mere thread, or even to single articulations.”

There is a great dearth of “*Seaweed*” on the Burmese coasts, that is to say, of those large leathery olive-coloured kinds with which our British shores are strewn. One may walk for miles along the sandy shores of Tenasserim and not find one. Nor are the rocks, which the receding tide leaves exposed, clothed with the smaller and more beautiful kinds—rose or green-coloured—to the extent they are at home.

In the place of seaweed, the rocks are covered with corals, sponges, sea-anemones and shells, the marvellous variety and beauty of which (especially in the Andaman Islands) enchant the lover of nature, as he wades among the rocks at low water, or looks down from his boat into the clear depths beneath him. Seaweeds, certainly, do not form a conspicuous feature in the Botany of Burma.

But although “*Seaweeds*,” as the word is commonly understood, are very scarce, “*Algæ*,” in the wider sense which science gives to this term, as including both sea and fresh-water weeds, are sufficiently numerous.

The following catalogue of species (mostly fresh-water weeds and some of them extremely minute objects) goes to confirm this statement. The species here named were all collected by the late Mr. Sulpiz Kurz, and were determined for him by Professors Martens and Zeller.

Among the lower Algæ are found the smallest forms, and what indeed appear to be, the first germs of vegetable life. It is here that the limits of the animal and vegetable kingdom are by some thought to be confounded.

Confervaceæ are, to the naked eye, merely green slimes; but, under the microscope, they are seen to consist of threads of extreme tenuity filled with green granular matter, which is sometimes arranged in definite patterns.

Desmidiaceæ are microscopic plants, also of a green colour, with a gelatinous exterior and of very variable form. They are reproduced by division after conjugation.

Diatomaceæ are minute organisms consisting of joints or frustules of a siliceous texture, variously combined in a gelatinous medium, and generally brown in colour. These siliceous frustules are among the most beautiful of microscopic objects. But,

though individually so minute, immense beds of rock, many feet in thickness, are found to consist, mainly if not entirely, of the persistent remains of these wonderful organisms. Some species, as *Bacillaria*, have an apparently spontaneous motion, being seen to move backwards and forwards, in a jerky manner, in the field of the microscope. Hence their claim, in the opinion of some, to a place in the animal kingdom; "but," observes Mr. Berkeley, "it is now well known that even active motion is not incompatible with the nature of vegetables"; and, "Mr. Ralf's discovery of the formation of spores by conjugation in several genera has effectually put an end to controversy."

Stagnant pools, ditches, running streams, the trunks of trees, wet stones and rocks, damp paths and walls, and the surface of mud are all habitats of Diatomacæ.

The duration as living *species* and the ubiquity of the lower as compared with the higher forms of vegetable life is a remarkable peculiarity. While no remains (I believe I am correct in saying) of Phanogamous plants, nor of the higher cryptogams, specifically identical with forms now existing, have been discovered in a fossil state, except in strata of very recent formation; on the other hand, many of the siliceous skeletons of Diatomacæ, of which the Tripoli of Bilin in Bohemia is mainly composed, are found to be identical with those of species now living on the earth; and this rock is referable to the Eocene period. The *specific* life of some of the minutest vegetable organisms is thus proved to be of immense duration. So of their ubiquity. The area within which the same species of any Phanogamous plant is found growing indigenously, though greater or less according to circumstance, is markedly limited; but cryptogamous plants, specifically identical, are found contemporaneously in the most distant parts of the world, and under the most different climatic conditions.

No tree, or shrub, or herbaceous plant is found at once in Britain and in Burmah: kindred forms may indeed be found, but not identical forms: we have, for instance, *Habenarias* among Orchids, in both countries, but they are specifically distinct. It is otherwise, however, when we leave flowering plants and descend to non-flowering plants. On coming to Ferns, we at once find identity of species; and, as we descend to lower and still more lowly organized forms, the instances of identity increase in number. For example (to confine illustrations to Burma), among ferns, *Hymenophyllum Tunbridgiense*, *Adiantum Capillus Veneris*, *Pteris aquilina* and *Aspidium aculeatum* may be gathered both in England and in Tenasserim: while another fern, *Agiopteris erecta*, a Burmese species, ranges from Japan to Madagascar, and grows also in the islands of the Pacific Ocean.

Among mosses, I have gathered the following British species in Burma: *Weissia tenuirostris* (= *Tortula cylindrica*), *Fanaria hygrometrica*, *Bryum roseum*, *Fissidens bryoides*, *Pogonatum aloides*, and *Sphagnum acutifolium*: and there are doubtless many more to be added to the number, when the mosses of the country come to be thoroughly investigated. Besides the above-mentioned British species, there may be gathered, within a mile of Maulmain, a small moss, *Schistomitrium Gardnerianum*, first found on the Andes of Quito!

To come to the Alga. In the list of the species collected by Mr. S. Kurz, I recognize as British, *Spirogyra* (*Zyguema*) *quinina* and *S. decimina* (these two species are frequent in clear pools on commons and similar places in England); *Euastrum ampullaceum* and *ansatum*; *Closterium striolatum*: to which may be added *Laurencia obtusa*; *Catenella opuntia*; *Enteromorpha compressa* and *intestinalis*; *Lyngbya majuscula*; probably, also, many more, which, from my slight acquaintance with the subject, I am unable to specify.¹

¹ After the above remarks were written, and while turning over the leaves of Lyell's Principles of Geology to verify the correctness of my statement that 'Tripoli' is referable to the Eocene period, I came, singularly enough (Vol. II. p. 390), upon the following observations:—

"The fact of the ubiquitous character of cryptogamous plants deserves special attention. Linnæus observed that, as the germs of plants of this class, such as mosses, fungi, and lichens, consist of an impalpable powder, the particles of which are scarcely visible to the naked eye, there is no difficulty in accounting for their being dispersed through the atmosphere, and carried to every point of the globe where there is a station for them." And the examples given by him are these:—No less than 200

A few words are needed here by way of apology for the confused arrangement of this group of plants. I collected no Algæ whilst in Burma, and my knowledge of this Order is extremely slight. The species here enumerated and arranged were, as stated above, all collected by the late Mr. Sulpiz Kurz. He appears to have made two distinct collections, and to have sent the first to M. Martens for determination; but the second (in consequence of that gentleman's death in the interim) to M. Zeller for the same purpose. The two separate papers by Martens¹ and Zeller² were made over to me by Mr. Theobald for combination, and were found to be arranged on two different systems. Being acquainted with neither, I referred to such botanical works as I had, but failed to discover any one system with which I could bring them into agreement. In fact, no two authors appear to agree upon the method of arrangement. In addition to this, I failed to find even the names of some genera of Messrs. Martens and Zeller. It remained for me to combine the two varying catalogues to the best of my ability, guided by such aid as I could find. This, accordingly, I have done. The difficulty of this task must serve as an apology for the very unsatisfactory character of the result.—C.P.

Order DIATOMACEÆ. (Brittleworts.)

A family of Confervoid Algæ. Crystalline fragmentary bodies, angular, brittle, flat, usually nestling in slime, uniting into various forms and separating again; multiplying by their spontaneous separation. (Lindley.)

Sub-order DESMIDIEÆ.

ETASTRUM, Ehrenberg.

- E. AMPULLACEUM, Ralf.
E. ANSATUM, Ralf.

PLEUROTENIUM.

- P. TRABECULA, Ng.
P. BACULUM, de Bary.

CLOSTERIUM, Nitzsch.

- C. STRIOLATUM, Ehr.

Sub-order CYMBELLÆ. (DIATOMACEÆ), Zeller.

PODOSIRA, Ehrenberg.

- P. KURZII, Zell. Akwab, on sea-covered rocks.

Order CONFERVACEÆ. (Confervas.)

“An Order of Algæ. Vesicular, filamentary or membranous bodies, multiplied by zoospores generated in the interior, at the expense of their green matter.”

“Waterplants, commonly of a green colour, but occasionally olive, violet or red; inhabiting the ocean in some instances, but commonly found in fresh water; some of them even belonging to both kinds of fluid; some found in mud, others floating freely; most attached, in some way, on rocks as parasites.”—Lindley, Veg. Kingdom.

species of lichen were brought home from the Southern hemisphere by the Antarctic expedition under Sir James Ross, and almost every one of these was ascertained to be also an inhabitant of the Northern hemisphere, and most of them European,” p. 391. Again: “It is a remarkable fact that Dr. (now Sir Joseph) Hooker has been able to identify no less than a fifth part of Antarctic algæ (excluding the New Zealand and Tasmanian groups) with British species. Yet there is a much smaller proportion of cosmopolite species among the Algæ than among the terrestrial cellular cryptogams, such as lichens, mosses, and Hepaticæ.” The correctness of this last observation, I think, may be doubted.—C.P.

¹ List of Algæ collected by Mr. S. Kurz, in Burma and adjacent islands, by Dr. G. v. Martens, in Stuttgart, J.A.S.B. 1871, Part II, p. 461.

² Algæ collected by Mr. S. Kurz in Arrakan and British Burma, determined and systematically arranged by Dr. G. Zeller, High Councillor in Finance in Stuttgart, J.A.S.B. 1873, Part II, p. 175.

Sub-order *CHELEOPTORACEÆ*, Zeller.

GONGOSIRA.

- G. ONUSIA, Zeller. Elephant Point, on old trees.
 G. PYGMEA, Ktz. Rangoon, on submerged bricks.
 Forma *tenuis*, non ultra 1,180 lin. crassa.

CHELOPHORA, Schrenk.

- C. STRICTA, Ktz. Kadeng-choung, near Natmadhi, on submerged dead trees, and on stones in a rivulet at Khyee-thay, near Prome.
 C. TUBERCULOSA, Ktz. Swamp between Phoungyee and Kha-ya-tsu.
 C. RADIANSA, Ktz. On stems in Kyā eng, Pegu.
 C. PISIFORMIS, Ag. Swamp near Phoungyee and the Myit-ma-kha-choung, near Prome.

STIGEOCLINIUM, Kützling.

- S. TENUE, H. On stalks of *Polygonum*, in Byndor Eng.
 var. *T. gracile*, Ktz.
 S. RANGOONICUM, Zell. A cistern in Rangoon.

Sub-order *CHROOLEPIDÆ*, Zeller.

CHROOLEPTS, Agardh.

- C. TENUE, Zell. Elephant Point, on *Sonneratia apetala*.
 C. KUEZII, Zell. On leaves in evergreen forests along the Choung-mench Valley, Toung-ngoo, especially on *Alsodeia*.
 C. FUSCO-ATRUM, Zell. Same locality as last.
 C. ELONGATUM, Zell. On trees in evergreen forests on the Yē-tho stream of the Pegu range.
 C. CALAMICOLA, Zell. On leaves of *Calamus* near Rangoon.
 C. BOTRYOIDES, Ktz. On trees in the Pegu range.
 C. UMBRINUM, Ktz. On trees along the Ye-tho stream.
Protococcus crustaceus, Ktz.
 C. LAGENIFERUM, Hildebrand. Rangoon lake, on *Conferva inaequalis*.
 C. FLAVUM, Ktz. On bamboo leaves, Central (Pegu?) range,
 var. *filis tenuioribus*, articulis longioribus, *Chr. flavi et elongati* intermedium.
 Yo-mā, ad arborum corticem frequens.
 C. VILLOSUM, Ktz. On trees in hills east of the Tsittoung at 2000 to 3000 feet.

Sub-order *ULOTHRICHÆ*, Zeller.

ULOTHRIX, Kützling.

- U. SUBTILIS, Ktz. Eng-ga-na, Pegu.

SCHIZOGONIUM, Kützling.

- S. TENUISSIMUM, Zell. Chincena plantations of Martaban at 3500 feet, at Shan-toung-gyee.

Sub-order *CONFERYÆ*, Zeller and Martens.

COMPSOPOGON, Montagne.

- C. HOOKERI, Mont. Akyab, in rivulets.

CLADOPHORA, *Kützling*.

- C. MINUTISSIMA, Zell. Elephant Point.
 Perhaps only the young state of some other *Cladophora*.
 C. (ÆGAGROPHILA) CONTORTA, Zell. On a boat's bottom in the Tsittoung.
 C. EXIGUA, Zell. On *Paludinas* at Balaehoung, Pegu.
 C. CODIOLA, Zell. On trees in Eng-shwē, Pegu.
 C. TRANQUEBARIENSIS, Roth. Floating in Tē-choung. Central range.
 C. SCITULA, Schr. On seaweeds on Boronga Island.
 C. SIBEPENS, Ktz. Khayeng-mathay-choung, Pegu.
 C. JAVANICA, Ktz. Kadeng-choung, at Natmadhi.
 C. CALICOMA, Ktz. Same locality as last.

RHIZOCLINIUM, *Kützling*.

- R. OCCIDENTALE, Ktz. Mangrove swamps along the Koladyn River.
 R. ARBOREUM, Ktz. Elephant Point, or *Sonneratia apetala*,
 especially on side facing the west.
 R. HOOKERI, Ktz. Elephant Point, on mud.

CHLATOMORPHA, *Kützling*.

- C. INDICA, Ktz. On seaweeds on Boronga Island.

CONFERVA, *Linnaeus*.

- C. FUGACISSIMA, Roth. South Andaman in fresh water.
 C. BOMBYCINA, Ktz. Same locality as last.
 var. *ε subæqualis*.
 C. INÆQUALIS, Rab. Rangoon.
 C. UTRICULOSA, Ktz. Khayeng-mathay-choung.
 C. BURMANICA, Zell. Yenay-eng. Irrawaddy Valley.
 C. SUBSETACEA, Ktz. Akyab, in brackish water.
 C. RHYPOPHILA, Ktz. Eng-swē and Irrawaddy Banks.
 C. FUNKII, Ktz. Phoung-gyi.

Sub-order DIPLOSTROMIÆ, *Zeller*.DIPLOSTROMIUM, *Kützling*.

- D. TENUISSIMUM, Ktz. Elephant Point, on mangrove roots.

Sub-order ULVACEÆ, *Zeller and Martens*.PHYCOSERIS, *Kützling*.

- P. BURMANICA, Zell. Elephant Point, on mangrove roots.
 P. LOBATA, Ktz. South Andaman, on rocks at Camping Bay.

ISODERMA, *Kützling*. (PHOTODEMIACEÆ, *Martens*.)

- I. FONTANUM, Ktz. Andamans, Labyrinth Archipelago, on
 Termoklee Island, in sweet-water pools
 of dried-up creeks.

ENTEROMORPHA, *Linklater*.

- E. COMPRESSA, Lk. Arakan, frequent on the sandstone banks of
 Boronga Island. Akyab and Elephant
 Point.
 E. POLYCLADOS, Ktz. Andamans, Ross Island and Middle Straits,
 on rocks.
 E. COMPLANATA, Ktz. South Andaman, Ross Island, on rocks ;
 also Arakan, Boronga Island.
 E. INTESTINALIS, Lk. South Andaman, in brackish swamps of the
 mangrove jungles.
 var. *A. capillaris*, Ktz.

Sub-order ZYGNEMACEÆ, Zeller and Martens.

STATROSPERMUM, Thomson.

- S. FRAGILE, Zell. Rangoon lake, Kaleng-choung at Natmadhi and along Irrawaddy River.

MESOCARPUS, Hassall.

- M. SCALARIS, Hass. Eng-ga-nā, Pegu. And below Karen hamlet, Mui-hau. Southern (Pegu?) range.
M. INTRICATUS, Hass. In swamp between Ok-khan and Tsan-choung.

ZYGNEMA, Agardh.

- Z. AMPLUM, Zell. Pool between Phoung-gyi and Kha-ya-tsu.
Z. VAUCHERII, Ag. Kyā-eng, Pegu.
Z. STILLINUM, Ag. Tōnk-yan, near the Bala-choung.

SPIROGYRA, Agardh.

- S. TROPICA, Ktz. Akyab, in brackish water.
S. QUININA, Ktz. Akyab, in brackish water.
var. β *inaequalis*, Næg. Beeling. Kadeng-choung, near Kway-ma-kheing, Pegu.
S. DECIMINA, Ktz. Toung-naweng-choung, Prome, on rocks in the Irrawaddy. Myoma. Kha-ya-ton in brackish, and Akyab in sweet water.

A very common *Alga* in Burma, especially on river flats.

Forma *crassior*, filis sterilibus ad 1/38 lin. crassis. Pegu, in montibus Yomæ centralis, Wā-tha-bwöt-choung, in fluvio frequens.

S. MARGINALIS, Ktz.

S. ELONGATA.

Kyi Tay, on the Irrawaddy, Prome, and Akyab in stagnant or sluggish waters.

S. MAMUSCULA, Ktz.

A marsh near Thoun-gyi.

S. JUGALIS, Ktz.

Kyā-eng and Akyab, with *Oscillaria viridis*.

S. CRASSA, Ktz.

A lake near Rangoon.

S. IRREGULARIS, Næg.

Khay-eng-mathay-choung, Pegu range, and in brackish creeks, near Rangoon.

S. ADNATA, Ktz.

Po zwōn-doung. Bala-choung. Pegu.

S. NIIDA, Dillw.

In a marsh between Ok-khan and Thean-choung, Pegu; also at Khyi-tay near Prome, and stagnant water along the Koladyne Valley.

S. SUBÆQUA, Ktz.

Arakan, Koladyne Valley, in stagnant waters.

RHYNCHONEMA, Zeller (?).

R. KURZII, Zell.

Eng-ga-nā, Pegu.

Sub-order PALMELLACEÆ, Zeller and Martens.

GLEOCAPSA, Kützinger.

G. LUTEO-FUSCA, Mart.

Dry bed of the Med-za-li-choung, Pegu.

PALMELLA, Lyngbye.

P. SUBSALSA, Mart.

On brackish flats along the Koladyne R.

MICROCYSTIS, Kützinger.

M. ÆRUGINOSA, Ktz.

In a freshwater pool near the Koladyne R.

PLEUROCOCCUS, Meneghini.

P. (PROTOCOCCUS) VULGARIS, Menegh. Walls of Circuit House, Rangoon.

Sub-order *SIROSIPHONACEÆ*, Zeller.*SIROSIPHON*, Zeller.

- S. PARASITICUS*, Zell. Evergreen forests on the Choung-mench stream, Pegu range. On leaves.

Sub-order *SCYTOMENACEÆ*, Zeller.*SCYTONEMA*, Agardh.

- S. AUREUM*, Menegh. Elephant Point, between Rangoon and San-ji-wā and the Kayeng-mathay Stream
- S. CINEREUM*, Menegh. On old Pagodas about Pegu and Kyā-eng.
var. β *Julianum*, Rab. (*Drilosiphon Julianus*, Ktz.). Pegu. Central Ranges.
- S. GRACILE*, Ktz. On Irrawaddy Flats, and a cistern at Palay-kweng.
- S. TOMENTOSUM*, Ktz. Rangoon, on trees.
- S. PEGUANUM*, Martens. Pegu, and Phoung-gyi, on trees.
- S. VARICUM*, Ktz. Choung-mench stream and Wā-choung, at Pazwōn-doung.
- S. VIEILLARDI*, Mart. Akyab, in dried-up brackish marshes.
- S. FULVUM*, Zell. Rangoon, on leaves of *Calamus*, and on trees in the hills.
- S. FUSCUM*, Zell. San-u-way, near Rangoon, in rice fields and in Choung-mench and Wā-choung.
- S. KURZIANUM*, Zell. On trees on the Pegu Range.
- S. MURALE*, Zell. On walls of Circuit House, Rangoon.
- S. OLIVACEUM*, Zell. Cracks in sandstone on the Zaymeni-choung.
- S. PARVULUM*, Zell. On sandstone in the Pegu Range.
- S. (SYMPHOSIPHON) RHIZOPHORE*, Zell. On trees, especially *Sonneratia apetala*, in mangrove swamps at Elephant Point.
- S. SUBCLAVATUM*, Zell. On old brickwork in Henzada.
- S. VIOLASCENS*, Zell. On clay along the Choung-mench Stream.

Sub-order *MASTIGOTHIRICHEÆ*, Zeller.*SCHIZOSIPHON*, Kützling.

- S. PARIETINUS*, Næg. Akyab, on the walls of the old lighthouse.

MASTIGOTHRIX, Kützling.

- M. ERUGINEA*, Ktz. On dead trees in Yenay-eng, Pegu.

Sub-order *RIVULARICEÆ*, Zeller.*RIVULARIA*, Reth.

- R. PEGUANA*, Zell. On submerged dead trees in Kadeng-choung, near Natmadhi.

GLEOTRICHIA, J. Agardh.

- G. KURZIANA*, Zell. Akyab, on freshwater plants.

Sub-order *SPERMOSIRIEÆ*, Zeller.*CYLINDROSPERMUM*, Kützling.

- C. HUMICOLA*, Ktz. On river mud at Khyoung-gyi on the Irrawaddy.
- C. MACROSPORUM*, Ktz. Floating in the Kadeng-choung near Natmadhi.

ANABAINA, *Ad. Jussieu.*

- A. BULLOSA, Ktz. Tsittoung Valley. Toung-ngoo. Po-zwōn-doung, and in mud at Bala-choung.
 A. FLOS-AQUÆ, Ktz. Hlein River, between Byn-dor Hscāt and The-ong-choung.
 A. STAGNALIS, Ktz. In the Hlein River near Byn-dor Eng, and Khyoung-gyi on the Irrawaddy.
 A. SUBTILISSIMA, Ktz. On mud of tidal creeks, Rangoon.
 A. INDICA, Zell. Akyab, on brackish mud and sand of Yē-tho-choung, and streams in the Pegu range.

Sub-order NOSTOCHEÆ, *Zeller.*NOSTOC, *Fauchro.*

- N. (HORMOSIPHON) ELLIPSOSPORUM, Rab. Whay-do stream, Pegu range.
 var. *Vaginis achromaticis.*
 N. GRANULARE, Rab. Elephant Point, in stagnant freshwater.
 N. PURPURASCENS, Ktz. Floating in Kadeng-choung, near Natmadhi.
N. rufescens, Ag., forma purpurascens.
 N. RIVULARE, Ktz. Moist rocks in Kōn-choung, Pegu range.
 N. HETEROTHRIX, Zell. Po-zwōn-doung; Bala-choung; Khyoung-gyi.
 An *Hormosiphon heterothrix*, Ktz.? gyi.
 N. KURZIANUM, Zell. West slopes on Wā-tha-bwōt-choung, Pegu range.
 N. LIMOSUM, Zell. River flats on the Irrawaddy and Hleing.
 N. SAXATILE, Zell. Moist rocks on the Kayeng-mathey-choung, Pegu range.

Sub-order OSCILLARIEÆ, *Zeller.*SYMPLOCA, *Kützling.*

- S. KURZIANA, Zell. On the bottom of a boat on the Myit-nan stream, at Thabyē-gōn.
 S. LUTESCENS, Zell. Irrawaddy flats, and bottom of boats in the Hleing River.

SIROCOLEUM, *Zeller.*

- S. INDICUM, Zell. On sea-washed rocks, Akyab.

HYDROCOLEUM, *Kützling.*

- H. MENEGHINIANUM, Ktz. Elephant Point, in mangrove swamps.
 H. SIRIATUM, Zell. Swampy stream at San-ji-wā, near Rangoon.

LYNGBYA, *Agardh.*

- L. PALLIDA, Zell. On submerged rocks, Wathay-bwōt-choung, Pegu range.
 L. MAJUSCULA, Dillw. Hill streams, east of Toung-ngoo.

CITHONOBLASTUS, *Kützling.*

- C. KURZII, Zell. Elephant Point, in mangrove swamps, and adhering to the larger sea-weeds.
 C. BURMANICUS, Zell. On the walls of a cistern, near Henzadah.
 C. LYNGBYEI, Ktz. Akyab, on sea-washed rocks.

PHORMIDIUM, *Kützing*.

- P. ARENARIUM, Rab.
P. thinoderma, Ktz. Akyab, on brackish mud.
 P. INCUNDATUM, Ktz. On the wall of a cistern, near Henzadah.
 P. PAPHYRINUM, Ktz. Hill streams of Arakan and in freshwater
 on Boronga Island.
 P. ORYZETORUM, Mart. Floating in tanks and rice fields in Arakan.

OSCILLARIA, *Boer*.

- O. ANTILLARUM, Ktz. Akyab, in brackish swamps.
 O. BREVIS, Ktz. Kadeng-choung, near Natmadhi, and near
 Kyā-eng, in freshwater.
 O. CHALYBEA, Martens. Marshy spots between Wā-choung and
 Kha-ya-tsu.
 O. GRATELOUPII, Bory. Elephant Point, in freshwater, and Akyab.
 O. SANCTA, Ktz. On wet walls of a cistern, near Henzadah.
 O. VIOLACEA, Wallr. On freshwater mud, Rangoon.
O. fenestralis, Ktz. On freshwater mud, Rangoon.
 O. VIRIDULA, Zell. Htou-kya-gat, east of Tsittoung River in the
 Hpet-wun-choung, covering the stones
 in dense dark green patches.
 O. GRANULOSA, Martens. In freshwater, Akyab.
 O. VIRIDIS, Vauch.
O. tenuis, Ag.

Sub-order LEPTOTHIRICHEÆ, *Zeller*.LEPTOTHRIX, *Kützing*.

- L. OCHRACEA, Ktz. Pegu Range, in various spots. Kha-deng,
 Thayet and Wā-choung.

HYPHOTHRIX, *Kützing*.

- H. ERUGINEA, Rabenh. In spring near Kyn-ba-li-choung Pegu.
 H. CALCICOLA, Ag. On an old brick wall at Henzadah.
 H. (LEPTOTHRIX) SUBTILISSIMA, Rab. Damp walls near Henzadah.
 H. VIRIDULA, Zell. Marsh at Wanēt, Pegu.

Sub-order CHROOCOCCEÆ, *Zeller*.CHROOCOCCUS, *Kützing*.

- C. (PROTOCOCCUS) MINOR, Ktz. Elephant Point, on *Sonneratia apetala*.
 C. INDICUS, Zell. Forest swamp, Prome.
 C. GRANULOSUS, Zell. Dry river bed near Thabyē-gōn.

SYNECHOCOCCUS, *Zeller*.

- S. FUSCUS, Zell. Thyt-kouk Stream, Hpet-wun-choung.

APHANOCAPSA, *Næg*.

- A. ALBIDA, Zell. Floating in putrescent salt swamps, Akyab.

It is only of late years that the extraordinary importance in the order of nature of several minute Algæ is beginning to be fully realized, but it is now pretty well established that various diseases are the result of the development in the body, of particular species of minute organisms, each species producing its appropriate effects

in the body wherein it is developed.¹ The organisms in question are referred by Cohn to the genus *Micrococcus*, whose cells increase by catenate subdivision or division in one direction only, and the cells of the different species are so similar that specific characters have to be sought for, in the chemical reaction they produce on substances brought in contact with them. The following species are enumerated in the paper quoted.

MICROCOCCLUS (MONAS) PRODIGIOSUS, Ehrenburgh.

Colourless cells imbedded by thousands of millions in a gelatinous mass, at first rose-red, deepening to blood-red, and alternately turning pallid. The colouring matter is soluble in alcohol, but not in water, and when separated, is orange-red, turned carmine by acids, and yellow by alkalies. In the spectroscope it shows a broad absorption band in the green.

This red jelly grows on nitrogenous substances, as cooked potatoes, meat, bread, eggs, paste, and such like, and is known as 'blood rain.'

M. (BACTERIDIUM) LUTEUS, Schröter.

On solid substances this forms yellow globules the size of a poppy seed, increasing to that of half a peppercorn, and drying up into flat umbilicate disks. On fluids it forms a thick yellow skin. Colouring matter insoluble in water, and unchanged by sulphuric acid or alkalies.

M. (BACTERIDIUM) AURANTIACUS, Schröter.

On solids, as on cooked potatoes and eggs, this forms orange-coloured drops, and on fluids a golden-yellow skin. Colouring matter soluble in water.

M. FULVUS, Cohn.

Rusty-coloured drops which expand into gelatinous masses. Grows on horse dung.

M. CHLORINUS, Cohn.

Green or yellowish-green masses on cooked eggs, or in fluids forming sap-green layers, which by degrees colour the whole fluid yellow-green. The colouring matter is soluble in water and not reddened by acids.

M. (BACTERIDIUM) CYANEUS, Schröter.

Forms blue patches on cooked potatoes. In fluids, at first it turns them greenish and then blue. The colouring matter is soluble in water, at first verdigris-green and then clear blue, turned by acids to intense carmine.

M. (BACTERIDIUM) VIOLACEUS, Schröter.

Forms on cooked potatoes violet-coloured gelatinous drops.

The following species are important and interesting from the part they play in the production of fermentation and disease.

M. UREA, Cohn.

Forms a film on urine. Fresh urine allowed to stand at a temperature of 30° Centigrade, in a few days loses its acid reaction, becomes neutral, and ultimately alkaline. The *Urea* disappears and is replaced by carbonate of ammonia, and the alkaline *Urates* and *Phosphates* of ammonia are eliminated. These changes only take place when the *M. urea* is present.

M. (MONAS) CREPESCULUM, Ehr.

Common on putrefying fluids.

M. CANDIDUS, Cohn.

Forms snow-white spots on cooked potatoes.

M. (MICROSPHERA) VACCINÆ, Cohn.

This organism is undoubtedly the active principle in vaccine lymph. It exists

¹ See Science Gossip for July, 1882, for a popular account of these organisms, extracted from "Kryptogamen Flora," by Dr. L. Rabenhorst.

in fresh vaccine lymph of either man or animals, and also in the matter of true small-pox. If vaccine lymph is strained or filtered to eliminate the *Micrococcus* cells or corpuscles, the lymph loses its power of producing cow-pox. The lymph also loses its power by putrefaction, during which process the *Micrococcus* disappears under the action of the putrefactive *Bacteria*. This species is a true animal ferment, and is probably only one of a numerous class of similar organisms which constitute the true origin of various diseases.

M. DIPHTHERITICUS, Cohn.

This species is developed on wounds, and also on the various mucous surfaces in *Diphtheria*. Once established, it spreads rapidly by means of the lymphatic vessels, and produces the most destructive and fatal results.

M. (MICROSPORON) SEPTICUS, Klebs.

Developes on suppurating wounds and putrefying surfaces, and is the active agent in producing *pyæmia* and *septicæmia* in man and animals.

M. (MICROZYMA) BOMBYCIS, Béchamp.

This species is developed in the intestines of silk-worms, causing a fatal and contagious plague in those insects.

Such are some of the enemies by which animals are surrounded and threatened, but there is little doubt that to other similar species of minute vegetable organisms are due the most formidable diseases which threaten man—Leprosy, Consumption, Typhus, and many others.

Order FUCACEÆ. (Sea-wracks.)

“Olive-coloured inarticulate sea-weeds, whose reproductive organs are borne in stalked sacs upon the walls of the spherical cavities excavated in the substance of the frond. Fructification, *Sporangia* or spore-sacs and *Antheridia*. The spores of *Fucus* divide into two, four, or eight within the sac; those of other genera remain undivided. The Antheridia are filled with spermatozoids (or antherozoids), which in *Fucus* have been seen to fertilize the spores.”—Griffith and Hentrey.

“Cellular or tubular unsymmetrical bodies, multiplied by simple spores formed externally.”—Lindley.

Sub-order ENTOCARPEÆ, Martens.

SPHACELARIA, Lyngbye.

S. FURCIGERA, Ktz. South Andaman, Camping Bay.
Parasitic on *Sargassum aquifolium*.

Sub-order GALAXAUREÆ, Martens.

GALAXAURA, Lamouroux.

G. PLICATA, Ktz. South Andaman. Frequent on coral reefs,
and often thrown up on the beach.
G. MARGINATA, LX. South Andaman, Ross Island.
G. TOMENTOSA, Ktz. South Andaman, at Camping Bay.
G. OBLONGATA, LX. South Andaman, Ross Island.

Sub-order SARGASSEÆ, Martens.

SARGASSUM, Agardh.

S. MICROCYSTUM, Ktz. (?) South Andaman, and along the coast.
Kurz remarks that he was unable to find this species full grown.
S. ÆQUIFOLIUM, Ag. South Andaman, Camping Bay.
S. WIGHTII, Grev. South Andaman, South Corby's Cove.

CARPACANTHUS, *Kützling*.

- C. ILICIFOLIUS, Turner. Andamans. Labyrinth Archipelago, near Termoklee Island, in deep water.

TURBINARIA, *Bory*.

- T. TRIQUETRA, Y. Ag. Nicobars. South Andaman, at South Corbyn's Cove.
T. CONDENSATA, Sonder. South Andaman, at South Corbyn's Cove.

Sub-order *HILDENBRANDTIACEÆ*, *Zeller*.HILDENBRANDTIA, *Kützling*.

- H. ARAKANA, Zeller. Akyab, on sea-washed rocks.

Sub-order *DICTYOTEÆ*, *Martens*.ZONARIA, *Agardh*.

- Z. FRASERI, Grev. South Andaman and Arakan coast on rocks, and marine sandstone banks.

Sub-order *BATRACHOSPERMEÆ*, *Martens and Zeller*.BATRACHOSPERMUM, *Roth*.

- B. GUIANENSE, Montg. South Andaman, above Watering Cove.
B. MONILIFORME, Roth. Hill streams near Kyā-eng, and marsh near Phoungyi, Pegu.

Sub-order *CHANTRANSIÆ*, *Zeller*.CHANTRANSIA, *Fries*.

- C. ROSEOLA, Zell. On stems of *Polygonum*, in Byndor Eng, Pegu.

Sub-order *ÆDOGONIACEÆ*, *Zeller*.ÆDOGONIA, *Linklater*.

- Æ. KÜRZII, Zell. Marsh near Wanet, Pegu.
Æ. VESICATUM, Link. Zamayi-choung, and Eng-ya-na, Pegu.
var. *G. fuscescens*, Ktz. On roots of plants in Kyā-eng, Pegu.
Æ. TENELLUM, Ktz. In swamps and ditches, near Htoukyān-gyi, Rangoon.
Æ. SCUTATUM, Ktz. On roots of plants in Kyā-eng, Pegu.
Æ. ROTHII, Bréb. Floating on the 'Lake,' Rangoon.
Æ. LANDSBOROUGHII, Ktz. Htoukyān, near Rangoon
Æ. GRACILE, Ktz. On trees at Eng-shwē, below Henzada.
Æ. BRAUNII, Ktz. Eng-shwē, and Kadeng-choung, near Natmadhi.
Æ. APOPHYSATUM, A. Br. Kyā-eng, Pegu.

BULBOCHETE, *Agardh*.

- B. PEGUANA, de Bory. On rocks in Kam-balu-toung, Pegu range.
B. INTERMEDIA, Zell. Kyā-eng, Pegu.

Sub-order *VAUCHERIEÆ*, *Martens and Zeller*.VAUCHERIA, *De Candolle*.

- V. SUBMARINA, Berkeley. Koladyne River, in brackish water, clothing the rocks in dense green patches.
V. SESSILIS, D.C. Htou-kyā-gat, in streams.
V. CLAVATA, D.C. Andaman Islands, in sweet waters.

HALYMEDA, *Lamouroux*.

- H. CUNEATA, Ktz. Andamans, Termoklee Island, Labyrinth Archipelago.
 H. OPUNTLE, LX. South Andaman, Diamond Island.
 H. DISCOIDEA, Bene. South Andaman, etc. Frequent on coral reefs all along the coast.

BRYOPSIS, *Lamouroux*.

- B. PACHYNEMA, Mart. South Andaman, in mangrove swamps towards Birdnest Cape.
Falonis confervoides, Harv.
 B. TENUSSIMA, Notaris. Camping Bay, South Andaman, on sandstone.

Order CERAMIACEÆ. (Rose-tangles.)

“Rose-red or purple sea-weeds, with a filiform frond, consisting of an articulated, branching filament, composed of a string of cells, sometimes coated with a stratum of small cells. Fructification: 1. *Berry-like receptacles*, with a membranous coat, containing numerous spores. 2. *Tetraspores* attached to the ramuli or more or less immersed in the substance of the branches, scattered. 3. *Antheridia*, produced in the same situations as the spores.”—Griffith and Henfrey.

“Cellular or tubular unsymmetrical bodies, multiplied by tetraspores.”—Lindley.

Sub-Order DELESSERIEÆ, *Zeller and Martens*.AGLAGOPHYLLUM, *Montagne*.

- A. MULTIPARTITUM, Ktz. South Andaman.

HYPOGLOSSUM, *Kützling*.

- H. BENGALENSE, Mart. Elephant Point, on trees.
 H. LEPRIEURII, Ktz. Elephant Point, in mangrove swamps.
 H. VIELLARDI, Ktz. Arakan, frequent on sandstone rocks and old branches, or on the submerged mangrove stems, not only in the tidal channels of Koladyne River, but also along the sea coast.
 Perhaps only a juvenile state of
H. Leprieurii.

Sub-order LAURENCIEÆ, *Martens*.LAURENCIA, *Martens*.

- L. OBTUSA, LX. Arakan, on marine sandstone banks of Boronga Island.

BOSTRYCHIA, *Montagne*.

- B. INTRICATA, Mont. Elephant Point, in mangrove swamps.
 B. RIVULARIS, Harvey. Elephant Point, in mangrove swamps.

Sub-order POLYSIPHONEÆ, *Martens and Zeller*.POLYSIPHONIA, *Greville*.

- P. SUBADENCA, Ktz. Elephant Point, in mangrove swamps.
 var. MAJOR, “ramis crebrioribus minus strictis.”
 P. RUFO-LANOSA, Harvey. Akyab, on grasses.

Sub-order TYLOCARPEÆ, *Martens*.GYMNOGONGRUS, *Martens*.

- G. PYGMEUS, Grev. Arakan, on marine sandstone banks of Boronga Island.

Sub-order *SPHEROCOCCEÆ*, *Martens*.SPHEROCOCCUS, *Linnaeus*.

- S. MULTIPARTITUS, Ag. South Andaman.
 var. *lichenoides*,
Fucus aruginosus, Turner. Often washed up by the sea.
 S. LICHENOIDES, L. South Andaman and Termoklee Island.
 An edible species often thrown up by the sea.
 S. LEMANIA, Ktz. Arakan, on marine sandstone banks.
 S. CONFEROIDES, Ag. On rocky shores of Boronga Island.
 S. PUMOSUS, Ktz. On marine sandstone banks of Boronga Island.

Sub-order *GELIDEÆ*, *Martens and Zeller*.ACROCARPUS, *Kützinger*.

- A. INTRICATUS, Ktz. Akyab, on sea-washed rocks. South Andaman and Termoklee Island, on submerged mangrove stems.
 A. PUSILLUS, Ktz. On marine sandstone banks of Boronga Island.

HYPNEA, *Lamouroux*.

- H. SPINELLA, J. Ag. Diamond Island and Arakan.
 H. MUSCIFORMIS, LX. Diamond Island.
 H. DIVARICATA, Grev. Diamond Island.

Sub order *GIGARTINEÆ*, *Martens*.GIGARTINA, *Lamouroux*.

- G. (EUCHEMA) SPINOSA, Ag. Andamans, Termoklee Island.
Fucus lichenoides, Willd. non. L.

CHONDROCOCCUS, *Kützinger*.

- C. SPINULOSUS, Ktz. South Andaman and Ross Island.

GRATELOUPIA, *Agardh*.

- G. FURCATA, Ktz. Arakan, marine sandstone banks of Boronga Island.

Sub-order *GYMNOPILOACEÆ*, *Martens*; *HALYMENIÆ*, *Zeller*.HALYMENIA, *Agardh*.

- H. TENUISPINA, Ktz. Andamans, Labyrinth Archipelago, Termoklee Island, ejected from the sea, parasitic on other sea-weeds.

Kütz remarks: "*Dumontia robusta*, β . *Wightii*, J. Ag., was found by Wichura, in the Bay of Bengal, and most likely occurs also in Burmese waters."

CATENELLA, *Greville*.

- C. OPUNTIA, Grev. Elephant Point, on stumps in swamps.

Sub-order *CORALLINEÆ*, *Martens*.JANIA, *Lamouroux*.

- J. ADHERENS, LX. South Andaman, coral reefs at Camping Bay.
 J. FASTIGIATA, Harvey. South Andaman, at Camping Bay, and at South Corbyn's Cove.

AMPHIROA, *Lamourour*.

- A. TRIBULUS, Lx. Thrown up on Diamond Island, hitherto known only from St. Croix, Antilles.
 A. FRAGILISSIMA, Lx. South Andaman, at Camping Bay.

Sub-order CERAMIEE, *Martens and Zeller*.HERMOCERAS, *Kützling*.

- II. FLACCIDUM, Harvey. In crevices of rocks on Boronga Island.

GONGROCERAS, *Kützling*.

- G. RADICANS, Zell. Elephant Point, in mangrove swamps.

Of the edible seaweeds Kurz remarks: "The seaweeds commonly eaten by the Burmans are *Gigartina spinosa*. GREY. (*agar agar* of the Malays), and *Spharococcus lichenoides*, Ag. (Ceylon moss of commerce). These are usually called by the Burmese *Kyauk puen*."

The latter of these is, I presume, the species alluded to by Dr. Mason under the name *Plocaria candida*, and which seems to be superior to most other species, in being free from the bitter principle, which renders most species so nauseous.

According to an analysis by Dr. O. Shaugnessy, this seaweed is composed of

Vegetable jelly	54	5
Starch	15	0
Woody fibre	18	0
Gum	4	0
Sulphate and muriate of soda	6	5
Sulphate and phosphate of lime	1	0
	<hr/>	
	99	0

Of the best method of preparing it, Dr. O'Shaugnessy remarks: "In the first place, from the tendency of *pectin* or vegetable jelly to form insoluble compounds with saline and earthy bases, it is necessary to steep this fungus for a few hours in cold rain-water as the first step in its preparation. This removes a large portion of the sulphate of soda, leaving all the gelatine and starch. It should next be dried by the sun's rays and ground to a fine powder. Cutting or pounding, however diligently or minutely performed, still leaves the amylaceous globules so mechanically protected, and so closely involved in an external sheath of tough ligneous fibre, that scarcely a particle of the starch can be extracted by boiling, even though the decoction is prolonged for several hours. When ground to powder, boiling for twenty-five minutes or half an hour dissolves all the starch and gelatine. The solution while hot should be passed through muslin or calico, and thus the ligneous fibre is removed; lastly, the strained fluid should be boiled down till a drop placed on a cold surface gelatinizes sufficiently." The product thus strained may then be eaten with milk and sugar and flavoured with lemon juice and sherry. According to Balfour's *Cyclopædia of India* (see *Agar Agar*), the quantity annually shipped from Singapore averages 10,000 piculs or rather less than 400 tons, and all this goes to China, where it is used in place of size, for dressing cotton goods, and the finer varieties are also employed to make a jelly or sweetmeat, called in Canton *Wong-leung-fan*. It is an article of export that deserves more attention than it has received, as likely to prove of use in the arts in Europe if once introduced to notice, much as it is in China. The selling price of the first quality is sixteen shillings a hundredweight, and of the second ten shillings. It is said, when used as a paste, not to be liable to the attacks of insects, but this, if it is, as described, an edible amylaceous compound, seems hardly probable.

The economic value, however, on the whole, of seaweeds is not great. The ashes of seaweeds yield soda and iodine, and the weed itself is used near the coast

for manure, and even it is said for food for cattle, who perhaps in some places may acquire a taste for it. It was once supposed that the 'edible bird's nest' was formed of a species of gelatinous seaweed, but it is now well known that it is composed of interlacing threads of salivary mucus, developed periodically in varying amount, by several species of *Collocladia*. Laver, once so much esteemed by people of scrofulous habit, is a seaweed (*Porphyra vulgaris*), but the use of seaweed as a medicinal agent, together with burnt sponge, has fallen out of fashion since the discovery of the active ingredient in both, *iodine*, to which their efficacy in scrofulous complaints was due. A revival has however taken place of late in the form of a nostrum barbarously named 'anti-fat,' which is believed to mainly consist of a preparation of the common bladder-weed of the English coast. That there is urgent need of some such medicine is unquestionable, since from the vast number of quack medicines advertised in the most blatant fashion in every periodical, it is certain that the number of persons who support such a system and consume such trash must be enormous, a fact which affords the strongest evidence of in how many cases, the undesirable adiposity of their muscular system must have spread to and permeated their brains as well.

FUNGI.

Cellular flowerless plants, deriving nourishment through their spawn or *mycelium*, which consists of a mass of loose, delicate, branched and interlacing threads of a cottony texture (readily seen in earth which contains what is called "mushroom spawn"), and propagated by means of minute spores. Fructification various.

"A large class of cryptogams distinguished from Algae, more by habit than by general character. They agree with them in their cellular structure, which is void of anything like vascular tissue, except in very few cases, while they differ in their scarcely ever being aquatic, in deriving nutriment from the substance on which they grow, and in the far lower degree of development of the organs of impregnation." "The uses of Fungi are various. They afford excellent and stimulating food, valuable medicine, besides less important assistance in domestic economy. Their office in the organized world is to check exuberant growth, to facilitate decomposition, to regulate the balance of the component elements of the atmosphere, to promote fertility, and to nourish myriads of the smaller members of the animal kingdom. They occur in every part of the world where the cold is not too intense to destroy their spawn, or where there is sufficient moisture, though they abound most in moist temperate regions where the summer is warm."—*Berkeley*.

The species named in the following catalogue are, for the most part, those collected by the late Mr. Sulpiz Kurz, as named and described by the late Frederick Currey, F.R.S., in the Linnean Society's Transactions, from which they have been copied. The greater number were collected in Burma; a few in Bengal. These last I have left standing in the list, as, in all probability, they will one day be found in Burma also. A few species, collected by myself, and recently named for me by Mr. M. C. Cooke, have been added to the list, and inserted in their proper places. They are distinguished by the initial P.

Agaricini.

AGARICUS (LEPTOTA) CONTINUUS, Berk.	Maulmain, P.
A. (PSALLIOTA) CAMPESTRIS, L.	Maulmain, P.

This, the genuine English Mushroom, used to make its appearance in my compound in Maulmain, during the rainy season, on rare occasions and after long intervals, very much to my surprise. I can recollect only three or four such in the course of some twenty years. On each occasion it was in or near the same spot, at the foot of a tree and at the bottom of a steep bank where, year after year, I used to heap up all the fallen leaves I could collect to make vegetable mould. Suddenly, on some day in the rains, two or three mushrooms of a small size would appear in the gravel path near the decayed leaves; but my hopes of a succession were always disappointed, as

after that one day's display, there would be no more perhaps for two or three or six years! I never saw any on or near the stable dung, where one might more naturally have expected to find them; nor did I ever hear of any other person having found them; that is to say—if they were observed also by others, as they may well have been, I never heard of it.

“Some persons have inferred, from the springing up of mushrooms whenever particular soils and decomposed organic matter are mixed together, that the production of Fungi is accidental” (spontaneous?) “and not analogous to that of perfect plants. But Fries, whose authority on these questions is entitled to the highest respect, has shown the fallacy of this argument in favour of the doctrine of equivocal generation. ‘The sporules of Fungi,’ says this naturalist, ‘are so infinite that in a single individual of *Reticularia maxima*, I have counted above ten millions, and so subtle as to be scarcely visible, often resembling thin smoke; so light that they may perhaps be raised by evaporation into the atmosphere, and dispersed in so many ways by the attraction of the sun, by insects, wind, elasticity, adhesion, etc., that it is difficult to conceive a place from which they may be excluded.’”¹

If we grant full weight to this statement, it still remains a most remarkable and in many ways unaccountable fact, that the mushrooms in my compound should have come up after intervals of several years, in the very same place, and (as far as my observation went) nowhere else; especially as, being gathered by me as soon as seen, they had no opportunity of ripening and shedding their sporules. After their first arrival on the spot, it must be presumed that their vitality lay dormant in the *Mycelium* underground.

A. (HYPHOLOMA) APPENDICULATUS, Fr.	Maulmain, P.
LENTINUS COADUNATUS, Hook. fil.	Maulmain, P.
L. CAPRONATUS, Fr.	Myo-dwyn, Pegu.
L. DESCENDENS, Fr.	Htou-kye-gat, Pegu.
L. FURFUREOSUS, Fr.	Pegu Yo-mā Range.
L. VELUTINUS, Fr.	Pegu Yo-mā Range.
L. GLABRATUS, Mont.	N. Rajmahal Hills, Bengal.
L. SAJOR CAJU, Fr.	S. Andaman.
(Malay name for the plant).	
L. EXILIS, Fr.	Htou-kye-gat, Nakawa. Pegu.
L. INGUINANS, Berk.	Kemendine, Rangoon.
L. KURZIANUS, Currey.	Pegu Yo-mā Range.
L. CÆSPITOSUS, Currey.	Pegu.
L. IRREGULARIS, Currey.	Pine forests, Karen country.
MARASMIUS PARISHII, Cooke.	My compound, Maulmain, P.
M. BURMENSIS, Cooke. ²	My compound, Maulmain. P.
SCHIZOPHYLLUM COMMUNE, Fr.	Botanic garden, Calcutta. Ross Island, Andamans. Htou-kye-gat, Pegu. K. Maulmain. P.
LEUZITES ALBIDA, Fr.	Htou-kye-gat, Pegu.
L. PALISOTI, Fr.	Seven Pagodas, Toung-ngoo. Htou-kye-gat.
L. OCHROPHYLLA, Berk.	Maulmain. P.

Polyporei.

POLYPORUS (MESOPUS) PERENNIS, Fr.	Sent by Dr. Stoliczka from Penang.
P. (MESOPUS) XANTHOPUS.	Nakawa. Htou-kye-gat. Tsittoung Valley. Yo-mā. S. Andamans. K. Maulmain. P.
P. (MESOPUS) FLORIDEUS, Berk. ³	Pegu. Bookce, Karen Hills.
P. (MESOPUS) HYPOBLASTUS, Berk.	Hōwrah, Calcutta, on bamboo.
P. (MESOPUS) CRASSIPES, Currey.	Pegu Yo-mā.
“Only a young state of <i>P. xanthopus</i> ,” Cooke.	

¹ Whole passage extracted from Lyell, Principles of Geology, vol. ii. p. 391.

² Allied to *M. ramentis*, but certainly not the same.—Cooke.

³ First found by Spruce at Panuré, Amazon, S. Am.

- P. (MESOPUS) ANTHELMINTICUS, Berk. At the base of old bamboos. Used as an
Burm. *Thau-mo*. anthelmintic.
P. (PLEUROPIUS) SANGUINEUS, Fr. Matlah, Lower Bengal, Kurz, Maulmain. P.
P. (PLEUROPIUS) MODESTUS, Yo-mā Range.
P. (PLEUROPIUS) FLABELLIFORMIS, Kl. Yo-mā Range.
P. (PLEUROPIUS) AFFINIS, Fr. Yo-mā Range. Bookee, Karen Hills.
P. (PLEUROPIUS) PICIPES, Fr. Botanic Garden, Calcutta.
P. (PLEUROPIUS) LUCIDUS, Fr. Botanic Garden, Calcutta.
P. (PLEUROPIUS) AMBOINENSIS, Fr. Pegu, Karen Country.
P. (PLEUROPIUS) SPLITGERBERI, Mont. Nat-toung, Toung-ngoo.
P. (PLEUROPIUS) BRUNNEO-PICTUS, Berk. Arakan, on old wood.

Anodermei.

- P. (APUS) FUNALIS, Fr. Lower Bengal.
P. (APUS) RUBIDUS, Berk. Pegu.
P. (APUS) PEGUANUS, Mont. Maulmain. P.
P. INCERTUS, Currey. Loc. ?

Placodermei.

- P. APPLANATUS, Fr. Htou-kye-gat, Toung-ngoo.
P. MARGINATUS, Fr. Pine Forests, Bookee.
P. PERSOONII, Fr. Pegu, Kurz. Maulmain. P.
P. HOLOSCLERUS, Berk. Yo-mā Range, Myo-dwyn.
P. PARISHII, Berk. Maulmain. P.
P. CINEREO-FUSCUS, Currey. Nakawa, Pegu.

Inodermei.

- P. CUINABARINUS, Fr. Botanic Garden, Calcutta.
P. SCRUPOSUS, Fr. Martaban Hills.
P. FECI, Fr. Pegu Yo-mā.
P. VERSICOLOR, Fr. Sikkim, Himalaya.
P. PINSITUS, Fr. Nat-toung, Toung-ngoo.
P. ANEBUS, Berk. Htou-kye-gat, Pellowa.
P. XEROPHYLLACEUS, Berk.¹ Botanic Garden, Calcutta.
TRAMETES LOBATUS, Berk. Sikkim Terai, on old logs.
T. UMBRINUS, Currey. Nakawa. Htou-kye-gat, Pegu.
T. OCCIDENTALIS, Fr. Botanic Garden, Calcutta, on old logs.
T. CINGULATUS, Berk. Pegu Yo-mā.
DEDALIA TENUIS, Berk. Pegu Yo-mā.
D. DISCOLOR, Fr. Pegu Yo-mā.
D. ZONATA, Fr. Pellowa. Htou-kye-gat, Pegu.
HEXAGONIA POLYGRAMMA, Mont. Pellowa. Htou-kye-gat.
H. KUIZI, Currey. Matlah, Bengal.

Hydnei.

- HYDNUM UDEM, Fr. Matlah, Calcutta.
TREMILLODON GELATINOSUM, Fr. Sikkim Himalaya.
IMPEX FLAVUS, Kl. Arakan. Baronga Island.
I. PALLESCENS, Fr. Pegu Yo-mā.
GRANDINIA GRANULOSA, Fr. Pellowa. Htou-kye-gat, Pegu.

Auricularini.

- THELEPHORA PUSILLA, Currey. Sikkim Himalaya.
T. PALMATA, Fr. Botanic Garden, Calcutta.

¹ "Not this species, but *P. Curryi*, Berk." (Cooke).

LACHNOCLADIUM BRASILIENSE, Berk.	Calcutta.
SPHEREUM ELEGANS, Fr.	Lower Pegu.
S. OSTREA.	Sikkim Himalaya.
S. LOBATUM, Fr.	Htou-kye-gat. Seven Pagodas.
S. SCYTALE, Berk.	Pegu. Bookee, Karen Hills.
S. ADUSTUM, Lev.	Southern Yo-mā. Pegu.
S. PAPYRINUM, Mont.	Pegu. Timeokee.
S. MEDICUM, Currey.	Sikkim.
S. CYATHIFORME, Currey.	Bookee, Karen Hills.
CORTICUM VIOLACEO-LIVIDUM, Fr.	Pegu Yo-mā.
C. LEVIGATUM, Fr.	Pegu Yo-mā.
C. MOUGEOTII, Fr.	Sikkim.
GUEPINIA RAMOSA, Currey.	Howrah, Calcutta. Arakan.

Clavariiei.

CALOCERA VISCOSA, Fr.	Seebpore, Lower Bengal.
TYPHULA FUSCIPES, Fr.	Sikkim.

Tremellini.

TREMELLA FOLIACEA, Fr. P.	Sikkim.
HINNEOLA AURICULA-JUDE, Fr.	Nakawa. Htou-kye-gat.
H. AURICULA-CANIS, Fr.	Pegu. Northern Yo-mā.

Phalloidei.

PHALLUS DÆMONUM, Rumph.	My compound, Maulmain. P.
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On one or two occasions I gathered this curious and very elegant fungus, in my compound, among the decayed leaves. The stem, which is about the thickness of one's thumb, and some four or five inches high, is white in colour, fibrous, brittle, and hollow. The pileus, which is also white, is reticulated and hangs down over the stem like a beautiful lace veil. The whole structure is so frail as hardly to bear handling. It is, however, pleasanter in the sight, than in the handling, as, like all the genus, it emits a very offensive odour.

Nidulariacei.

CYNTHUS INTERMEDIUS, Mont.	Seebpore, Bengal, Kurz. Maulmain, P.
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Lycoperdacei.

LYCOPERDON GEMMATUM, Fr.	Sikkim.
L. PUSILLUM, Fr.	Lower Pegu.
L. BRASILIENSI, Fr.	Nakawa, Htou-kye-gat.

Trichodermacei.

TRICHOCOMA PARADOXUM, Jungh.	Sikkim Himalaya.
TRICHIA PYRIFORMIS, Hoffm.	Loc. ?
ARCYNA UMBRINA, Fr.	Pellowa, Htou-kye-gat.

Helvellacei.

PEZIZA AURANTIA, Pers.	Sikkim.
P. RUTILANS, Fr.	Htou-kye-gat.
HELOTIUM CITRINUM, Fr.	Sikkim.

Sporocybacei.

STILBUM INCONSPICUUM, Currey.	Seebpore, Bengal.
S. IRYTHROCEPHALUM, Dittm. var.	Bot. Gard., Calcutta.

Sphæriacei.

XYLARIA DIGITATA, Grev.	Bot. Gard., Calcutta.
X. TABACINA.	Sikkim.
X. GUYANENSIS, Mont.	Htou-kye-gat.
X. POLYMORPHA, Grev.	Bot. Gard., Calcutta.
X. HYPOXYLON, Grev.	Bot. Gard., Calcutta. Arakan.
X. KURZIANA, Currey.	Bot. Gard., Calcutta.
X. FLAGELLIFORMIS, Currey.	Tsittoung Valley.
X. MUTABILIS, Currey.	Bot. Gard., Calcutta. ¹
HYPOXYLON SUBORBICULARE, Welw. and Currey.	Bot. Gard., Calcutta.
II. CONCENTRICUM, Bolt.	Bot. Gard., Calcutta.
II. MARGINATUM, Schw.	Pegu.
DIATRYPE RUGOSA, Currey.	Pegu Yo-mā.
HYPOCREA VARIABILIS, Currey.	On living leaves of bamboo. Pegu Yo-mā.
SPILERIA PHASELINA, Mont.	Nakawa, Htou-kye-gat.
S. SUBLIMATA, D.R. and Mont.	Kambala-toung.
PORONIA FILEIFORMIS, Berk.	Maulmain. P.
MICROPELTIS APPLANATA, Mont.	Mangrove Bay, South Andaman.
FUMAGO SALICINA, Tal. Sel. Fung.	
Carp. Vol. II. p. 280.	Wā-choung. Pegu Yo-mā.
NECTRIA EUGENLE, Currey.	On leaves of Eugenia. Pegu Yo-mā.
GRAPHIOLA PHŒNICIS, Poit.	On leaves of <i>Phœnix paludosa</i> , Calcutta. P.

LICHENS.

Cellular flowerless plants, deriving nourishment through their whole surface from the medium in which they live, the air : propagated by spores.

“ A large tribe of cryptogams belonging to the Fungal alliance, and distinguished from Fungi by their not deriving nutriment in general from the substance on which they grow, but from the surrounding medium ; by their slow development and long endurance ; and, technically, by their producing within their substance granules distinct from the general tissue, called *gonidia*, which in certain conditions are reproductive. Lichens are in some cases useful as articles of food and medicine ; but their principal economical value consists in their properties as dyes.”—Berkeley.

Cenomyces rangiferina, commonly called *reindeer moss*, is the chief food of the reindeer, when other food cannot be obtained. *Cetraria islandica*—the *Iceland moss* of the shops—is a well-known article of nourishment. And Tripe de Roche, on which Canadian hunters are sometimes reduced to subsist, is furnished by lichens of the genus *Gyrophora* and others.

I have not heard of any collection of Lichens having been made by the late Mr. Sulpiz Kurz ; I am, therefore, reduced to offer the following meagre list of a few species casually gathered by myself on the hills of Martaban and Tenasserim.

They have been named (through Dr. M. C. Cooke) by the Rev. J. M. Crombie.

PYXINE, sp. ?

CLADONIA DECORTICATA, Fr.

COCCOCARPIA MOLYBDEA, Nyl.

PARMELIA KAMTSCHADALIS, Ach. On rocks.

P. LATISSIMA, Fée. On rocks.

P. LEVIGATA, Ach. On rocks.

USNIA DASYPOGON, Fée. On trees.

U. FLORIDA (STRIGOSA), Fée. On trees.

U. CRATINA, Ach. On trees.

¹ This is certainly *X. scharoides* of Berk. (Cooke).

CLASS II. ACROGENS.

AXIS OF GROWTH DISTINCT, GROWING FROM THE APEX, WITH USUALLY NO PROVISION FOR SUBSEQUENT INCREASE IN DIAMETER, AND WITH FREQUENTLY DISTINCT FOLIAGE. REPRODUCTION BY THE ACTION OF *Antherozoids* ON *Archegonia*.

MUSCALES.

Plants composed of cellular tissue only. *Archegonia* or *Antheridia*, or both formed on the stem or branches of a new plant, that is developed from the *spore* on its germination.¹

MUSCALES. THE MOSS ALLIANCE.

MOSESSES.

The word *Moss* has been used by unscientific persons in a very loose and indefinite manner, being applied to almost any plant of a small, cæspitose and compact habit of growth. For instance, Reindeer-moss (so called) is, strictly speaking, a lichen; Carrageen-moss is a seaweed; and Spanish moss is a Bromeliaceous plant, or of the same order as the Pine-apple! As a Botanist speaks, however, "*moss*" has a limited and thoroughly well-defined application.

True mosses, technically speaking, are cellular Acrogens, *i.e.* plants whose tissue (with some exceptions) is composed of cells and not of vessels, and which grow at the end. They are, for the most part, small lowly plants of thin delicate texture, generally gregarious, and choosing for their habitats, trees, rocks and walls, or clay banks and bogs, but hardly disdaining any locality which will provide them with their chief sustenance, moisture. Some mosses are very singular in their choice of a habitat. One very remarkable and beautiful genus (*Splachnum*) chooses the decayed dung of animals, though it does not refuse to grow on an old hat or an old shoe. Another moss—*Funaria hygrometrica*—affects bare patches of ground, especially where there are any charred remains. This peculiar habit seems to accompany the plant in every part of the world: for it was on just such a patch of burnt ground, that, on crossing a deserted Toung-ya in the mountains, I found this common British species.

Mosses differ exceedingly in size, colour, and texture,—also, as a consequence, in general outward aspect. Some *Phasea*, including roots, stem and fruit, vary from a line to one-eighth of an inch in total length; while *Polytrichum commune* (a single plant) will sometimes attain the length of two feet, so that hassocks and mats are made of it. The urn alone, or sporangium, of the latter is capable of holding concealed within it a very large number of fully developed plants of the former. Many species of *Meteorium* and *Neckera* clothe the branches of damp forest trees with a drooping drapery many inches in length. *Polytrichum* and *Pogonatum* furnish

¹ [The following remarks are from the pen of the Rev. C. Parish, who has kindly contributed the catalogue here given, the only alteration in which being the interpolation in its place of the order *Characeæ*, in accordance with the scheme of classification followed in this edition.]

exceptions to the uniformity of the cellular tissue of mosses, for they develop vascular tissue; also to their generally delicate and translucent texture, for they are firm, tough, and dry. Nor are all mosses green, though that is the prevailing colour. Some are nearly white, as *Leucobryum* and *Octoblepharum*; others nearly black, as *Andraea*; others, again, are of a beautiful golden yellow, as *Stereodon prænollis* and *Trachypus* (*Neckera*) *crispatula*, Burmese plants. And many others, such as *Stereodon* and *Meteorium*, present a beautiful admixture of various shades of brown and yellow. Trees and rocks owe, indeed, much of their rich colouring to the mosses which adorn their surface.

Mosses, like ferns and orchids, are either terrestrial or epiphytal; they are erect, creeping, or pendulous, simple or branched. They are covered with small leaves, commonly growing uniformly round the central axis, so as to make the plant appear cylindrical, but not unfrequently they are more or less bifariously disposed, which gives the moss a flattened appearance. In one (I believe, solitary) instance, that of a rare European moss called "*Burbaumia ophylla*," a moss may be said to be leafless, for to all intents and purposes it is so, presenting to the eye nothing but a single seta or stem about half an inch high surmounted by a rather large *sporangium*; rudimentary leaves have, however, been discovered. But, however mosses may differ from each other in their general appearance, the fructification, when once seen or understood, affords an unfailling mark by which to distinguish the class.

Accordingly, leaving the male and female organs of reproduction, which are concealed and microscopic, we will now describe what is alone visible to the naked eye and is commonly called the fruit of a moss. This (I except here the small and partially distinct group, *Andraea*), is in the form of a hollow capsule, called the *theca* or *sporangium*, which is either sessile among the leaflets, or elevated on a rigid bristle-like support or stalk, called the *seta*. This spore-case is more or less globose or cylindrical, or sometimes even square. It contains the spores and opens in various ways to allow of their escape. In every case, in an early stage, before the *sporangium* is fully ripe, it is surmounted by a sort of cap or veil, which is called the *calyptra*. This small appendage either covers the spore-case uniformly like an extinguisher, when it is said to be *nitiform*; or it is ruptured laterally, and sticks jauntily on one side like a Normandy cap; or, if one may draw a comparison from the country, like that remarkable sort of night-cap which Tamil boys wear when they go to school; it is then called *dimidiata*. This *calyptra*, or hood, or veil (as it is variously called), is sometimes large enough (relatively to the size of the spore-case) to be a conspicuous object upon it, but oftener it is small and very fugitive. When this hood has fallen off or been removed carefully by a pair of pincers, the spore-case is laid bare, and in some few mosses, as in *Phascum*, it is seen to be entire, though it shows a small beak or point, and the spores can only escape by its decay and irregular rupture. In the great majority of cases, however, the *sporangium* is furnished with a lid, or operculum, which is nearly flat, or conical, or lengthened into a slender curved point. This lid, when the *sporangium* is fully matured, falls off (or it may be pulled off shortly before maturity), disclosing either a naked mouth, as in *Sphagnum* and *Gymnostomum*, or—much oftener—a single or double row of *cilia*, or teeth, as they are commonly called, which form an exquisitely beautiful fringe to the mouth of the *sporangium*. These teeth expand and contract in a lively manner, according as moisture is applied or withheld. Inside the urn, or *sporangium*, the innumerable green spores may now be seen. No one, except those who have seen these fringes of teeth, or *peristomes*, as they are called, can form any idea of their exquisite variety and beauty. They are among the loveliest objects which the microscope has ever revealed.

Apart, however, from their beauty, the most singular feature about these teeth, or *cilia*, is their number. In some (comparatively few) mosses, as we have seen, they are wholly wanting; but where they are present, they are always four, or some multiple of four, *i.e.* they are 4, 8, 16, 32 or 64. No other number is known; nor, as far as I have seen or heard, are they ever fewer or more numerous by so much as one, through abortion, or chance malformation, or sport, as often happens with the stamens or other parts of flowering plants; so exquisitely perfect are they in their minute organization.

There are other parts of mosses which have technical names, such as the smaller leaves about the base of the *seta*, certain swellings in the *sporangium*, etc., but into these lesser points, as well as into the various forms which the *peristome* assumes, I forbear to enter. For those who wish to pursue the study farther, there is no lack of books, though, indeed, I know not any *one* which shall give a description of all known mosses.

Of the uses of mosses, looked at from man's ordinary point of view, as furnishing something specially beneficial to himself, I fear there is little or nothing to say. They appear indeed, in this respect, to rank below even the "inutilis alga." But in the economy of nature they are of the highest importance. They go far towards giving the earth her first coating of vegetation, and form a soil in which other plants innumerable are enabled to establish themselves, and find at once support and nourishment, besides protection from the extremes of heat and cold. Moss-spores are Nature's pioneers in the Vegetable Kingdom. She scatters them broadcast on the winds and sows their fertilizing dust over the earth. They fly forth on their errand, invisible, and venture where nothing else as yet can. They climb the precipitous mountain's side and seize on each coign of vantage, settling on every tiny ledge, and creeping into every crevice. They penetrate the deep shade of the forest and pour their myriads over the tree-trunks. They wander over the bleak moor and gather about its fountain heads, fostering the young springs, and throwing over the granite boulders the only garment they will endure. They dive into the recesses of caverns and make the roofs and sides glisten with their translucent atoms.¹ They grasp the roughness of the barren wall, and cling tenaciously to the smooth roof-tile, and lay the foundation of a garden upon the house-top. They will even fly across Africa's arid wastes, and by their bright and unexpected presence instil hope into the sinking heart of the lonely traveller.² So, as by magic, they spread their green mantle over the face of the earth, the present home of insect life, and the harbinger to other animals and to man himself of flower and fruit and sustenance.

We come now to Order and Arrangement.

No one system appears to have met with the general approval of Bryologists. That adopted in the old *Muscologia Britannica* had the merit of simplicity and tolerable facility in the discovery of genera, which perhaps, after all, is the chief object aimed at.

The main divisions were made wholly to depend on the character of the fruit, little or no regard being paid to vegetative differences. The first Division contained that small group whose spore-case splits into valves: the second that with entire spore-cases: the third included those mosses whose spore-cases open with a lid, but have no peristome; the fourth those which have a single peristome; the fifth those with a double peristome; while the generic characters turned on the position of the fruit, the form of the calyptra, and the number and form of the teeth of the peristome; while, yet again, the specific differences lay mainly in the disposition and form of the leaves. This arrangement has been abandoned in newer works, as it was thought to link together groups of plants which had not sufficient natural affinity; and others have been adopted with a view, if possible, of grouping the species together more naturally.

Whether or not this object has been attained in any sufficient measure by any one of the existing systems may well be doubted if we judge from the words of the Rev. M. J. Berkeley, who is "facile princeps" in Cryptogamic Botany; he says, "On the whole, the state of Bryology must be considered as extremely imperfect. The entire subject clearly wants the revision of some master-mind."—*Handbook of British Mosses*, 1863, Preface, p. 45.

The arrangement which he himself adopts in the *Handbook* "was (he says)

¹ *Schistostega pennata* or *osmundacea* "occurs in several parts of England in caverns which are illuminated by a golden-green light from the refractive property of its conerva-like shoots."—M. J. B. in "Treasury of Botany."

² Mungo Park. This celebrated traveller is said to have taken courage at the sight of *Fissidens bryoides*, a small British moss, when in the heart of Africa.

drawn up with a view to the mosses of the British Isles alone;" it is therefore precluded from adoption here. I am compelled, therefore, to adopt the arrangement followed by Mr. William Mitten in his enumeration of "The Mosses of the East Indies," Vol. I. of "The Proceedings of the Linnean Society," Botany, Supplement. If the expression used should appear to imply any idea of regret at the use of this arrangement, that regret has reference solely to my inability to offer an easier and more familiar arrangement here, and one more suited to the character of the work. For, however great may be the merits of the arrangement, as an approach to a natural grouping of the species (and Mr. Mitten's great experience of this Order of Plants and his acknowledged authority should be a sufficient guarantee that they are so), looked at artificially it certainly appears to be complicated and difficult, so that I altogether despair of making it intelligible. As, however, my small collection was incorporated in this arrangement some years ago by Mr. Mitten himself, and as he has now further kindly undertaken to do the same with a catalogue of mosses collected by the late Mr. Kurz, and named by a German Bryologist (which I found impossible to make agree with my own), I can but use his arrangement simply as it is and unexplained, or with such slight explanations as are in my power to give; and this I now accordingly do.

MUSCI.

* I. HOMODICTYA.

Leaf-cells uniform in structure.

† SCHISTOCARPI.

Fruit splitting into valves.

Group *ANDRÆACEÆ*.

‡ STEGOCARPI.

Fruit having a lid.

§ ARTHRODONTI.

Groups.

- | | |
|---------------------------|-----------------------------|
| 1. <i>DICRANÆÆ</i> . | 9. <i>BRYÆÆ</i> . |
| 2. <i>LEUCOBRYÆÆ</i> . | 10. <i>HYPNÆÆ</i> . |
| 3. <i>TRICHOSTOMEÆÆ</i> . | 11. <i>NECKERÆÆ</i> . |
| 4. <i>GRIMMÆÆ</i> . | 12. <i>LEUCODONTEÆÆ</i> . |
| 5. <i>ORTHOTRICHEÆÆ</i> . | 13. <i>LENKEÆÆ</i> . |
| 6. <i>FUNARIÆÆ</i> . | 14. <i>MNIÆÆ</i> . |
| 7. <i>SPLACHNÆÆ</i> . | 15. <i>HYPOTTERYGIEÆÆ</i> . |
| 8. <i>BARTRAMIEÆÆ</i> . | |

|| NEMATODONTI.

Groups.

- | | |
|------------------------|--------------------------|
| 1. <i>BUXBAUMIÆÆ</i> . | 2. <i>POLYTRICHEÆÆ</i> . |
|------------------------|--------------------------|

¶ II. HETERODICTYA.

Leaf-cells diverse in structure.

1. *SPLAGNÆÆ*.

- * οὐδὸς 'like' and ἐκίτρον 'a net.' † σίχζω, σχίστις 'split' and καρπὸς 'fruit.'
- † στέγος 'a covering' and καρπὸς 'fruit.'
- ‡ ἄρθρον 'a limb or joint' and ὀδὸν-ὀντος 'a tooth.'
- || νῆμα 'a thread' and ὀδὸν-ὀντος 'a tooth.'
- ¶ ἕτερος 'other or different' and ἐκίτρον 'a net.'

¹ One of the objections to the Analytical key above given seems to me, if I may be allowed to offer an opinion, to lie in the choice of words and terms. The first requirement in an analytical

ANDREA, *Ehrenberg.*

This genus is the only one among mosses which has what has already been partially described as a *Schistocarpous sporangium*, or spore-case. It consists of very few species, four of which are natives of Great Britain, the rest being found in various parts of the world, but (with one or two remarkable exceptions for which geology has to account) always in Alpine or sub-Alpine countries. They are lowly-tufted plants, rarely exceeding two inches in length, with very minute leaves of a dark reddish-brown colour, in the mass looking almost black. I believe they are invariably found on granite or quartzose rocks. The *sporangium*, which is about the size of a small pin's head, is terminal and sessile. It has a mitriform *calyptra*, which becomes ruptured irregularly. The striking peculiarity of the genus, in which it differs from every other, is that, when ripe, the spore-case bursts into 4 (or 6-8, Berkeley) distinct valves, which, however, cohere at the summit. In this division of the spore-case into four valves, although these valves do not ultimately expand, *Andraea* approaches *Jungermannia*, of which we shall speak in due course.

Andraea rupestris (*petrophila*, Ehr.), with two or three more species, is found in the Himalayas, though, of course, only at a considerable elevation. I have not found it on our Burmese mountains, where it may possibly grow, though I doubt if they attain a sufficient height for it, their maximum being about 8000 feet. The exceptional locality for *Andraea*, above alluded to, is the plains of Germany, where, on granite rocks, Mr. Berkeley says, *A. Rothii* is found, with other Alpine mosses.

I have gathered this species on the granite rocks of Dartmoor in Devonshire. The genus receives its name from Andrea, a Hanoverian doctor.

Those who never visit the mountains of Burma are not very likely to have their attention drawn to the mosses of the country. They will, probably indeed, wonder where they are. In the hot weather they are completely dried up, and even in the rainy season, the number to be found in the plains is very small, and they are

table is, surely, that its terms be sharply antithetical: the second, that they shall convey, through their derivatives, the meaning which is meant to be conveyed by them, *clearly*; and, if possible, cover the whole meaning. Some of the terms above given do not answer to these conditions. Those for the primary division (supposing the division itself to be a good one, though it has the inconvenience of leaving nearly the whole of the Order on one side) are excellent; they are at once sharply opposed, and express exactly what it is meant they should, neither more nor less: viz. "leaf-cells uniform" and "leaf-cells not uniform."

We come now to the first subdivision and the word *Schistocarpi*, an excellent term in itself, as well expressing the distinctive character of the Group "*Andraceae*;" but its next opposite, *Stegocarpi*, labours under the difficulty, first, of not being clearly antithetical, and secondly, of being used to cover more than its meaning warrants. It means "fruit with a lid," and the recognized opposite to it, used in other systems, is "*Cleistocarpi*" "fruit closed," or "*fruit without a lid*." But this term finds no place here. The explanation given in the *Preface* is: "The *Chistocarpous* Order has been suppressed, because its component groups are referable to families of higher development." Doubtless this is so *naturally*, but being so, the term "*Stegocarpi*" should surely have been changed or omitted. It has no antithetical term, strictly speaking, and though its meaning is "with a lid," it is used to include those mosses which are without one! A simple change of term, such, for instance, as *Holocarpi*, or *whole-fruited*, would fairly have covered both those with a lid and those without one, and would at the same time have been sharply opposed to *Schistocarpi* or *split-fruited*.

To come to the farther subdivisions *Aethradonti* and *Nematodonti*, the simple meaning of these two terms is "teeth-jointed" and "teeth like spun thread;" but they are explained to mean, the first: "Peristome with teeth built up of a triple series of agglutinated cells; the two outer series coloured, and often united in one; the inner, broader and thinner in texture, transparent, forming little transverse bars." The second: "Peristome composed of several layers of threads, free, or the inner ones united into a woven membrane; or, adhering by the points of their tooth-like processes to the edge of a drum-like membrane."

Now all this is a great deal more than the terms used can possibly signify; besides, the points or peculiarities described are far from being easy or simple.

Lastly, no explanation is afforded of the principles on which the very large groups of genera have been founded, further than this, that "they are founded upon a difference in the mode of growth, or in the structure of the leaves."

It will, I think, be admitted that, however *natural* this Order or arrangement may be, coming in as an *artificial* system in aid of the natural, it does not commend itself for its facility to a beginner. This is the reason why, if it were possible, I would gladly have substituted some more simple system here.

for the most part minute and inconspicuous. *Garekea phascoides* (*Grimmia flexuosa* of Griff. Notulae), with *Didymodon flaccidus* and *Tortula cylindracea* (which Mitten says is a form of our common British *Weissia tenuirostris*), may be looked for on clay banks. *Bryum coronatum* is rather common on walls and old Pagodas. A small *Hypnum* or two, *H. Wrightii* and *H. Taroyense*, with *Steloma microcarpon* and *caudatum*, may be found frequently on trees; *Leskea investis* and two or three more on rocks and stones; but these are all small and scanty, hardly large enough to attract attention. The only two plants, perhaps, which are found in the neighbourhood of the towns worthy of description, are—

OCTOBLEPHARUM ALBIDUM, Hedwig.

This is one of the very few mosses which has eight teeth in the peristome. None are found with this number in Great Britain, nor, I believe, in Europe. We have a moss with four teeth—*Tetraphis*; but this too is a rare number, sixteen being by far the commonest, in fact the prevailing number, either in a single or double series.

O. albidum grows in small dense tufts of a glaucous colour, i.e. a very pale green, approaching to white. The individual plants are about a quarter of an inch high; stem simple; leaves linear, suddenly acuminate, nerveless, fleshy, spreading on all sides, not curled when dry. Spore-case terminal, ovate:—*peristome* consisting of eight broad teeth with an interval between them, and a line down the centre. *Operculum* beaked; *calyptra* dimidiate. Rather common on trees; easily detected by its whitish colour.

SCHISTOMITRIUM GARDNERIANUM, Mitten.

This is another small caespitose moss of a glaucous hue, smaller even than the last. Stem simple or nearly so, one-eighth of an inch high; leaves densely imbricated, lanceolate, pointed, nerveless. Spore-case on a very short stalk, cup-shaped or turbinate; *operculum* conical, long, straight, subulate; *calyptra* exceedingly long and subulate (awl-shaped), jagged and laciniated at the base, dimidiate; *peristome* none. The fruit is almost hid among the leaves. It forms large conspicuous patches, always, as found by me, immediately at the foot of large trees. Young-wine, near Maulmain.

This curious little moss is found nearly all over the world: in Nepal, Madras, Hong-Kong, in Brazil (where Gardner first discovered it), and in Mexico at 3000 feet of elevation.

As mosses, though ubiquitous in small quantities, have their proper home in the temperate regions of the earth, where they reach their highest development, it is necessary to ascend the mountains, if our finer Burmese species would be found. There the fine branched *Hypna*, and the pendulous species of *Meteorium*, and others, may be found in fair profusion on the ground and festooning the trees.

Besides forms peculiarly Tropical, we find, there, at considerable elevations, a sprinkling of European species, such as *Sphagnum cuspidatum*, *Funaria hygrometrica*, and *Polytrichum (Pogonatum) aloides*.

As a detailed description of species is more than is contemplated in this work, also more than is likely to be required by the rising Bryologists of Burma, I shall bring this short sketch of the Order to a close with a brief description of the three European species last mentioned; and this I shall borrow chiefly from Mr. Berkeley.

SPHAGNUM, Ehrenberg.

Sporangium globose; *receptacle* elongated, fleshy; *peristome* none; lid convex, nearly flat; *calyptra* irregularly torn; leaf-cells of two kinds (*Heterodictya*), the one large, containing a spiral thread, the walls perforated between the spirals; the other linear, surrounding the first.

S. cuspidatum: Stem elongated, branches fasciculate (crowded at the end), attenuated, some deflexed, closely adpressed. Stem leaves ovate, acute, spreading; branch-leaves lanceolate, tapering; margin undulated when dry. Extremely variable.

Sphagnum is commonly known as "bog-moss;" it forms, as it decays, the principal ingredient in peat. There is but one genus of this group. "The species are difficult of definition, and are probably far less numerous than is supposed."

FUNARIA, *Hedwig*.

Sporangium obliquely pyriform, thick, subventricose; *apophysis* (a peculiar goitre-like swelling at the base of the sporangium of some mosses, absent from others), tapering into the foot-stalk, even, or furrowed when dry. *Ring* (round the base of the *peristome* in some mosses, detaching itself when the lid falls off), when present, large; *peristome* double, outer of 16 oblique teeth, connected at their tips by a small reticulated circular disk; inner a membrane divided into 16 lanceolate processes, opposite to the outer teeth, and slightly adherent at the base; *lid* plano-convex; *calyptra* swollen at the base, subulate above, at length split on one side.

F. hygrometrica: Upper leaves crowded, forming a bud-like mass, ovato-oblong, acuminate; nerve reaching to the apex; sporangium pyriform, incurved, deeply furrowed when dry; ring broad, at length revolute; fruit-stalk flexuous, and highly hygrometric. When in fruit, about one inch high. Extremely common, and found in most parts of the world.

POGONATUM, *Bridel*.

Sporangium oval or oblong, not angular (as in *Polytrichum*); *calyptra* densely hairy; teeth 32 united by their tips to a tympanoid (drum-skin like) membrane; leaves densely lamellate (having numerous lamellæ or thin plates on either side of the mid-rib).

P. aloides: Stem short, leaves lengthened, lanceolate, from a sheathing base, toothed, thick, pointed; sporangium soft, oblong; lid conical, acuminate. One to two inches high. Forming loose patches; affecting dry sandy places.



SYSTEMATIC LIST OF BURMESE MOSSES.

I. HOMODICTYA.

SCHISTOCARPI.

ANDREA, *Ehrenberg.*

(none yet discovered in Burma).

*STEGOCARPI. ARTHRODONTI.

DICRANEÆ.

GARCKEA, *Bridel.*

- G. PHASCOIDES, C. Müll. Clay banks, Maulmain.
- LEPTOTRICHUM, *Hampe.*
- L. REINWARDTI, Mitt. On trees, Moolce-it, 6000 to 7000 feet.
- TREMATODON, *Richard.*
- T. SABULOSUS, Griff. On the ground, mountains.
- LEUCOLOMA, *Bridel.*
- L. TAYLORI, Mitt. On trees, plains.
- L. TENERUM, Mitt. sp. nov. Maulmain.
- L. EROSCUM, Mitt. sp. nov. Maulmain.
- L. LUCINERVE, Mitt. sp. nov. Moolce-it.
- DICRANUM, *Hedwig.*
- D. SUBULATUM, Mitt. On the ground, mountains. No-a-la-bo,
Tavoy, and Moolce-it.
- D. UNCINATUM, Harv. Moolce-it.
- DIDYMOBON, *Hooker.*
- D. FLACCIDUS, Mitt. On the ground, Maulmain.
- HOLOMITRIUM, *Bridel.*
- H. CUCULLATUM, Mitt. sp. nov. Mountains.
- LEUCOBRYEÆ.
- OCTOBLEPHARUM, *Hedwig.*
- O. ALBIDUM, Hedw. Trees, common, Maulmain.
- O. SERRATUM = TAYLORIA INDICA. Among moss, on rocks, mountains.
- LEUCOBRYUM, *Hampe.*
- L. JAVENSE, Mitt. Moolce-it. No-a-la-bo (Ox's hump).
- L. WIGHTII, Mitt. On rocks, Maulmain.
- SCHISTOMITRIUM, *Dozy and Molkenboër.*
- S. GARDNERIANUM, Mitt. Foot of trees, Young-wine, Maulmain.

TRICHOSTOMEÆ.

TORTULA, *Hedwig.*

- T. CYLINDRICA, Mitt. Maulmain.
Weissia tenuirostris.
 T. INDURATA, Mitt. sp. nov. Mountains.

HYMENOSTYLIUM, *Bridel.*

- H. INTERRUTTUM, Mitt. sp. nov. Mountains.

SYRRHOPODON, *Hooker and Greville.*

- S. FASTIGIATUS, Dozy and Molk. Mountains.

CALYMPERES, *Swartz.*

- C. SEMILIBERUM, Mitt. sp. nov. Trees. Tavoy.
 C. PARISHII, Mitt. sp. nov. Tavoy.
 C. PROBOSCIDIÆ, Mitt. Tavoy.
 C. VARIUM, Mitt. sp. nov. Tavoy.

GRIMMIEÆ.

GRIMMIA, *Ehrenberg.*

- G. CANESCENS, Mitt. Moollee-it.

ORTHOTRICHEÆ.

MACROMITRIUM, *Bridel.*

- M. NIPALENSE, Mitt. Schw. Tavoy.
 M. PARISHII, Mitt. sp. nov. Tavoy.
 M. CALYMPEROIDEUM, Mitt. sp. nov. Tavoy.
 M. MOORCROFTII, Schw. Mountains.
 M. SULCATUM, Brid. Moollee-it.
 M. INTRICATUM, Mitt. sp. nov. Moollee-it. Tavoy.

FUNARIEÆ.

EXTOSPHOION, *Schweinitz.*

- E. WALLICHII, Mitt. Crevices of granite, Moollee-it.

FUNARIA, *Schreber.*

- F. HYGROMETRICA, Dill. On the ground, in Toung-yas.

SPLACHNEÆ.

TAYLORIA, *Hooker.*

- T. INDICA, Mitt. On rocks between Kau-kerect and Mya-wa-dee.

BRYEÆ.

BRYUM, *Dillenius.*

- B. ROSEUM. On the ground, Moollee-it.
 B. FILIFORME, Mitt. Mountains.
 B. CORONATUM, Schw. Walls, old pagodas, Maulmain.
 B. RUBENS? Mitt. Mountains.
 B. NIPALENSE, Mitt. On the ground, Ta òk, 4000 feet.

HYPNEÆ.

HYPNUM, *Dillenius.*

- H. TAVOYENSE, Hook. Common on trees about Maulmain.
 H. WIGHTII. On trees, Maulmain.

METEORIUM, *Bridel.*

M. WIGHTII, Mitt.	On trees, mountainous districts.
M. ARBUSCULUM, M. sp. nov.	On trees, mountainous districts.
M. SPARSUM, M.	On trees, pendulous, mountainous districts.
M. DIVERGENS, M.	On trees, pendulous, mountainous districts.
M. SQUARROSUM, M.	On trees in damp shady jungles.
M. MEDIUM, M.	On trees, mountains.
M. CORDATUM, M.	On trees, mountains.
M. MOLLISSIMUM, M.	On trees, pendulous, mountains.

STEREODON, *Bridel.*

S. JULIFORMIS, M.	On decayed wood, Maulmain.
S. INFLEXUS, M.	On trees, Maulmain.
S. CAPILLACEUS, M.	At 6-7000 feet, very scarce.
S. CURVIROSTRIS, M.	Trees, ?
S. BUTENZORGHII, M.	On trees, mountains.
S. COMPRESSIFOLIUS, M. sp. nov.	Moolee-it.
S. CYPEROIDES, M.	Dauna-toung, 4-5000 ft.
S. APPRESSUS, M.	On trees, Maulmain.
S. NIPALENSIS, M.	Maulmain and Martaban.
S. ORTHOTHECIUS, M.	On trees, mountains.
S. ROSTRATUS, M.	Trees, ?
S. LIGNICOLA, M.	On trees, Maulmain.
S. ALBESCENS, M. a minute species, mixed with <i>Octoblepharum albidum</i> .	
S. PREMOLLIS, C. Müll.	Moolee-it.
S. ACUTIRAMEUS, M.	Mountains.
S. PLICATUS, M.	Mountains.
S. ERINACEUS, M.	On trees, pendulous, mountains.
S. ERRATICUS, M.	On trees, mountains.
S. MACROCARPUS, M.	Rocks and trees, mountains.
S. TENUIS, M.	Rocks and trees, mountains.
S. UNCFOLIUS, Mitt. sp. nov.	On trees, pendulous, mountains.
S. GLAUCOCARPUS, Mitt.	On trees, mountains.
S. RUGICUSPIDATUS, Mitt. sp. nov.	Mountains.
S. CESPITOSUS, Mitt. sp. nov.	Mountains.
S. TRACHYCARPUS, Mitt. sp. nov.	Mountains, mixed with <i>S. erinaceus</i> .

SAULOMA, *Hook. fil. and Wilson.*

S. MICROCARPON, Mitt.	On Jack-tree in my garden, Maulmain, P.
S. CAUDATUM, Mitt. sp. nov.	On trees, Maulmain.

NECKERELLA.

NECKERA, *Hedwig.*

N. FLABELLATA, Mitt.	loc. ?
N. VITTATA, Mitt.	loc. ?
N. RECTIFOLIA, Mitt.	On trees, mountains.
N. ACUTATA, Mitt.	On trees, mountains 5000 to 6000 feet.
N. PARISHII, Mitt. sp. nov.	On trees, mountains 5000 to 6000 feet.
N. PROCLADA, Mitt.	On trees, mountains.
N. ALOPECUROIDES, Mitt.	On trees, mountains.

LESKEA.

TRACHYPUS, *Schweinitz.*

T. BICOLOR, Schw.	On trees, mountains.
T. FUSCESCENS, Mitt.	On trees, mountains, pendulous.
T. CRISPATULUS, Mitt.	On trees, mountains, pendulous.

LESKEA, *Hedwig.*

- L. CYMBIFOLIA, Mitt. On trees and rocks, Moollee-it, 6000 feet.
 L. INVESTIS, Mitt. On rocks, Maulmain, and on trees, Moollee-it.

CALICOSTELLA, *Mitten.*

- C. PAPILLATA, Mitt. On trees, mountains.

MNIACEÆ.

FISSIDENS.

- F. ANOMALUS, Mont. On the ground, mountains.
 F. AREOLATUS, Griff. On the ground, mountains. Moollee-it.
 Nō-ā-la-bo.
 F. BRYOIDES, Hedw. On the ground, mountains.
 F. ZIPPELIANUS, Hedw. On the ground, mountains.

RHIZOGONIUM, *Bridel.*

- R. SPINIFORME, Bruch. On the ground, Moollee-it. Nō-ā-la-bo.

MNIADELPHUS, *C. Muller.*

- M. MOLLIS, Mit. sp. nov. loc.?

MNIUM, *Dillenius.*

- M. RHYNCHOPHORUM, Hook. On the ground, Moollee-it.

HYPOTERYGEÆ.

CYATHOPHORUM, *Bridel.*

- C. ADIANTUM, Mitt. On the ground, mountains.

** NEMATODONTI.

POLYTRICHEÆ.

POGONATUM, *Bridel.*

- P. ALOIDES, Brid.
 P. GYMNOPHYLLUM, Mitt. On the ground, Moollee-it.
 P. HUMILE, Mitt. On the ground, Moollee-it.

II. HETERODICTYA.

SPHAGNEÆ.

SPHAGNUM, *Dillenius.*

- S. CUSPIDATUM, Ehr. Boggy ground, mountains.

HEPATICÆ (Liverworts).

“The cryptogams belonging to this curious section, known popularly under the name of Liverworts, though confounded with Lichens, differ from the mosses, to which they are closely allied, in their capsule (whether opening definitely or indefinitely) never having a distinct lid, consequently in the total absence of a peristome. In many genera there is no stem, but the leafy shoots are replaced by an expanded membranous frond, which may be quite simple or repeatedly forked, while it is sometimes irregularly lobed or lacinate. Sometimes it is crisped and plicate, and sometimes furnished with gill-like plates above. Below it is generally attached to the substance on which it grows by slender delicate rootlets.”—M. J. Berkeley.

This Section or Group comprises three distinct Orders :

I. JUNGERMANNIACÆE (Scale Mosses).

“Creeping moss-like plants, either with imbricated, very cellular leaves surrounding a central axis, or with leaves and axis fused into a common leafy expansion, *i.e.* either leafy or frondose. Spore-cases 1, 2 or 4 valved, erect, with elaters.”—Lindley.

By far the larger portion of the plants of this Order have distinct leaves of a very moss-like character, though arranged on a different plan from those of mosses—they are also more delicate in texture and are lobed and cut into an endless variety of forms, and are always nerveless. Their chief character, however, by which they may be at once known from mosses, is the spore-case, which is globose, elevated on an exceedingly delicate and translucent stalk, and, when ripe, bursts open into four distinct and expanded valves, having its green spores mixed with separate *elaters*, or double thread-like spiral bodies which assist in their dispersion.

A very much smaller portion has a frondose thallus (or simple leafy expansion) and a single valved spore-case split on one side, or a 2-valved one, with a central columella.

The word *Hepatica* or *Liverwort* is really only applicable to those plants of this group which have such a flat frondose thallus; the name having been applied, in the first instance, I believe, to *Marchantia polymorpha*, a common British plant of just such a character, from a fancied resemblance, or supposed medicinal virtue.

I. FOLIOSÆ.

1. *Leaves succubous*.¹

JUNGERMANNIA, *Linnaeus*.

J. (PLECTOCOLIA, Mitt.) POLYRRHIZA, Hook.

J. (PLECTOCOLIA, Mitt.) ABIADNE, Taylor.

J. (ANTHELLA, Dumont) HIRIELLA, Weber.

PLAGIOCHILA, *Nees von Esenbeck*.

P. NIPALENSIS, Ldbg.

P. FRUTICOSA, Mitt.

P. FLABELLATA, Mitt.

P. PARVIFOLIA, Ldbg.

P. MICRODONTA, Mitt.

CHILOSCYPHUS, *Corda*.

C. COALITUS, *Nees*.

C. ARGUTUS, *Nees*.

2. *Leaves incubous*.¹

PHYSIOTIUM, *Nees von Esenbeck*.

P. SPHAGNOIDES, *Nees*.

P. ACINOSUM, Mitt.

SENDTNERA, *Endlicher*. (SEHISMA, Dumont).

S. JUNEPERINA, *Nees*.

S. DICRANA, Taylor.

LEPIDOZIA, *Nees von Esenbeck*.

L. FLEXUOSA, Mitt.

MASTIGOBRYUM, *Nees*. (BAZZANIA, Gray).

M. PRÆRUPITUM, *Nees*.

M. TRIDENS, *Nees*.

M. CONCAVULA, Lind.

¹ *Succubous* = imbricated in such a manner that the upper edge of each leaflet *underlies* that next to it in succession. *Incubous* = the upper edge of each *overlying* that next to it.

PTYCANTHUS, *Nees von Esenbeck.*P. STRIATUS, *Nees.*LEJEUNIA, *Gottsche and Ldby.*L. (PHRAGMICOMA, *Dumont*) UNDULATA, *Mitt.*L. (PHRAGMICOMA) REPLETA, *Taylor.*L. (PHRAGMICOMA) ADEPLANATA, *Nees.*L. FLEXUOSA, *Mitt.*FRULLANIA, *Raddi.*F. GRACILIS, *Nees.*

II. FRONDOSÆ.

SYNHYMENIUM, *Griffith.*S. AUREO-NITENS, *Griff.*ANTHOCEROS, *Micheli.*A. LEVIS, ? *Hook.*MONOCLEA, *Hooker.*M. CRISPATA, *Hook.*

II. MARCHANTIACEÆ (Liverworts proper).

“Spore-cases valvate, seated on the underside of a stalked target-shaped disk. Spores mixed with elaters.”—M. J. Berkeley.

Green frondose expansions growing on damp ground.

DEMORTIERA, *Nees von Esenbeck.*D. NIPALENSIS, *Nees.*

III. RICCIACEÆ (Crystal Worts).

“Spore-cases valveless, either sunk in the frond or seated on its surface. Spores not mixed with elaters.”—M. J. B.

Although I have not gathered any plants of this order, for want of attention to it, it cannot be reasonably doubted but that some are to be found in Burma.—P.

MUSCI.¹

COMBINED LIST OF BURMESE MOSSES.

DICRANEÆ.

ARCHIDIUM, *Bridel.*A. INDICUM, *Hampe.*A. BIRMANICUM, *Mitten.*

¹ The reason for giving two distinct lists of mosses is this:—Mr. Theobald sent me a list of mosses collected by the late Mr. Kurz and named by two German Bryologists—Müller and Hampe—for combination with my own. On comparing the two, I was struck by the remarkable fact that in no single instance were the names identical! It naturally forced itself upon my mind that, at least in some cases, different names must have been given to the same plants. As I was quite unable to combine the two lists, I had recourse to my old friend Mr. Mitten (already mentioned), who kindly undertook the task. After a delay of some weeks, this second list, as here presented, combining Mr. Kurz's collection and mine, was returned to me. But—such appears to be the unsettled nomenclature of Bryology—I was unable to recognize many of my old friends in their new dress! In many instances, the old familiar names had vanished, and new and unfamiliar names were substituted. The order, moreover, and arrangement were seen to be different. Therefore, as my remarks on this family of Plants were already written, I have thought it best to give my own list, as originally arranged by Mr. Mitten himself some years ago; and, next, the combined list according to the new arrangement. By way of accounting, in some measure, for the remarkable discrepancy between Mr. Kurz's mosses and mine, I may mention, that mine were wholly collected in the Tenasserim Provinces, and Mr. Kurz's in Pegu and Upper Burma.—P.

- GARCKEA, *C. Mueller.*
 G. PHASCOIDES, Hook.
- DICRANELLA, *C. Mueller.*
 D. (LEPTOTRICHUM) KHASIANA, Mitt.
 D. SUBCOARCTATA, *C. Muell.*
- TRIMATODON, *Rich.*
 T. CONFORMIS, Mitt.
 T. KURZII, Hampe.
Indicus, Mitt.
- CERATODON, *Bridel.*
 C. STENOCARPUS, Mont.
- SYMBLEPHARIS, *Montagne.*
 S. (DICRANUM) REINWARDTII, Dozy and Molk.
- HOLOMITRIUM, *Bridel.*
 H. CUCULLATUM, Mitt.
- DICRANODONTIUM, *Schimp.*
 D. (THYRSOMITRIUM) INCINATUM, Harvey.
(Didictyon, Hampe.)
- DICRANUM, *Hedwig.*
 D. SUBREFLEXUM, *C. Muell.*
- CAMPYLOPUS, *Bridel.*
 C. ERICOIDES, Griff.
 C. GOUGHII, Mitt.
 C. KURZII, Hampe.
 C. RIGIDISSIMUS, *C. Muell.*
 C. SUBLUTEUS, Mitt.
- PECTIOPHYLLUM, *Mitten.*
(Leucoloma, Bridel.)
 P. (SYRRHOPODON) TAYLORI, Schf.
 P. TENERUM, Mitt.
 P. EROSUM, Mitt.
- LEUCOBRYEÆ.
 OCHROBRYUM, *Mitten.*
 O. KURZIANUM, Hampe.
 O. SUBULATUM, Hampe.
 O. (SCHISTOMITRIUM) GARDNERIANUM, *C. Muell.*
- OCTOBLEPHARUM, *Hedwig.*
 O. ALBIDUM, Hedw.
- LEUCOBRYUM, *Hampe.*
 L. EXSERTUM, Hampe.
- PEGOPHYLLUM, *Mitten.*
 P. JAVENSE, Brid.
 P. WIGHTII, Mitt.
- GRIMMIEÆ.
 GRIMMIA, *Ehrenberg.*
 G. CANESCENS, Hoffm.

SYRRHOPODONTEÆ.

SYRRHOPODON, *Schweinitz.*S. FASTIGIATUS, Doz. and Molk.
S. KURZII, Muell.THYRIDIIUM, *Mitten.*

T. GRACILE, Mitt.

CALYMPERES.

C. SEMILIBERUM, Mitt.
C. VARIUM, Mitt.
C. PARISHII, Mitt.
C. MOLUCCENSIS, Schw.

TORTULEÆ.

TAPEINODON, *Mitten.*

T. (WEISSIA) FLACCIDUS, Harv.

HYMENOSTYLIUM, *Bridel.*H. VERRUCOSUM, Mitt.
H. INTERRUPTUM, Mitt.TORTULA, *Hedwig.*T. (WEISSIA) CYLINDRICA, Bruch.
T. INDURATA, Mitt.
T. TENASSERIMICA, Mitt.
T. (TRICHSTOMUM) TOPOPHACEA, Brid.
T. (TRICH.) ORIENTALE, Willd.
T. (BARBULA) BORONGENSIS, Hampe.
T. (BARB.) ACUTISSIMA, C. Muell.
T. (BARB.) SELENOCARPA, C. Muell.
T. GANGETICA, C. Muell.HYOPHILA, *C. Mueller.*H. BURMENSIS, Hampe.
H. HARVEYANA, Hampe.

ORTHOTRICHEÆ.

MACROMITRIUM, *Bridel.*M. NIPALENSE, Hook.
M. PARISHII, Mitt.
M. CALYMPEROIDEUM, Mitt.
M. MOORCROFTII, Schw.
M. SULCATUM, Hook.
M. INTRICATUM, Mitt.
M. DENSUM, Mitt.
M. ELLIPTICUM, Hampe.CRYPTOCARPUS, *Dozy and Molkenboër.*

C. MARGINATULUS, C. Müell.

FUNARIEÆ.

PHYSCOMITRIUM, *Bridel.*

P. PULCHELLUM, Griff.

ENTOSTHODON, *Schweinitz.*

E. WALLICHII, Mitt.

FUNARIA, *Schreber.*F. LEPTOPODA, Griff.
F. HYGROMETRICA, Hedw.

SPLACHNACE.

TAYLORIA, *Hooker.*T. INDICA, *Mitt.*

BARTRAMIE.E.

BARTRAMIA, *Hedwig.*

B. LONGICOLLIS, *Hampe.*
 B. MOLLICULA, *C. Muell.*
 B. TRICHOPHYLLA, *C. Muell.*
 B. SUBLEVISSIMA, *C. Muell.*
 B. HOMOMALLA, *C. Muell.*
 R. PROFUNDIFOLIA, *C. Muell.*
 B. RHIZOGONOIDEA, *C. Muell.*
 B. ANGUSTA, *Mitt.*

BRYE.E.

BRACHYMENIUM, *Schweinitz.*B. NIPALENSE, *Hook.*BRYUM, *Dillenius.*

B. CORONATUM, *Schw.*
 B. DOLIOLUM, *Dabq.*
 B. FLAVIDUM, *C. Muell.*
 B. BURMENSE, *Hampe.*
 B. PINETORUM, *C. Muell.*
 B. PILIFORME, *Mitt.*
 B. ROSEUM, *Schreb.*

ORTHOMNIUM, *Wilson.*O. TRICHOMITRIUM, *Wils.*MNIUM, *Dillenius.*M. RHYNCHOPHORUM, *Hook.*RHIZOGONIUM, *Bridel.*R. SPINIFORME, *Hedw.*

HYPOPTERYGIE.E.

CYATHOPHORUM, *Bridel.*C. ADIANTUM, *Griff.*C. KURZIANUM, *Hampe.*

HOOKERIE.E.

CALICOSTELLA, *Mitten.*C. PAPILLATA, *Mont.*DISTICHOPHYLLUM, *Dozy and Molkenboer.*D. MOLLE, *Mitt.*

NECKERIE.E.

METEORIUM, *Bridel.*M. WIGHTII, *Mitt.*M. SCABRIUSCULUM, *Mitt.**Neckera camptoclada,**N. dieranoblata, C. Muell.*M. (NECKERA) LANCEOLATUM, *C. Muell.*M. ARBUSCULUM, *Mitt.*

M. SPARSUM, Mitt.
 M. DIVERGENS, Mitt.
 M. MEDIUM, Mitt.
 M. CORDATUM, Mitt.
 M. MOLLISSIMUM, Mitt.
 M. CRINITUM, C. Muell.
 M. NEMATOSUM, C. Muell.
 M. CRASSUM, Wils.

TRACHYPUS, *Schweinitz.*

T. BICOLOR, Schw.
 T. FUSCESCENS, Mitt.
 T. CRISPATULUS, Hook.

NECKERA, *Hedwig.*

N. PARISHII, Mitt.
 N. FIMBRIATA, Harv.
 N. ACUTATA, Mitt.
 N. HIMALAYANA, Mitt.
 N. Burmensis, Hampe.
 N. UROCLADA, Mitt.
 N. SUBRUGULOSA, Hampe.
 N. SUBINTEGERRIMA, Hampe.
 N. LACERIDENS, Hampe.

POROTRICHUM, *Bridel.*

P. ELEGANTULUM, Mitt.
 P. ALOPECUROIDES, Hook.
 P. VITTATUM, Mitt.
 P. GLOSSOPHYLLUM, Mitt.
 P. BURMANICUM, Mitt.
 P. (NECKERA) JAVANICUM, C. Müll.

HOMALIA, *Bridel.*

H. ROTUNDATA, Hampe.
 H. BIFORMIS, Hampe.
 H. EROSA, Hampe.
 H. PENNATULA, Mitt.

SEMATOPHYLLÆ.

MEIOTHECIUM, *Mitten.*

M. (PTEROGONIUM) MICROCARPUM, Harv.

CHIONOSTOMUM, *C. Mueller.*

C. (NECKERA) ROSTRATUM, Griff.

ACROPORIUM, *Mitten.*

A. ACUTIRAMEUM, Mitt.

ISOCALPE, *Mitten.*

I. (NECKERA) CAPILLACEA, Griff.
 I. (STEREODON) UNCIFOLIOLA, Mitt.

ACANTHOCOMA, *Mitten.*

A. RUGICUSPIDATUM, Mitt.
 A. (STEREODON) SURCULARIS, Mitt.
 A. (STEREODON) PILOSULUS, Mitt.

RHAPHIDORHYNCHUM, *Schimper.*

R. CESPITULOSUS, Mitt.
 R. PREMOLLIS, Mitt.

STEREODONTEÆ.

ISOPTERYGIUM, *Mitten.*

- I. (STEREODON) LIGNICOLA, Mitt.
 I. ALBESCENS, Hook.
 I. DISTICHACEUM, Mitt.
Hypnum pycnopteron, C. Muell.
 I. SUBPALLIDUM, C. Muell.

RAGROTHECIUM, *Schimper.*

- R. NEMORALE, Mitt.

LEPTOHYMENIUM.

- L. (PTEROGONIUM) JULACEUM, Hook.

PTEROGONIUM, *Swartz.*

- P. INFLXUM, Harv.
 P. CAUDATUM, Mitt.

ENTODON, *C. Mueller.*

- E. PLICATUS, C. Muell.

SYMPHYODON, *Mont.*

- S. TRACHYCARPUS, Mitt.
 S. ERRATICUS, Mitt.
 S. ERINACEUS, Mitt.
 S. DIVARICATUS, Mitt.
 S. ELLIPTICUS, Mitt.
 S. (ENTODON) PERFORASCENS, C. Muell.

TRICHOPELMA, *Mitten.*

- T. (NECKERA) TENUE, Hook.
 T. (LEPTOHYMENIUM) NATTOUNGENSE, C. Muell.
 T. (HYPNUM) MACROCARPUM, Hortsch.
 T. (HYPNUM) ORTHOTHECIUM, Schw.

CAMPYLIUM, *Sull.*

- C. GLAUCOCARPUM, Hortsch.

ECTROPOTHECIUM, *Mitten.*

- E. (STEREODON) ASSAMICUM, Mitt.
 E. COMPRESSIFOLIUM, Mitt.
 E. APPRESSUM, Mitt.
Hypnum protractile, C. Muell.
 E. BUTENZÖRGI, Bel.
 E. CYPEROIDES, Hook.
 E. RETICULATUM, Dozy and Molk.
Hypnum succosum and
crassi-reticulatum, C. Muell.

TAXITHELIUM, *Spruce.*

- T. (HYPNUM) NIPALENSE, Hook.
 T. TRACHYLOPHYLLUM, C. Muell.
 T. MICROCLADUM, C. Muell.
 T. SAXOPHYLLUM, C. Muell.

HYPNEÆ.

STEREOPHYLLUM, *Mitten.*

- S. (HYPNUM) TAVOYENSE, Hook.
 S. WIGHTII, Mitt.
 S. (PLATYHYPNUM) YOMAHENSE, Hampe.

RHYNOSTEGIUM, *Schimper.*

- R. SUBVAGANS, Hampe.
R. CYLINDROTHECIUM, C. Muell.

ANOMOBON, *Hooker.*

- A. FUSCINERVIS, C. Muell.

THUIDIUM, *Schimper.*

- T. (LESKEA) INVESTE, Mitten.
Cyrtohypnum adicollum, Hampe.
T. CYMBIFOLIUM, Doz. and Molk.
T. TRACHYPODON, Mitt.
Cyrtohypnum cygnisetum, Hampe.
T. TRACHYACRON, C. Muell.
T. GLAUCINUM, Mitt.
T. PRIONOPHYLLUM, C. Muell.

SKITOPHYLLE.E.

FISSIDENS, *Hedwig.*

- F. ANOMALUS, Mont.
F. AREOLATUS, Griff.
F. CIRCINALIS, Mitt.
F. flaccidus, C. Muell.
F. PLANIFOLIUS, C. Muell.
F. DIVERSIFOLIUS, Mitt.
F. urceolatus, Hampe.
F. CORNUS, C. Muell.
F. PERPUSILLUS, Thw. and Mitt.
F. MINUTUS, Thw. and Mitt.
F. spathulatus, C. Muell.
F. SUBCRENULATUS, Hampe.
F. PAPILLOSUS, Thw. and Mitt.
F. granulatus, Hampe.
F. ATRICULATUS, C. Muell.
F. SUBSPATHULATUS, Hampe.
F. LUTESCENS, Hampe.
F. CROCATUS, Hampe.
F. CRASPIDOPHYLLUS, C. Muell.
F. BORONGENSIS, Hampe.

POLYTRICHE.E.

POGONATUM, *Bridel.*

- P. HUMILE, Mitt.
P. ALOIDES, Brid.
P. GYMNOPHYLLUM, Mitt.
P. RUFISETUM, Wils.
P. MACROSTOMUM, Brown.
P. BURMENSE? Hampe.

SPHAGNE.E.

SPHAGNUM, *Dillenius.*

- S. CUSPIDATUM, Ehrh.

Species enumerated by C. Mueller and Hampe amongst those collected by Kurz, but not known to Mr. Mitten.

- MILDEA HAMPEANA, C. Muell.
DICTYOPTERON FALCATUM, C. Muell.

- CHÆTOMITRIUM SCOTTIANUM, C. Muell.
 ROZIA DECOLORATA, C. Muell.
 PLATY-HYPNUM MEGABLASTUM, C. Muell.
 HYPNUM MARCIDULUM, C. Muell.
 H. ROBUSTI-PINNATUM, C. Muell.
 H. FULVO-NITENS, C. Muell.
 H. REFLEXULUM, C. Muell.
 DREPANO-HYPNUM SUBLEIOPHYLLUM, Hampe.
 D. SCABRUSCULUM, Hampe.
 D. PUNCTULATUM, C. Hampe.
 D. VARIIFLEXUM, Hampe.
 D. PRIONOTRICHUM, C. Muell.
 D. CURVATIRAMEUM, C. Muell.

Order CHARACEÆ.¹

Acotyledonous plants, cellular, aquatic. *Stems* tubular, jointed, naked or surrounded by several parallel elongated cells. *Branches* whorled, on a level with the joints. *Reproductive organs* antheridia and sporangia, borne on the branches.

Characæ often exhale a fœtid alliaceous odour, and their transparent rhizome is fixed in the mud of stagnant and running water, by filiform tubular rootlets. The plant is sometimes reproduced by the lower nodes of the stem being converted into starchy tubers.

CHARA, *Linnaeus*.

- C. GYMNOPHYTES, A. Brongn. In paddy fields along the Koladyne Valley.

NIFELA, *Agardh*.

- N. ROXBURGHII, A. Brongn. Kyā-eng, Pegu.
 N. MICROGLOCHIA, A. Brongn. Arakan. Swamps on the Koladyne River.
 N. OLIGOSPIRA, A. Brongn. Kyā-eng, Pegu.

Order EUISETACEÆ (Horsetails).²

A singular order of leafless Aerogens with hollow jointed stems which are simple or branched. The place of leaves is taken by a membranous sheath at every joint, completely surrounding the stem or branch in a whorl, and is divided either into a number of small teeth like a saw, or into fewer and more elongated lobes. Any one who has noticed the Casuarinas, which are so common on the sandy sea-shores of Burma, may be said to have seen a gigantic equisetum. It is impossible to look at the branches of this singular tree without seeing the likeness at once. Their jointed branchlets (for they are leafless too), harsh to the touch like an Equisetum, with toothed sheaths also at the joints, suggest that plant at once. They are, however, in all but this accidental though obvious similarity, widely different plants.

The fructification of Equisetum (the only genus) is in the shape of a terminal cone, commonly about $\frac{3}{4}$ to 1 inch in length, consisting of a number of peltate, or shield-like scales, attached to a central axis, packed closely together by their edges, the flat shield-like surface being outwards. As the cone ripens and expands, the edges of the

¹ "A family of plants generally classed among the Algae, but which, from the character of their reproductive organs, perhaps demand a more elevated position. They are remarkable for their well-known circulation, first discovered by Corti. The Characæ are aquatic plants of filamentous structure, exhibiting elongated axes furnished at intervals with whorls of branches."—Griffith and Henfrey, Micrograph. Dictionary.

² "Tubular, symmetrically branched bodies, multiplied by spiral coated nucleoli, filled with starch."—Lindley, Veg. Kingdom.

³ The present account of the Ferns and Fern allies of Burma is drawn up and arranged by the Rev. C. Parish, but the localities from the Nicobar group have been added from a paper on the vegetation of the Nicobar Island in the Journal of the Asiatic Society of Bengal, 1876, Part II, p. 105, and where a species has been added on the authority of Kurz the letter (K.) indicates the fact.

scales separate, and show a circle of spore-cases on their under-surface, each of which opens by an internal slit and discharges the spores. These spores are remarkable for being surrounded by two spiral filaments called *elaters*,¹ which are coiled tightly round them. When uncoiled, which in a dry state of the air they will become, these filaments are seen to be attached by their centre to a common point of the spore, so as to make them look like four legs, each with a swollen termination like a foot, bearing the spore at their point of junction. They are highly hygroscopic, and if a number of them be laid on a piece of glass under a microscope, and breathed upon and allowed to dry alternately, they may be seen to twist and untwist themselves and wriggle about as if they were endowed with life.

Equiseta are humble plants, two or three feet high, though occasionally attaining a larger size. They appear to be the degenerate descendants of gigantic ancestors, which under the names Calamite and Stigmaria are now found (together with gigantic Lycopodia) fossilized in our Coal-measures.

They are rigid, hard, plants, rough to the touch, owing to the quantity of siliceous matter which their cuticle contains. In *Equisetum hyemale* this is so great as to make it useful for polishing furniture and metals, for which purpose it is sold under the name of Dutch-rush. A section of this cuticle, when submitted to a microscope and viewed by polarized light, forms a very beautiful object; the crystals of silica are clearly seen arranged in rows running parallel with the axis of the stem.

Equiseta have been generally classed near to Ferns, being considered their near allies; but Lindley says that "their relation to Ferns is not obvious." In the possession of elaters they resemble *Jungernanniaceæ* and *Marchantiaceæ*—and, as he says, "the resemblance between the peltate scales of *Equisetum* and the umbrella-like heads of the spore-cases in *Marchantia* is too obvious not to strike the most unpractised observer." It is with these that he thinks *Equisetum* has its nearest affinity.

I have found one species, and but one, in Burma :

EQUISETUM, *Linnaeus*.

E. DEBILE, Roxb.

Order LYCOPODIACEÆ (Club-mosses).

An order of Acrogens, with one- to three-celled axillary spore-cases or thecæ, without any jointed ring. Reproductive bodies all of one kind.

LYCOPodium,² *Linnaeus*.

Erect, pendulous, or creeping plants, with closely imbricated, narrow, rigid leaves, and a swollen or club-shaped termination, in the axils of the scales of which the thecæ, or spore-cases, are situated. Spore-cases kidney-shaped, one-celled, opening by two valves, many-seeded. The fruit-heads or club-like terminations are sometimes branched, as in *L. clavatum*. They may be likened to large mosses, or to diminutive fir-trees; indeed, "they are intermediate between ferns and cone-bearing trees on the one hand, and between ferns and mosses on the other" (Lindley).

They are the dwarf representatives of the gigantic *Lepidodendra* and *Sigillaria* which flourished in the forests of the primæval world, and the fossil remains of which are found abundantly in our Coal-measures.

¹ Elater—ἐλάτηρ, placentæ genus. Placenta, botanically, is that part of the interior of an ovary where the ovule originates: or the name may be given from the meaning of the Greek word for "to drive," because it scatters or propels the spores.

I have used the word *elater* here for the spiral threads of the spores of *Equisetum* because Lindley uses it, but they are both structurally and morphologically different from the proper elater of *Jungernanniaceæ*. In the former, they are attached to the spore, and according to Berkeley are but the splitting up the outer coat of the spore—"nothing more than the unrolled spiral of which that outer coat consists." Whereas, in the latter, they are wholly independent bodies, attached to the valves of the spore-cases, and instead of being simple threads, are elongated sausage-like hyaline sacs, in which a double spiral lies coiled up.

² Lycopodium. λέκος, a wolf, and πῶς-ποδός, foot - from a fancied resemblance.

As to ferns, so to Lycopods, medicinal virtues have been ascribed. "The most remarkable plant of the order is the *Yatum condenado*. *Yatum*=Great Devil and *condenado*=accursed—which appears to be *L. rubrum* of Chamisso. Sir W. Hooker, who calls it *L. catharticum*, states that it acts most vehemently as a purgative, and has been administered successfully in Spanish America in cases of Elephantiasis."—Lindley.

One of the most curious uses is that to which the spores of *L. clavatum* are put. In consequence of their highly inflammable nature, they are used, under the name of "Vegetable Brimstone," to produce stage lightning. Apothecaries also are said to roll pills in the powder to keep them from sticking to one another.

Lycopodium clavatum is a long straggling terrestrial species, common also in Europe. *L. phlegmaria* is an epiphyte, and may be not unfrequently seen hanging from trees in shady jungles to the length of 12 to 18 inches. *L. involvens* or *circinale* (as I take the plant to be which grows on Zwā-ga-byñ) is a small, terrestrial, tufted, caespitose species, with rather rigid tripinnate branches growing round a common central root. It is possessed of extraordinary hygrometric properties. When wet, it lies expanded; but when dry, either out of doors in the hot sun, or indoors in a dry room, it rolls itself up into a round ball. In consequence of this property, it was quite an unmanageable specimen for the Herbarium, so, not being placed among the other species, it has been unfortunately mislaid and lost. I cannot, therefore, speak positively of it, but, in appearance, it corresponds exactly to the two figures of *L. lepidophyllum* of Hooker, Icones Plantarum, Vol. II. tab. clxii. and clxiii. But that it is there said to be a native of Mexico, I should have pronounced it to be that species; which, indeed, it may possibly be, notwithstanding the distance of the two localities.

L. CLAVATUM, L.

L. PHEGMARIA, L.

L. CERNUUM, L.

(var. *curvatum*, Sw. Kamorta, *vide* Kurz.)

L. LAXUM, Presl. Kamorta, *vide* Kurz.

L. SQUARROSUM, Forster

L. OBTUSIFOLIUM, Hamilton.

(*Hamiltonii*, Spring.)

L. INVOLVENS, Sw.

SELAGINELLA,¹ *P. de Beauv.*

Though of the same natural order, *Selaginella* present a totally different appearance from *Lycopodia*. Instead of the hard rigid habit of the latter, they are plants of a thin and delicate texture, and are distinguished by their much-branched trailing stems, which are flat, and have their innumerable small leaflets bifurcately disposed. Their fructification consists of axillary two- to three-valved thecae, borne on terminal scaly spikes. A small and uninteresting species, *S. Blangieri*, is common on wet clayey banks, and is only two or three inches long; but the larger kinds, when they find a suitable habitat, form large tangled masses, and are very beautiful objects. At Way-ta-ma-yaing, south-east of "The Three Pagodas," I have waded knee-deep in them. I am indebted for the names of the undermentioned species to Mr. Baker, of Kew, who will, I believe, shortly publish a work containing a description of all the known species of *Lycopodiaceæ*.

S. DEBILIS, Spring.

Zwa-ka-byñ.

S. CHRYSOCALON, Spr.

Zwa-ka-byñ.

S. BLANGIERI,² Spr.

On banks and old Pagodas, common.

(*S. pruriifolium*, Baker. *Lycopodium imbricatum*, Roxb.)

¹ *Selaginella*, dim. of *Sclago*, a name of Pliny's for some plant.

² *S. imbricata* of Kurz's list = *S. Blangieri*, Spr.

- S. PUBESCENS*, Spr.
S. FLABELLATA, Spr.
S. CAULESCENS, Spr.
S. WALLICHI, Spr.
S. ATROVIRIDIS, Spr.
S. CAUDATA, Spr.
S. RADICATA, Spr.
S. VAGINATA, Spr.
S. TENELLA,¹ Spr. Kamorta, *fide* Kurz.

PSILOTUM,² *Sw.*

(*Bernhardia*, Willd.)

A genus of a single species. Epiphytal, erect, about one foot high, slender, dichotomously branched; stem 3-sided; thecae axillary, 3-celled; leaves minute, bristle-like. On trees in damp jungles towards the south; rare.

- P. TRIQUETRUM*, Sw.
Bernhardia dichotoma, Willd.

Order MARSILIACEÆ.

Lycopodal Aerogens, with reproductive bodies of two kinds. The order is divisible into two distinct groups, to one of which belong *Marsilea* and *Pilularia*; and to the other *Azolla* and *Salvinia*. All the genera are aquatic.—*Berkeley*.

SALVINIA, *Micheli*.

A genus of small aquatic plants, with a filiform floating rhizome or root-stock, alternate imbricated fern-like leaves, and bladder-like fruit on short leafless branches. "All the supposed species are reducible to one which occurs in the south of Europe in stagnant pools, and is found in all the warmer parts of the world."—*Berkeley*.

- S. cucullata*, Roxb. (M.)

Order FILICES. FERNS.

The late Dr. Mason, in his introductory remarks under this head, after acknowledging what he kindly calls a "valuable Catalogue and Synoptical table" furnished by me, goes on to say that "Synonymy is the great opprobrium of Natural History. The difficulty in the study of nature is not in what God has made, but in deciphering the illegible characters that man has written upon her face. She places us on an enchanting ground of hill and dale, dingle and dell, stream and streamlet, and 'every tree that is pleasant to the sight and good for food'; but naturalists, by the multiplicity of barbarous names they have heaped on the same object, have turned the whole into a continent of mud.

"A tribe of ferns with the sori continuous on the margin, and easily recognized, Linnæus designated *Pteris* or plume, the Greek name for ferns. Modern naturalists, Dutch and English, German and French, have so *improved* on him and on each other that *Pteris* now appears in different books under *eighteen* different names, and, to complete the cycle, showing the impertinence of these changes, Sir Wm. Hooker, the most distinguished of living Botanists, has gone back to the old Linnæan genus and adopted it in his new work on ferns.

¹ Among *species dubia* of Spring.

² Presumably from ψιλῶς, to strip off the hair, in allusion to the bare, naked appearance of the plant, which may fairly be said to be leafless.

"The tree fern which appears under Wallich's name of *Polypodium giganteum* will be found in the following Catalogue under Sir Wm. Hooker's name of *Alsophila gigantea*;¹ but Moore more recently refers it to *Alsophila glabra*. He remarks, 'it sometimes becomes difficult to distinguish *Alsophila* and *Polypodium*.' Where there is no natural boundary, why make an artificial one?"

"The silver fern is referred to *Nothochlana argentea*, that being the systematic name under which it is described in the latest work on ferns to which I then had access; but I since find that Sir Wm. Hooker refers it to *Cheilanthes argentea*. Moore observes: '*Nothochlana* has all the habit of *Cheilanthes*, with which some of the species have much affinity.'

"One of the most common ferns in Burma, very abundant at the base of the old walls of Toung-ngoo, is the four-eared *Pteris*, *P. quadriaurita*, easily recognized by each of the lower pair of pinnae being double, so as to suggest two pairs of ears. To the description of this species Sir Wm. Hooker devotes a dozen lines of large type, and then adds 12 dozen lines in small type mainly to an exposition of the synonyms."—F.M.

Our good and worthy missionary has been a little hard here, I think, on botanists, indeed, on naturalists generally; for, although a confused heap of synonyms and a multiplicity of barbarous names might reasonably be pronounced to be an inconvenience, they hardly deserve to be stigmatized as an opprobrium: and while the subject may legitimately afford (as it has afforded before now) a fair mark for a shaft of good-humoured satire, it is hardly the occasion for so serious a homily as he has read us.

One wonders the more at Dr. Mason's warmth, when one reflects that but for this very barbarous nomenclature, and for the aid of those artificial boundaries with which naturalists furnished him, he would have been simply unable to compile the work in which he evidently took such pleasure, which will cause his name to be remembered in Burma as that of an ardent observer and lover of nature, and the only fault of which is the *want* and not the *excess* of that artificial symmetry which yet he so strongly decries! He must have forgotten, too, when he called a synoptical table "valuable," that its value lay wholly in its artificial character.

"Where there is no natural boundary, why make an artificial one?" I presume, in order to bring part at least of this boundless nature within handling distance. Its vastness makes definition necessary; in no other way can it be dealt with. *System* means putting loose materials into shape, and this must be an artificial process. And though we say (as we do) that nature refuses to be bound by system, it is not, after all, so much nature that we bind as ourselves by it, in order that we may learn her ways and instruct ourselves in her methods, by following them in all their intricacies as far as we are able. And for this we want names and terms, and their very increase shows that we are pursuing her farther, and realize more thoroughly her infinite variety; and in so doing we do no violence to nature, but reap infinite advantage to ourselves.

To come to Ferns and to the point. Fewer names, of course, sufficed when less was known—*Pteris*, for example, when known ferns were few, might be used to designate all those which had their "sori continuous on the margin"; and *Polypodium*, for that matter, to designate all the rest, without inconvenience. But as the number increased, discrimination would become necessary, and with discrimination, subdivision, and with subdivision a greater attention to minute points of structure, and, withal, new names. So that what was once a *Pteris* or a *Polypodium*, came to be called something else; the old name being, however, retained for a section

¹ Some people call this word *gigantea*.
A rhyme most proper for "infantia."
But if you'd not offend my ear,
I pray you, call it *gigantea*.
And yet to blame you I'll not venture,
Should you call a silver-fern, *argentea*.
Nor deem me in this thing pedantic—
I point you to a fault *gigantæ*.—C.P.

—that section to which the original simple definition was found to be most applicable, or which included plants that came nearest in character to the one to which the name was first applied. Hence, e.g. Wallich's *Polypodium giganteum* would become Hooker's *Alsophila gigantea*, and so on. And hence, inevitably, *Synonymy*. And, as in nature, animal or vegetable, those species are accounted to be the highest and the most perfect, which have the greatest differentiation of parts, i.e. separate organs for separate uses (a bird, for instance, to possess a higher organism than a snail); so, in Botany, an increased, and presumably appropriate, terminology, as it is the consequence of a larger discrimination, or differentiation of species, argues an advance and not a deterioration in that Science.

And, for the inordinate multiplication of names for one species, however undesirable, the thing has been unavoidable—it was not planned, but it grew:—it is not an “opprobrium,” but an accident. One person finds a fern in one place, say Burma; a second finds one in another place, say China; and a third in a third, say New Caledonia; and so on; but not one of the three knows for certain whether it be new or not; so each gives it a name, according to his fancy or his judgment. In course of time all these several plants find their way to Kew, with many others collected by different persons all the world over; and, when they come to be collated and compared, they are all found to be one and the same, and perhaps not new either, but to have had a name given it long ago, possibly even by Linnaeus himself! Some who have given a new name may even have been authors of note, but their names must give place to the oldest. Thus, for example again (I invent the names), *Pteris elegans* of one, may be *Pt. repens* of another, and *Pt. bifurcata* of a third, and so on, and the clearing up of all this difficulty, and the unravelling of all this entanglement (which may have been growing for years), may well afford Sir Wm. Hooker matter for “a dozen lines of large type,” with, possibly “twelve dozen more of small type in an exposition of the synonyms.” Nor, as a fact, is the fern in question, *Pteris quadriaurita*, always so “easily recognized” as Dr. Mason says. It is a wide-spread and Protean fern, “varying much in size of frond, number of pinnae, and in the nature of the apex of these pinnae.” A great part of the twelve dozen lines is taken up with the elucidation of these differences. True, there may be some who think all this to be waste of time, men even of a practical and legal turn of mind,—for, “de minimis non curat lex,”—but there are many who think differently, and are persuaded that, as in the operations of nature, a minute, and, if you like, contemptible millipore, by the persevering continuance of its obscure work, has built up habitable islands without number, and barrier reefs hundreds of miles long; so, in the study of nature, the power of patient persevering attention to, and investigation of small things, has resulted in making science what it is, and in building up the fame of a Hooker or a Darwin.

Ferns hold the first rank among Cryptogamous plants, i.e. plants whose organs of reproduction, though existent, are hidden from view. They are flowerless plants. They are also called *Aerogeous*, because they grow from the point, or terminal axis only. They are, further, remarkable for their *vernation*, or manner in which they are folded before expansion, which is called *circinnate*, or, familiarly, rolled up like a watch spring. The elegant crozier-like terminations of the undeveloped fronds must have been remarked by all who have observed the growth of ferns. These unroll themselves just as a watch-spring would be unrolled if an attempt were made to expand it. Nothing can well be imagined more graceful than the form of a tree-fern when its fully developed drooping fronds are seen surmounted by a crown of the undeveloped circinnate ones.

A fern either grows on an erect *caudex* (stem or trunk), which may be only a few inches high, or many feet and tree-like, in which case the fronds are *tufted*, growing all round a common central axis; or, it develops a slender elongated horizontal axis, called (as in a similar growth of orchids) the *rhizoma*, or root-stock, from which the fronds issue at varying distances. The *frond*, which, strictly speaking, is the leafy portion of the plant only (though it may be sometimes used more generally for that and its support too), is raised on a longer or shorter stalk, which is the *stipes*. The larger, or primary, divisions of the frond are called

pinnæ, their subdivisions *pinnules*, and theirs again (or, in any case, the ultimate and smallest divisions) *segments*. The *rachis* (back-bone) is the part which, in fact, stands in that relation to the divisions or subdivisions—the central stalk as we may call it—and the *costa* is the mid-rib of the leafy segment. We come next to the fructification, which is always¹ seated on the under-surface of the frond, in round heaps, in lines (straight or curved), or in patches. These are called *sori*, which word, indeed, only means “heaps.” If these *sori* be closely examined with a lens, they will be seen to be composed in all *Polypodiaceæ* of smaller stalked bodies, with a jointed ring nearly surrounding them; these are the *Thecæ*, or *sporangia*; and, last of all, when the fructification is thoroughly ripe, these *thecæ* burst asunder and scatter their contents in the form of the finest dust, which, in common parlance, is the seed, but, technically, *the spores*. The difference is that the true seed (of Phanogamous plants) germinates from given points, one point always descending as a rootlet, and another ascending as a leaf-bud; whereas in the spore (the analogous organ in Cryptogamous plants) germination takes place indifferently from all points. But I had nearly forgotten one other part of which it is necessary to know the name. A very large proportion of ferns have their *sori* covered with a thin filmy or scaly covering, shaped to suit the form of the sorus. This is the *indusium*, sometimes also called the *involute*. It is on the presence or absence of this covering, on the shape of the *sori* and the direction they take, as well as on the veining of the fronds and the different structure of the *thecæ* (which are not always ringed, as just now described), that the divisions of the alliance “*Filicales*” are made to turn.

Many ferns have had medicinal virtues ascribed to them, whether with good foundation or not, I am unable to say—probably, in order to prove effective, a few grains of faith should be added to the dose.

The fronds of certain ferns contain mucilage, and so may be considered lenitive. Some are certainly fragrant and aromatic—our European *Lastræa oreopteris* is remarkably so, the plant being covered with small glands of an essential oil—it too therefore may have some healing virtue of a mild nature. “Capillaire is so called because prepared from *Adiantum capillus-Veneris*.” But, if all that is said be true, there is hardly a complaint that may not have its cure in a fernery. Ferns are solvent, deobstruent, sudorific, antihæmatic, anthelmintic, febrifugal, astringent and purgative—they are tonic and emetic, and they cure the rickets. However, (what is undoubtedly true and more practical), pigs feed upon the roots of *Pteris esculenta* in Tasmania, and human beings will do the same when very hungry and nothing better offers itself. Indeed, my friend Mr. Theobald tells me that he found “the young curly stems” (the crozier-headed fronds aforesaid) “very nice, when boiled tender and mixed with butter and pepper.” I should have thought they would prove rather *husky* food, from the quantity of dry scales which cover those young shoots—and that he must have been somewhat in the mood of the Prodigal; however, the Scotch, I believe, eat nettle-tops, and like them; and a Burman is almost as bad as a caterpillar in his omnivorous appetite for green things, so, what wonder? But, to make an end with the uses of the Fern, the very spores have been turned to good account, and have furnished the poet with a point:—

Gadshill: “We have the receipt of fern-seed, we walk invisible.”

Henry IV. Part i. Act ii. Scene 1.

The whole number of known ferns may be set down as about 2300, though every day new discoveries are being made and their number added to. Of this number, I have found about 1-tenth, or 212, in the Tenasserim Provinces, for my search can hardly be said to have extended farther. There must be more yet even in these Provinces, and many more in the whole of Burma—the greater

¹ As a remarkable instance of the saying that there is no rule without an exception, a fern has been found in Ceylon with its fructification on the upper instead of the lower surface! I possess a very fine specimen of “*Aspidium acuminatum*,” Synopsis, p. 253, which has all the fructification on the upper surface, or what may be called the wrong side.

part of which has been quite untouched by me—and, of these 212 species, not one was furnished by another person; they are all of my own individual gathering, as I never fell in with or heard of any fern-collector in Burma during the whole of my residence. The number, therefore, is not offered as strictly that of all the ferns indigenous to the country, only of those that I have proved to be so.

A full Catalogue of these is given below, and a limited number have been selected (in a somewhat arbitrary fashion certainly, at the same time, according to my idea of their individual interest, and with some reference also to space) for description, or as ground for some observation. There is the less need of a detailed description of all the ferns, as (which is not the case with the Orchids) books are to be had which contain full descriptions of all known species, viz. Sir Wm. Hooker's "Species Filicum" in five volumes, and Baker's "Synopsis" of the same, which is more compendious, handier and less costly.

Before leaving the subject of ferns, I should like to say a word or two on fern collecting. There are many fern collectors, but very few good fern collections. They are such pretty things and so easily pressed and dried, as compared with other plants, that many take to collecting them as an amusement; and, in the majority of cases, collections made in the ordinary way, however pretty they may look on paper, are, from a scientific point of view, utterly worthless. To identify a fern (unless, indeed, one be very familiar with it or it be a common one), a scrap, such as the tip of a frond, or a pinna, is quite useless; how much more, whereby to determine a new species! Yet scraps are the rule, and really good specimens the very rare exception. To be of real use (and it will look much better too), a fern, if small enough to lie on a sheet of cartridge paper, should be dried whole, rhizome and all; or, if of the tufted kind, the stipes, cut off at the very bottom, should be dried with the frond; and rather than cut, the specimen should be folded; or, if divided, the separate portions preserved, duly marked, on separate sheets. Or, again, if part must be sacrificed, let it be a *perpendicular half*, in which case, the remaining half will be the fac-simile of the lost half. In every case a specimen should be as large as it conveniently, or *inconveniently*, may, and always have a portion of the stipes showing the scales, if any, near the bottom. If the fern be so large as to make it impossible to dry any considerable portion of it, then a pinna must needs suffice; or, the end of the frond, and a portion of one of the lowest pinnae, which often differ in form from the rest; but, always if possible, a piece (a slice cut longitudinally will do) of the stipes. As a rule insects do not attack ferns so freely as they do other dried plants, but the best way to ensure their safety is to wash them over, when thoroughly dried, with a weak solution of corrosive sublimate dissolved in spirits of wine.

GLEICHENIA¹ BICHOTOMA, *Willdenow.*

Rhizome slender, creeping extensively underground, throwing up fronds at intervals. Stipes (frond-stem) rounded, slender, repeatedly dichotomous, *i.e.* branching in a bifurcate manner, first into two, then each of the two divided portions into two again, and so on indefinitely; the ultimate branches bearing simply forked pinnae, and at each point of bifurcation is a small pair of pinnae. The pinnae are lanceolate and pointed, pinnatifid; segments narrow, linear, blunt at the end. The whole frond is glaucous (of a bluish-white colour) underneath. This fern forms large tangled masses, varying much in height, from two to four feet or more. The sori, which are naked and consist of very few thecae, and are consequently small, are placed in two single lines, one on each side of the midrib of the segments.

On the cliff at Amherst, very sparingly. Abundant at Mergui on the road to Kulween. A common tropical fern, and of very wide range.

Another species, *G. longissima*, is found on mountains at a considerable elevation, as on Nat-toung, near Toung-ngoo. Other species, probably, remain to be found.

¹ *Gleichenia*—presumably from a proper name.

ALSOPHILA¹ GLABRA, *Hook.*

A very large fern, with a caudex, or stock, about two or three feet high, covered with the bases of old fronds. Fronds 5-6 feet long, bipinnate; pinnae 18 inches to 2 feet long, lanceolate, terminating in a lobed and serrated point; pinnules 4-5 inches long by $\frac{3}{4}$ broad, square at the base, nearly sessile, oblong, pointed, pinnatifid, *i.e.* cut down about half-way to the costa, or midrib, into lobes which are rounded and serrated. Sori very regular and uniform, forming two sides of a triangle² in the lobes, the apex towards the end of the lobe. Whole plant smooth. This is, undoubtedly, *Gymnosphera glabra*, of Blume. It is identified with *Alosphila gigantea*, Wall., in Hooker and Baker's Synopsis, of which latter fern Sir W. J. Hooker says in his "Species Filicum," that it grows to a gigantic size, "caudex 50 feet high. Wall.," "the mountains of Tenasserim" being given as a locality. This may be so, but I must say that, although I have seen a great deal of the Tenasserim forests, and although *A. glabra* is a common fern in damp shady places, I have never seen it larger than described above, nor have I seen any tree-fern at all approaching the size given for *A. gigantea*; none, indeed, I think, more than 10 or 12 feet high. These were *A. latibrosa*, *contaminans*, and *comosa*. The first two are aculeate, *i.e.* their stipites are covered with short sharp thorns. They are all three found here and there in mountain valleys. *A. comosa* may be found at the last 'tsakan or halting place, near a huge granite boulder, before you make the last ascent of Nat-toung, near Toung-ngoo.

DIACALPE³ ASPIDIODES, *Blume.*

A very elegant finely divided fern, averaging (as I know it on the Tenasserim mountains) about two feet in height. The stipes is about half this height, and is clothed with numerous brown scales at the base. The fronds are tripinnate, nearly as broad as long. The lower pinnae are much longer than the upper ones and nearly opposite; the others being alternate. The under surface is profusely covered with sori, which are globose, and closely covered by their indusium, which ultimately bursts irregularly at the top.

Abundant on the mountains at about 4000 feet.

DICKSONIA, *L'Heritier.*

Large, mostly aborescent ferns with inferior subglobose, or eup-shaped and entire, or more or less distinctly 2-valved involucre. *Cibotium*, by some kept distinct, is united under *Dicksonia*, in Baker's Synopsis. It belongs to that section which has very distinct 2-valved involucre.

CIBOTIUM⁴ GLAUDESCENS, *Hook.**C. Barometz*, Link.

A large and extremely beautiful fern, with a short caudex and fronds six or eight feet long. Fronds bipinnate, primary pinnae rather distant, alternate, lanceolate; secondary pinnae oblong, rather narrow and ending abruptly in a fine point, cut down nearly to the rachis or midrib; pinnules or segments subfalcate, acute; whole frond glaucous on the under side. Involucre 2-valved, one on each side of the base of the segments, or nearly in their axis. Said to be arborescent. It may grow in some places to a size which will entitle it to be so called (of this I cannot speak), but all the individuals which I have seen in the Tenasserim Provinces have only developed a very short caudex, but little elevated above the ground. I find it at the foot of a very fine waterfall which descends from Nō-ā-la-bo, a large

¹ *Alosphila*. ἄλσος, a watered wood, and φιλέω, to love.

² Or, better, as expressed in Synopsis Filicum, "like an inverted V."

³ *Diacalpe*. διά and κέλυτρον, an urn or drinking cup. Application not very apparent.

⁴ *Cibotium*. κιβώτιον, a little box, which the involucre well represents.

mountain East of Tavoy; also, by the stream that tumbles down the steep side of Patau, in the island called Madremacam, Mergui. In Baker's Synopsis the name is changed into *Dicksonia* (*Cibotium*) *Barometz*, because it is supposed by some to be the fern called *Polypodium Barometz* by Loureiro—a fern of which wondrous things have been said. The following account is taken from the "Treasury of Botany" under the heading of "*Cibotium*."

"*C. Barometz*, sometimes called *C. glaucescens*, is believed to be the '*Baranetz*,' *Agnus Scythicus*, or Tartarian Lamb, about which travellers have told so wondrous a tale. This 'Lamb' consists merely of the decumbent shaggy caudex of a kind of fern, which is *no doubt* the species just referred to. When inverted (the basal part of the stipes of four of the fronds, suitably placed, having been retained as legs, and the rest cast away), these caudices present an appearance which may be taken as a rude representation of some small woolly animal. The 'traveller's tale' is that on an elevated uncultivated salt-plain of vast extent, West of the Volga, grows a wonderful plant, with the appearance of a lamb (*Baran* in Russian), having feet, head, and tail distinctly formed, and its skin covered with soft down. The 'lamb' grows upon a stalk about three feet high, the part by which it is sustained being a kind of navel: it turns about and bends to the herbage, which serves for its food, and pines away when the grass dries up and fails. The fact on which this tale is based appears to be, that the caudex of this plant may be made to present a rude appearance of an animal covered with silky hair-like scales, and, if cut into, is found to have a soft inside with a reddish flesh-coloured appearance. When the herbage of its native haunts fails through drought, its leaves no doubt droop and die; but both perish from the same cause, and independently of each other. 'Thus it is (observes Dr. Lindley) that simple people have been persuaded that there existed in the deserts of Scythia creatures half animal, half plant.' 'This condition of the root-stock of some ferns' (writes Sir W. J. Hooker) long engaged the attention of early writers of the marvellous, and many strange figures were published of it; but Dr. Beyne, of Dantzic, in 1725, declared that the pretended *Agnus Scythicus* was nothing more than the root of a large fern covered with its natural villus or yellow down," etc.

It will be noted that the writer of this article says, there is "*no doubt*" that the fern which was the base of this wondrous tale is our *C. glaucescens*. But that fern must have been a *Scythian* or *Tartarian* plant—whereas ours is a tropical one. Is our *C. glaucescens* found also on the bleak and arid plains spoken of? Our fern, I believe, could not exist in such a climate. Again, to present even the most distant appearance of an animal, it is necessary that the caudex should be "*decumbent*" (as *Aspidium Barometz* is described by Willdenow "*radix decumbens, crassa*"), whereas our *C. glaucescens* has an erect caudex and tufted fronds. It is indeed pronounced to be "*caulescent*"; but in order to be caulescent, the caudex of a fern must be erect and not decumbent. This is the difficulty which seems to me to militate against the identity of the two plants. Erasmus Darwin's fanciful Muse thus describes this strange fern; (the very first line, I observe, ill-suits our tropical plant):

"Cradled in snow and fanned by arctic air
Shines, gentle Barometz! thy golden hair;
Rooted in earth each eloven hoof descends,
And round and round her flexile neck she bends;
Crops the grey coral-moss and hoary thyme,
Or laps with rosy tongue the melting rime,
Eyes with mute tenderness her distant dam,
Or seems to bleat—a vegetable Lamb."

Loves of the Plants, Canto I., 281.

¹ e.g. That of *Davallia Canariensis*, sometimes called the "hare's foot fern," from the similarity of the end of the rhizome to the foot of that animal.

HYMENOPHYLLUM,¹ *Smith*, and
TRICHOMANES,² *Smith*.

These two genera, separated by their fructification only, are remarkable for the delicate and translucent texture of their fronds, and have been called "filmy ferns" in consequence.

The fructification of *Hymenophyllum* is either terminal or lateral relatively to the pinnæ, or to the frond itself, if entire; but it appears always to end a contracted segment of a divided frond, or the vein of an entire frond. The thecæ are sessile or nearly so on a central receptacle, or *columella*, which looks like the prolonged and thickened vein. The involucre is 2-lipped, formed of the same substance as the frond itself.

The fructification of *Trichomanes* is very similar, but the involucre is undivided, looking like a little urn, and the central axis, or *columella*, on which the thecæ are seated, is considerably prolonged, forming a seta—hair or bristle,—which peculiarity has caused, if not all the species, at all events our single British one, to be called *The Bristle-fern*. They both have slender thread-like (more rarely stout) creeping rhizomes, which love to hide themselves in the deep moss which clothes the lower parts of trees, or among any loose vegetation which will provide them with the moisture they require. Some have exceedingly minute and simple fronds—others fronds a foot or more in length, and much divided. I have gathered about a dozen species in all, but, I dare say, there are many more yet undiscovered. A British species, *Hymenophyllum Tunbridgiense*, is among those gathered. A pretty little *Trichomanes*, which I discovered many years ago at Henzai, and named *Henzaiense* accordingly, appears in the Synopsis Filicum as the mutual discovery of a *Mr. Henzai* and myself at Maulmain, in *Pegu*! A larger and a widely distributed species, *T. Javanica*, with fronds about 6 or 8 inches long and pinnated, which are tufted at the end of short rigid rhizomes, emitting long wiry roots, is a terrestrial fern, frequently found on the banks of hill-streams. It is one of many ferns to be found by the stream at Madrecamam, Mergui, a delicious little bit of fern-hunting ground.

Space does not admit of special description.

DAVALLIA,³ *Sm.*

This genus furnishes about a dozen species, all tree-loving, and never so happy as when they can insert their long running rhizomes among the sheathing bases of the huge leaves of the Palmyra or Talipot Palms, which often cling to the trunk long after the leaves themselves have perished. Mergui is rich in such trees—indeed, I do not know that I have ever seen anything finer or nobler than a grove of *Corypha umbraculifera* (Talipot), which is to be seen a little way in, behind the town. On their trunks, as also on the numerous cocoa-nut trees all round about, may be found in profusion *Davallia solida*, *D. elegans*, *D. bullata*, with many other most interesting ferns.

The *Davallias* have nearly all gracefully drooping and much-divided fronds on scaly creeping root-stocks. Maulmain has furnished one new species:—

D. HYMENOPHYLLA, *Par.*

D. Parishii, *Hook.*

This species has fronds of so extremely delicate and semi-transparent a texture that the name "*Hymenophylla*" naturally suggested itself. The rhizome is short, and not scaly. Stipes very slender and brittle; "fronds flaccid, 6–9 inches by 4–6 inches, in outline deltoid, divided down to the rachis on the lower part; but not on the upper. The lowest pair of pinnæ are broadest and most deeply cut on the lower side; lowest *pinnules* reaching down nearly to the rachis, toothed more than half-way

¹ *Hymenophyllum*. ὑμην-ενος, a thin membrane; and φύλλον, a leaf.

² *Trichomanes*. θριξ-τριχός, a hair; and μάδος, thin (?), in allusion to the thin bristle?

³ *Davallia*, presumably from a proper name.

down, with oblong, blunt, crenate lobes; sori few, marginal in the crenations." —*Hooker*. On limestone rocks in the neighbourhood of Maulmain. In crevices about the mouth of the Damathat Caves; but very difficult to extract owing to the depth at which the rhizomes hide themselves, and the brittle nature of the stipites. Only to be found during, or immediately after, the rains.

LINDSAYA,¹ *Dryander*.

This genus is distinguished by having its sori in a continuous line close to the margin of the frond, covered by a continuous indusium, which opens outwards.

L. LANUGINOSA.

L. lanuginosa is a rare plant. It has a creeping rhizome clothed with small scales. The fronds are very long and narrow; the stipes 5 or 6 inches, the frondose portion two feet long by some 4 inches broad, simply pinnate; pinnæ 2 inches long by $\frac{1}{2}$ an inch, and bluntly rounded at the end in the barren frond; narrower in the fertile frond. The pinnæ, being jointed on to the rachis, fall off in drying, which makes the dried specimens wear a wretched appearance. It very much resembles *Nephrolepis acuta* in appearance, and, like it, has little chalky dots along the edge of the upper surface of the pinnæ.

Found by me on one Palmyra tree only in Tavoy, and gathered only once, owing to the circumstance that the fronds disappear soon after the rains are over, and my visits to Tavoy were, on all but one occasion, made in the dry weather. No doubt a resident would find it on other trees.

L. ENSIFOLIA, *Sw.*

L. Griffithiana, *Hook.*

A most variable plant. In its "*ensifolia*" form, it is found on the hill overlooking Maulmain. This form shall be first described. Fronds closely set upon a slightly creeping rhizome, roots numerous, wiry. Height varying from 8 inches to 18, or even more; stipes about half the height; frondose portion pinnate; pinnæ opposite or nearly so, 5 or 6 pairs and a terminal one, on short stalks, narrow, linear, blunt-pointed, the lowest the longest, 5 or 6 inches long by $\frac{3}{4}$ inch broad, shortening upwards, the topmost sometimes pinnatifid. The stipes is slender, smooth and light brown in colour.

L. Griffithiana has a stipes 10 inches or a foot long, terminated by a simple undivided frond 7 or 8 inches long by $\frac{3}{4}$ inch broad. This, however, is but an undeveloped form of the foregoing, as was clearly proved by my finding at "Madremaeam" both forms on one stock, and numerous plants of intermediate forms:—and what is rather strange, the young seedlings are often bipinnate in an early stage and become simpler afterwards.

Lindsaya Lobbiana, hardly, if at all, distinct from *L. cultrata*, is also found in the same small paradise of Ferns.

ADIANTUM,² *L.*

The indusia of this genus open inwardly, being formed, in fact, by a portion of the edge of the frond turned back so as to cover the marginal sori; they are either distinct, or confluent and continuous.

A. PARISHII, *Hook.*

This is a most interesting discovery. Until it was found only one species of *Adiantum* was known to exist, which had an absolutely undivided frond:—this was *A. reniforme*, a Madeira and Teneriffe plant. My plant is thus described. Whole height 1 to 2 inches, tufted, *i.e.* with stipites growing all round a common central axis, as opposed to those ferns which have creeping root-stocks and throw up fronds here and there from it. "A few fibrous tomentose radicles descend into the soil, and, from the summit of these, at the dry season of the year, are seen little else but

¹ Lindsay—a proper name.

² Adiantum. ἀδιάντρον, the Greek name for the plant; a priv. and δάωω, to moisten.

jet-black, needle-like, very slender, but firm and brittle stipites, from $\frac{1}{2}$ to 1 inch in length, from which the fronds have fallen. In the rainy season, a new crop of fronds, with their stipites, appear. These fronds are an inch in length at the utmost, rather more in breadth, quite simple (undivided) flabellately orbicular, membranaceous, subpellucid; the somewhat cuneate base is entire; the rest of the frond, in the sterile plant, crenato-dentate; in the fertile 3 to 5-6 lobed, soriferous in the sinuses, the lobes themselves sinuato-crenate, though much less deeply than in the sterile fronds. Involucres of a thick, subcoriaceous texture and dark colour, subreniform, large for the size of the frond, and closely applied to it. All the veins originate from a thickened common point at the base of the frond, are many times dichotomous, distant from each other, and very conspicuous, some extending into the involucre and there bearing the sori; the rest terminating just within the margin of the frond, and clubbed at the apex. Stipites very slender, erect, rigid, glabrous, intensely black and glossy, jointed at the setting on of the frond, which is there deciduous."—Hooker, *Filices Exotice*, sub Pl. LI.

This charming little fern was discovered in 1857 on the top of Zwā-ga-byu—the large Limestone rock visible from Maulmain to the North, and familiarly known as "The Duke of York's nose."

ADIANTUM CAPILLUS-VENERIS,¹ *L.*

This, the true "Maiden-hair fern," found, now but sparingly, on the sea-coasts of Great Britain and Ireland, in Madeira and elsewhere, is also found in Burma. When wading across the Megala-choung, a tributary of the Houng-drau, in 1858, I came upon a fine mass of it growing on the face of a rock which formed an island in the middle of the stream. I have never seen it since. I have it also from seaside rocks, Kurrachee.

A. LUNULATUM, *Burm.*

This is the very common but pretty species seen on banks almost everywhere. It is a long, slender, delicate fern, simply pinnate, pinnae about an inch across. The slender rachis is frequently elongated, and takes root at the apex.

CHEILANTHES,² *Sw.*

This genus consists of mostly small and much divided ferns, with free veins, sori terminal (or nearly) on the veins, at first distinct and rounded, afterwards often confluent. The indusium is made by the reflexed margin of the frond, and, like the sori which it covers, is roundish and distinct, or confluent and continuous.

C. varians and *C. tenuifolia* are rather common ferns on banks: both are found on the hill which overlooks Maulmain. They are slender brittle plants about 8 or 9 inches high. The fronds of the former are bipinnate, long and rather narrow, with distant pinnae. Those of the latter are tripinnate, broader and deltoid in outline. On *C. varians* I have often seen scales or gemmæ in the axis of the lobes, never on *C. tenuifolia*. These gemmæ will reproduce the plant, though I never saw them actually sprouting while on the fern itself.

C. FRAGILIS, *Hooker.*

A very brittle tufted species about a foot high (though often larger), bipinnatifid, almost too near to *C. Mysorensis* to be unmistakably distinct. On limestone rocks. If any one will crawl through the hole at the end of the (so-called) Farm-caves near Maulmain, and then clamber up the rocks, he will be sure to find it. This is where I discovered it. The rocks are, I believe, not otherwise to be ascended.

C. FARINOSA, *Kaulf.*

I take this opportunity of stating, once for all, that, although a detailed

¹ "Capillaire, the maiden-hair fern, from its being used to prevent the hair from falling off, says Matthioli (l. iv. c. 132), quoting from Theophrastus: 'ad delivium capillorum utile.'"—Prior, "Popular Names of British Plants." Williams and Norgate, 1870.

² Cheilanthes. $\chi\epsilon\acute{\iota}\lambda\omicron\varsigma$, lip or margin, and $\acute{\alpha}\nu\theta\omicron\varsigma$, flower, or that part of a plant which fructifies.

description of a few of the more remarkable ferns (as of Orchids) may be found here, it does not fall within the compass of this work, nor is it possible within the limits prescribed, to give this in the case of all the species mentioned. It is the less needful, as a published work exists, in which every known Burmese fern will be found fully and scientifically described, the "Synopsis Filicum." Accordingly, I simply mention that the above-named fern, one of the many so-called "silver ferns" (because their under-surface is covered with a white powdery—farinaceous—substance), is a Burman fern, to be found, no doubt, in many places, but, specially, on rocks at Kulwee in Beloo-gewn, near Maulmain. It used to be found on rocks close behind the General Hospital and elsewhere on the hill, sparingly: but I doubt if it be not now exterminated. Dr. Mason, no doubt, means this fern, by "*Nothochlæna argentea*"; but no *Nothochlæna* has yet been found, as far as I know, in Burma.

C. ARGENTEA, Hooker.

Another silver-backed fern—with varieties of a golden colour—is to be gathered on Zwā-ga-byñ, already mentioned (another small Paradise for a Botanist), near the top, together with *C. rufa*, *Nephrodium* (*Arthrotrix* of Wallich) *cochleatum*, *Lycopodium involvens* (a very curious and rare plant), and a host of other interesting things, both Cryptogamic and Phanerogamic. The remarkable point about the discovery of *C. argentea* here is that the other localities given for it are such as *Ural, Siberia; Kamtschatka; Altai*; and the Russian possessions in *N. America*; also at 5500 feet in Khasya. On Zwā-ga-byñ it is found at 2000 feet of elevation, and not there only, but generally, on Limestone rocks, in the neighbourhood of Maulmain and within a few hundred feet of the plain, and of very large size. It may be worthy of note, that several plants appear to descend to a lower level in Burma than elsewhere; for example, Oaks in Beloo-gewn at the sea-level; Pines, east of Mya-wad-dee, very few feet above the sea-level—*abundant* at 1000 feet; and Rhododendra at 4000 feet on Dauna-toung, Maulmain, and on No-a-la-bo, Tavoy, in latitude 14°.

*ONYCHIUM*¹ *AURATUM, Kaulf.*

A golden-backed fern. It seems to affect old *Toung-yas* and other clearings, where it is often most abundant; occasionally also it may be gathered on old Pagodas, rooting itself between the bricks. Kulwee; Ascent of Toung-wine, Maulmain; and Ka-la-ma-toung, Martaban.

*PTERIS*² *AQUILINA, L.*

The common English brake. A fern found all over the world in both hemispheres, "unless it be absent from S. temperate America, from which there are no specimens in the Kew Herbarium. In Lapland it just passes within the Arctic circle. It ascends in Scotland to 2000 feet; in the Cameroon Mountains to 7000 feet; in Abyssinia to 8000 or 9000 feet; in the Himalayas to about 8000 feet" (*Synopsis*). Our highest Burmese mountains are about 8000 feet (Nat-toung, Toung-ngu, being a little under this), and although I do not recollect noticing it at the summit of that mountain, it does most probably attain to our highest points. The *lowest* height at which I have found it is 700 feet above the sea, which is the height of Patau, Madremacam, Mergui, where it is found growing luxuriantly. Mergui is in about 12° North Latitude. This is, if I mistake not, another instance of a plant being found at an unusually low level on the Burmese coast. "Dr. Spruce has seen it in the Andes 14 feet high" (*Synopsis*). In Burma I should say it attains the average height which it attains in England.

P. LONGIFOLIA, L.

A common tropical species, to be seen on almost every wall and Pagoda that is at all dilapidated, nor does it always wait for that state, so impatient is it to establish its title to a footing. Martaban Pagoda used to be covered with it.

¹ *Onychium.* ὄνυξ, a nail of the hand, from supposed resemblance of segments.

² *Pteris.* πτερίς, a fern.

P. SEMIPINNATA, L.

A striking fern of moderate size, 2 or 3 feet high, to be known by the lower side of the pinnæ only, and not the upper, being cut into narrow linear pinnules. I found it but once. On the proper right bank of the Tenasserim River, a few miles from Mergui, are some pagodas whence a pretty view is obtained. I forget the name of the spot, but it was in walking to it that I gathered *P. semipinnata*.

P. LUDENS, Wallich.

Remarkable for having fronds of two distinct forms on the same root-stock. The barren frond has a black, polished stipes 4 or 5 inches high, and is "hastately 5-lobed," a prominent vein running into each lobe, cordate below; in fact, it may be described as between heart-shaped and arrow-headed with blunt lobes. It is of a coriaceous or leathery texture, green above, brown underneath. The fertile fronds are on much longer stipes, about a foot long, and are deeply pinnatifid, being divided into 3 primary lobes, these being again divided, the terminal one into three, and the lateral ones into two narrow linear pointed segments. The frondose portion is about as broad as long, varying from 4 to 6 inches. The rhizome or root-stock is creeping, about as thick as a crow-quill, hard and wiry.—Limestone rocks, Maulmain.

P. PEDATA, L.

This in general character is like the last, also in texture. Rhizome similar. Stipes one foot or more, smooth, brown; the frond at the end 4 to 6 inches each way, tripartitely divided primarily; the lateral divisions lobed on the lower side of the prominent rib, undivided on the upper; the terminal division lobed on both sides, with a larger lobe at the end, which is drawn out into a fine point. All the lobes, or pinnæ, as they may also be called, are much broader than those of *P. ludens*, and the fronds are all of one and the same form. Also on Limestone rocks, Maulmain.

CERATOPTERIS¹ THALICTROIDES.

An aquatic fern, from one to two feet high, generally wholly submerged in quiet deep waters. Root tufted, fibrous. Fronds rather succulent, and pellucid in texture. Sterile and fertile fronds different, though sometimes a frond is partly fertile, partly sterile. They are both much divided, being bitripinnate; but, in the sterile, the divisions are broad and expanded, and, in the fertile, narrow, linear, being contracted by the production of the fructification, which is sparse, scattered thinly under the continuously reflexed margin of the segments. Although generally found in water, this singular fern does not disdain other habitats. For several years it sprang up in the rainy season on the gravel path in my garden in Maulmain. How it came there I have no idea (as it was, in fact, my first acquaintance with the fern), except, of course, that the spores must have floated thither on the air, but it must have been from some long distance, as I am not aware of its existence anywhere near Maulmain, and my house was 70 feet above the level of the River Salween, in which it certainly could not grow. The plants, naturally, were small, yet they furnished very pretty little specimens, some 8 inches high, in full fructification.

ASPLENIUM,² Linn.

The second largest genus of ferns, "including plants from all parts of the world where ferns grow, of every variety in size, texture, and cutting." Sori, dorsal or marginal, attached to the veins, generally oblique as regards the medial line of the frond, long and linear, or short and oblong. Indusia the same shape as the sori, bursting along their whole length; when single, towards the mid-rib; when double (*Diplazium*), both ways.

A. nidus-avis, L.

Fronds 4-5 feet long by 6-8 inches broad, undivided, lanceolate, bright green,

¹ Ceratopteris. κέρατος, a horn; and περιός.

² Asplenium. a priv. and σπλήν, the spleen; from supposed power to cure.

smooth, glossy, tapering gradually below, till, at the base, nothing is left but the broad somewhat expanded brown mid-rib; numerous, set densely round a common axis, and curving gracefully outwards so as to form a sort of deep *nest* in the centre; hence the specific name. Roots densely matted, tomentose, brown. Always growing on trees in wet shady jungles, and forming striking and handsome objects. Frequent. Near Hleing-buay, on the Da-gying, is a swampy piece of jungle, high up on the big trees of which *A. nidus-avis* may be seen in perfection. Sori in this and the following species in long thin oblique lines.

A. GREVILLEI, *Wall.*

A rare terrestrial fern, of the same general character, having lanceolate undivided fronds about a span long, with foot-stalks of about equal length. "Tavoy" is given (and Mishmee) as a locality in the Synopsis. My specimens were gathered on *Tavoy Island*, on which I was once driven by a contrary wind, when making my way from Tavoy to Mergui in a Burman boat. *Asplenium nitidum, erectum, resectum, normale*, may all be found on trees on *Tu-ok*, at about 3000 feet, a rare place for ferns and orchids. Altogether I find some twenty species of this genus.

DIDYMOCHLENA¹ LUNULATA, *Beur.*

A genus of a single species. Fronds tufted. Caudex stout, erect, "subarborescent" (Synopsis). As seen by me, hardly deserving to be so called, as it was but a few inches high, but it may well grow higher elsewhere. Fronds (as seen) about 4 feet high, bipinnate; pinnules about 1 inch long, subquadrate, rounded, stalked. Sori 3-6 on each pinnule, elliptical. Indusium of the same shape, attached by a central longitudinal receptacle, and free all round. A handsome and remarkable fern found in South tropical America, Cuba, Madagascar, Natal, and Fiji Islands, *Loc. Tu-ok.*

ASPIDIUM² ACULEATUM, *Sw.*

A very common British species, gathered by me on the top of No-a-la-bo (Ox's hump), Tavoy, 4000 feet, in 1856, also on Moollee-it, 6000 feet. It appears to be world-wide.

NEPHRODIUM,³ *Rich.*

"Sori subglobose. Involucres cordato-reniform, attached by the sinus. A cosmopolitan genus, the species of which vary widely in size, texture, cutting and venation."—*Synopsis*. Out of the 30 or more species which I have found in Burma, it is difficult to know which to select for description. I will, therefore, give here, the only new and previously unknown species.

N. PARISIII, *Hooker.*

Caudex creeping. Stipes soft, slender, smooth and quite scaleless, 6-9 inches long. Fronds 6-8 inches each way, tripinnatifid, pubescent, deltoid, the lower *pinnæ* much the largest; lower *pinnules* larger than the others; segments and pinnules all decurrent so as to form a winged rachis. An elegant, transparent, succulent fern, most sensitive of drought, only growing in the wettest and shadiest nooks of limestone rocks (Maulmain) during the rains, perishing immediately the rains are over.

NEPHROLEPIS,⁴ *Schott.*

A small genus of Aspidioid ferns with kidney-shaped indusia, and very long, comparatively narrow, simply-pinnate fronds and creeping rhizomes. The *pinnæ* are jointed on to the rachis, consequently are apt to fall off in drying. The sori are round and the veins free. The *pinnæ* in *L. exaltata* and *L. acuta* have white cretaceous dots on their upper surface. I have not observed them on *L. tuberosa* (*cordifolia*, Baker). The latter plant I find always on trees; the former two on banks.

¹ Didymochlaena. *δίδυμος*, twin; and *χλαῖνη*, cloak or covering.

² Aspidium. *ἀσπίς-ἰδος*, a shield.

³ Nephrodium. *νεφρός*, a kidney; and *εἶδος*, appearance, in allusion to shape of indusium.

⁴ Nephrolepis. *νεφρός*, a kidney; and *λεπίς*, a scale, from the shape of the indusium.

OLEANDRA,¹ *Cav.*

A small genus distinguished by its slender, scaly, scandent rhizome, jointed stipes, and entire long narrow lanceolate or trap-shaped fronds. Sori round. *Indusia* reniform; in a single row close to the rachis (or mid-rib), nearly all along the frond.

O. CUMINGII, *J. Sw.*, var. *LONGIPES*, *Hook.*

Rhizome long, creeping or scandent, of the thickness of a crow-quill, emitting long wiry roots from its under surface. Stipites varying in length from 4 to 8-9 inches, smooth, rigid, jointed at the setting on, also at about 1½ to 3 inches from the base. Fronds varying from 5-6 inches to 18 or more in length, with a breadth of 1 to 1½ inch, tapering below and acuminate at the apex. Rare, as far as my experience goes. Very sparingly on rocks at the top of Toung-wine range, Maulmain; also on Madremacam, Mergui.

O. NERIFORMIS, *Cav.*

Fronds similar to the last, but stipes very short, the joint very near to the rhizome, which has a habit of growing in short curves with the fronds single or in tufts at the bent angle between the curves. Rare also; found but once, and very small, on trees on Dauma-toung at 4000 feet.

POLYPODIUM,² *L.*

The largest of all the genera, and a very unwieldy one, containing as it does some 400 species, of which I find about 40 in Burma. *Polypodium* may be said generally to include all those ferns which have round naked sori—in other words, sori without any covering, *indusium* or involucre. This is the one great point of similarity, but in all other respects—habit of growth, size, cutting, venation, texture—there is an endless diversity within the limits of the genus. These differences have been the foundation of several distinct genera with authors, e.g. *Phegopteris*,³ *Goniopteris*,⁴ *Dictyopteris*,⁵ *Niphobolus*,⁶ *Phymatodes*,⁷ and others; these are all, however, included in *Polypodium* in the "Synopsis Filicum," but the names are retained as those of sections of the genus, so that, practically, things remain much as they were; for, in specifying any one it becomes absolutely necessary to add the name of the section to that of the genus; and whether any advantage is thus gained, I very much doubt; however, leaving this to the doctors, I will go on to select a few species for particular mention.

P. (DICTYOPTERIS) TENUIFRONS, *Hooker.*

"Rhizome creeping, fragile; stipes very slender, 8-12 inches long; frond 6-12 inches each way, deltoid, the upper part pinnatifid; below the pinnatifid portion are 2 or 3 distinct pinnae, the lowest much the largest, deltoid; the lowest side produced, with deeply pinnatifid lanceolate lobes 2-3 inches long; texture very thin, flaccid; areolæ copious, without free veinlets; sori in rows near the main veins."—From *Synopsis*, *in part.*

In the debris of Limestone Rocks, about Maulmain, exactly as *Polypodium calcareum*⁸ grows in the debris of the limestone of Cheddar cliffs in Somersetshire, of which (wanting the rigidity) it has very much the appearance. If I recollect right, one locality is about the entrance, or, rather, the sloping approach to, "the Farm-caves."

¹ *Oleandra*. ?

² *Polypodium*. πολλός, many; and ποῦς-πόδος, many divisions.

³ *Phegopteris*. φηγός, fagus, a tree—oak or beech? and πτέρις.

⁴ *Goniopteris*. γωνία, an angle, in allusion to the venation.

⁵ *Dictyopteris*. δίκτυον, a net, in allusion to the venation.

⁶ *Niphobolus*. νιφόβωλος, rained upon like snow, in allusion (I presume) to the dispersion of the sori.

⁷ *Phymatodes*. φῶμα-ατος, lump or swelling; and εἶδος, appearance.

⁸ *P. R. bertianum*, Hoffm., of *Synopsis*. Whatever may be the right of priority in this name, I doubt if English botanists will give up the familiar *P. calcareum* for it.

P. (PHEGOPTERIS) OBSCURUM, *Hooker*.

I select this species chiefly with a view to point out an error in *Species Filicum*, Vol. IV. p. 237, 162. The fern there named *P. obscurum*, and described, is undoubtedly only *Nephrodium* (*Lastrea*) *melanopus* of the same work (Vol. IV. p. 110) without indusia. I can speak positively in this instance, as the specimens (thus differently named) were part of one and the same lot, all gathered in one place. By reference to the *Synopsis* it will be seen that Baker, in revising the specimens, thought so, for though (p. 308 of 1st ed.) he retains the species, he appends an observation, "very like a non-involucrate form of *N. sagenioides*," the latter being Baker's name for *N. melanopus*. And under the latter (p. 271) he remarks "*Involucres fugacious*," which they are. I give the description of the plant. Caudex 6-8 inches high, commonly elevated on its wiry roots. Fronds tufted. Stipes 6-12 inches high, slender, brittle, glossy-black (as is also the rachis till near the end), slightly scaly below. Frond 12-18 inches long by 6-8 inches wide, ovate-lanceolate, pinnæ 8-10 pairs, opposite, or nearly so, about 4 inches long by 1 inch broad, suddenly acuminate; the lowest pair different from the rest, being pinnate only on the upper half and bipinnate on the lower, the middle pinnæ longer than the rest. In hilly or mountainous parts, but at no great elevation.

P. (GONIOPTERIS) UROPHYLLUM, *Wall*.

This is really only a non-indusiate *Nephrodium*, the venation being exactly that of a *Eu-nephrodium*, and the habit of growth like that of the *N. abruptum* group; in fact, I detected indusia on this fern in a young state, and pointed out the fact to Sir W. Hooker, inclosing specimens to him which showed them plainly. This is acknowledged on p. 10 of Vol. V. of his *Species Filicum*: "Mr. Parish has lately convinced me that a minute indusium is seen upon the undeveloped sorus, which may require this (and possibly the same may be found in an equally early stage upon other species of *Goniopteris*) to be transferred to *Eu-polypodium*."

Caudex creeping; stipes 2 or more feet long, stout; frond 2-4 feet long, 1 foot and more broad; pinnæ several on each side of the rachis, 1 foot long and 2 inches broad, with a large terminal pinna, points acuminate; veins prominent, sori in two close rows, or sometimes only one.

P. BAREEFORME, *Hook*.

A fern of a very different habit from the last. Rhizome, creeping like a *Davallia*, densely clothed with scales, size variable; as seen by me, small; stipes 2-3 inches, frond 6-8 inches long, 4-5 inches broad, subdeltoid, tripinnate, ultimate segments entire or forked, linear, rounded at the point; veins single in each division; sori generally one on each segment, consisting of few thecæ. On trees, at 4000 feet and upwards. Dauna-toung.

P. SUBDIGITATUM, *Bl*.*P. Davallioides*, *Mett*.

A beautiful and much divided species, 2 or 3 feet high, with tufted fronds, terrestrial. On Nat-toung at 7000 feet, and Moelee-it, by the spring, 6000 feet.

P. (NIPHOBOLUS) ACROSTICHOIDES, *Forster*.

Rhizome creeping, as thick as a small crow-quill, clothed with round scales, which are closely appressed and dark in the centre. The fronds are narrow, long, strap-shaped, and pointed, varying considerably in length from 1 foot to 18 inches, and $\frac{1}{2}$ to 1 inch broad, narrowing into a stipes 1-3 inches in length. Under-surface covered with soft tomentum, which consists of stellate hairs, a characteristic feature of this group. Sori crowded in oblique rows on the upper half of the frond. Mergui, on trees.

P. (NIPHOBOLUS) PENANGIANUM, *Hooker*.

Rhizome creeping, stipes short; frond 12-18 inches long, by 2-3 inches broad, with a suddenly acuminate termination, tapering very gradually below; texture soft, thick, covered underneath with soft grey tomentum. Sori in a patch near the end but not reaching it, leaving a V-shaped opening below. Apparently rare; on trees.

P. (NEPHROBOLUS) NUMMULARIFOLIUM, *Mett.*

Rhizome extensively creeping, of the thickness of twine, covered with scales. Fronds of two forms, set all along at $\frac{1}{2}$ inch distances; barren fronds round or oval, $\frac{1}{2}$ to 1 inch long, on a short stipe $\frac{1}{2}$ – $\frac{3}{4}$ inch in length; fertile fronds linear, about 2 inches long by $\frac{1}{4}$ inch broad; sori scattered over the whole under-surface. The upper surface smooth, naked; under surface covered with ferruginous tomentum. On trees, Tavoy, Mergui.

P. (PHYMATODES) IRIOIDES, *Lam.*

A very frequent and almost ugly fern, with fronds 2–3 feet long and 2–3 inches broad, undivided, strap-shaped, of a pale colour and leathery texture; sori very small, dotted irregularly over the under surface. On trees.

P. (PHYMATODES) SINGOSUM, *Wall.*

A fern with a very remarkable rhizome, difficult to describe. It is commonly as thick as the finger, flat on the under surface, convex on the upper, fleshy, but often hollow, creeping, but not extensively; sometimes intertwined and forming patches the size of the hand, closely covered with peltate scales, which are black in the middle and pale round the edges. The stipes, 1–2 inches long, is jointed on a conical protuberance; barren fronds 3–6 inches long and $\frac{1}{2}$ –1 inch broad, the edge entire; fertile fronds longer and slightly broader, their margin sinuous; texture leathery; venation obscure; sori large, round or oblong, sunk in the frond, showing prominences on the upper surface. Trees, Mergui.

P. (PHYMATODES) RHYNCOPHYLLUM, *Hook.*

Rhizome creeping; barren fronds, round or ovate, 1–1 $\frac{1}{2}$ long on short stipites; fertile fronds 3–6 inches long, $\frac{3}{4}$ –1 inch broad, narrowing gradually upwards to a fine point; texture hard, dry; sori rather large, round, confined to the narrowed end, in a single line on each side of the mid-rib. On trees among moss. Mountains at a high elevation. Moolce-it.

P. (DRYNARIA) QUERCIFOLIUM, *Linn.*

This is the common fern which covers nearly every tree in the plains in Burma. It is dimorphous, *i.e.* it has fronds of two kinds, sessile barren fronds and stalked fertile fronds; the first are lobed only and very rigid, erect; the last are long, pinnated and drooping.

P. (DRYNARIA) CORONANS, *Wall.**P. (Drynaria) conjugatum*, *Lam.*

This is a much rarer fern. The rhizome is very stout and thick, and densely clothed with long reddish scales; its habit is to grow round a tree horizontally and encircle it, hence the name "*coronans*"; the fronds are of one kind only, but the lower portion is expanded and lobed so as to resemble the barren frond of *P. quercifolium*; it then becomes narrower, and expands again upwards, where it is deeply pinnatifid. The fronds are erect, about 2–3 feet long by 1 foot or more broad, and of an exceedingly hard and rigid texture. On the Shan border about Way-ta-mar-ying.

BRAINEA¹ INSIGNIS, *Hook.*

A small tree-fern of a rigid habit, in appearance much like a *Cycas*. Stem 3–4 feet high, crowned with a tuft of fronds 2–3 feet long by 8–12 inches broad. On mountains in the Yun-za-lin district among the pine-trees. "The sori are remarkable, confined to the costal arches, or also running up the simple veins half-way or more towards the margin, often becoming confluent."—*Hooker*.

GYMNOGRAMME,² *Desp.*

A rather large genus containing ferns of very different habit, form, and size;

¹ Brainea, from J. C. Braine, Esq., Hongkong.

² Gymnogramme. γυμνός, naked; and γράμμα, writing, or an inscribed mark.

veins simple or forked or anastomosing. Sori naked, oblong or linear, arising from, and following the course of, the veins.

G. JAVANICA, *Bl.*

Rhizome creeping; stipes smooth, scaleless, pale, 1-4 feet long; frond 1-1 feet, pinnate, lower pinnae often again pinnate, shortly stalked, except sometimes the upper ones, varying exceedingly in size according to the size of the plant, 3-12 inches long by $\frac{1}{2}$ -2 inches broad, the apex drawn out into a fine point. Sori copious, simple or forked, running along the parallel veins from the mid-rib, but falling short of the edge. Mountains at 4000 feet and upwards.

The only other species which I have found are *G. involuta* (*Selliguea Wallichiana*, Hook.), and *G. decurrens*;—both also mountain ferns.

MENISCIUM,¹ *Schreb.*

A small genus, with a *Goniopteris* appearance, habit and venation; fronds simple or pinnate; sori confined to the connivent transverse veinlets, hence short, and often somewhat concavo-convex, like a "meniscus" lens, whence the name. Species very variable and apt to run into one another. *M. triphyllum*, e.g. so called, is often five-leaved, and sometimes runs *M. Parishii* of Beddome close, which last Baker unites with *M. cuspidatum* of Blume, probably rightly, even suggesting that it is only "a meniseoid form of *Polypodium* (*Goniopteris*) *urophyllum*," which indeed it is uncommonly like.

ANTROPHYUM,² *Kaulf.*

Another small genus, very uniform in character, consequently without any very distinctive marks whereon to found species, of which probably too many have been made. The species are all small ferns with simple undivided rather leathery fronds, more or less lanceolate in shape and pointed, varying in length and breadth 3-12 inches by $\frac{1}{2}$ -2 inches, sessile, or nearly so, on a small creeping rhizome. The venation is reticulated with elongated meshes; sori copious, following the veins. Among moss, generally on the perpendicular trunks of trees in damp jungles.

The several varieties found in Burma are probably all referable to *A. coriaceum* of Wallich.

VITTARIA,³ *Smith.*

A small genus, consisting of a few ferns with long, narrow, undivided, often grass like fronds of leathery texture. Sori continuous along the edge or just inside it. *V. elongata*, a common fern, seen hanging like bunches of grass from trees, sometimes has fronds 2 feet long and only $\frac{1}{4}$ inch broad. *V. falcata* is a short rigid species with curved fronds, which I find in mountainous districts. *V. Amboynensis* I find on trees, ascent of Zing-kyik, behind Martaban; and in the same locality, as also on Madremacam, Mergui, I find a minute species, 1 inch in full length and less than a line in width, though in full fruit. This is *V. minor* of Fée, var. β . *minima* (Species Filicum, V. p. 183). "Probably too near to *V. falcata*."—Hooker.

TENITIS BLECHNOIDES,⁴ *Sw.*

A rather frequent fern. Rhizome creeping. Stipes 1-2 feet long, hard, brittle, smooth; fronds 1-1 $\frac{1}{2}$ feet long by 8-12 inches broad, simply pinnate; pinnae 5 or 6 pairs and a terminal one, 6-12 inches long by 1 inch broad, pointed; sori in two long lines half-way between the mid-rib and the edge. Barren pinnae broader.

DRYMOGLOSSUM PILOSELLOIDES,⁵ *Presl.*

A small creeping fern, very much resembling *Polypodium nummulariaefolium* (already described) in form; in fact, until we come to the fructification, the descrip-

¹ Menisium. *μηρίσκος*, a young moon, from the shape of the sori.

² Antrophyum. *ἐντρονον*, a cave; and *φύω*, to produce—from the cavities between the sori.

³ Vittaria. *vitta*, a band or fillet, from the form of the sori.

⁴ Tenitis. *ταϊνία*, *taenia*, same as *vitta*.

⁵ Drymoglossum. *δρυμός*, a forest; and *γλωσσα*, a tongue. Application not very clear.

tion of the one will answer for the other. Rhizome extensively creeping, of the thickness of twine, scaly, with fronds an inch distance; barren fronds round or oval, $\frac{3}{4}$ to 1 inch long, shortly stalked; fertile fronds about 3 inches long by $\frac{1}{4}$ inch broad and rounded at the ends; sori in a broad continuous line all round the frond just within its margin, the thecae mixed with peltate scales. Frequent. Abundant on trees in Tavoy.

HEMIONITIS¹ CORDATA, *Rorb.*

Caudex short; roots numerous, fibrous, very fine; fronds tufted; barren fronds on short stipites 1-2 inches, themselves 2-4 inches long, broad and blunt at the apex, cordate, or heart-shaped, at the base; fertile fronds triangular, like an arrow-head, about 3 inches each way, elevated on stipites or stalks 8-10 inches long. Veins anastomosing; sori covering the whole back of the frond and following the course of the veins. My specimens are marked 'Young-ngoo,' but I think this is a mistake; it may be found there, but the likelier locality is the Limestone rocks in the neighbourhood of Maulmain.

ACROSTICHUM,² *Linn.*

"Sori spread over the whole surface of the frond or upper pinnæ, or occasionally (apparently) over both surfaces. A large genus, almost entirely tropical, including groups with a wide range in venation and cutting"—*Synopsis*.

A. SORBIFOLIUM, *Linn.*

"Rhizome thick" (about the size of the little finger), "woody, often 30 or 40 feet long, clasping trees like a cable, sometimes prickly; frond 12-18 inches long, 6-12 inches broad, simply pinnate; barren pinnæ 4-8 inches long, $\frac{3}{4}$ -2 inches broad, 10-20 on each side the rachis, articulated with it at the base, the edge entire or toothed;" fertile pinnæ smaller and narrower, but not otherwise different. This is the description of the fern in its fully developed condition.

About the year 1860 I discovered in the extreme South of the Tenasserim Provinces a most singular and elegant form of a fern wholly new to me, of which the following may serve as a description. Roots (in the ground at the foot of a tree) numerous, wiry, of the thickness of pack-thread. Caudex or proper stem none, but from the roots was formed a slender branched rhizome no thicker than a knitting-needle; this, after having a very short lateral spread, turned and crept up the tree in the form of several slender stipites, which clung to the bark by innumerable minute rootlets. On these stipites, commencing almost from the ground, alternated a series of closely set elegant pinnæ about 2 inches long, on either side of the rachis of which were set 15 or 16 pairs of pinnules about $\frac{1}{4}$ inch long, which were themselves farther subdivided into 8 or 10 minute wedge-shaped segments, the whole of a fragile, semi-transparent texture, so as to give the plant almost the appearance of fine lace-work. No trace of sori was to be found on any part of the plant. Being much puzzled in determining its affinity, I forwarded a specimen to the late Sir William Hooker soon afterwards, with other ferns. He replied, inclosing me fragments of a fern found in Borneo, of a somewhat similar character, begging me to "hunt for more." Accordingly, I sent my man down expressly to Puckham, on our extreme South border, with directions to search till he found more of the same, instructing him also how to press and convey the specimens safely. I think he was gone six weeks, but he was successful. Among several small specimens like my original one, he brought back one some 15 or 16 feet long, carefully cut into equal lengths, and well pressed. This specimen is now before me, laid out on about 10 large sheets of paper, all numbered, so that by putting them end to end I can reproduce the whole plant in excellent condition. The lower part of this remarkable specimen corresponds to the description just given, and the upper part to that of *Acrostichum sorbifolium* previously given. Little by little the slender, delicate, finely

¹ Hemionitis. ἡμιόνος, a mule. The Greek name for some plant.

² Acrostichum. ἀκρὸς, the summit or end; and στήλη, spike or rank.

divided, lace-like fern, grows stouter upwards, till the stipes develops itself into a coarse thick prickly stem; and towards the end, the finely divided tripinnatifid fronds cease altogether, and their place is taken by the large simply-pinnated normal fronds of the above-named fern!

This is *Lindsaya? Parishii* of Baker, Synopsis, ed. 1868, p. 109; among the corrigenda, however, at p. 452, appears the following remark: "Probably one of the very curious abnormal forms of *Acrostichum sorbifolium*." This is correct. But, under *A. scandens* (a common Burmese fern), at p. 412, I find the following observation: "*Davallia achilleifolia*, Wall. (Hook. Sp. Fil. Vol. I. p. 195 t. 56 D.) seems to be a deltoid tripinnatifid abnormal form," i.e. of *A. scandens*. I have little doubt, however, that it is rather a form of *A. sorbifolium*, for the figure might have been taken from a portion of my specimen, so truly does it represent it! I have another somewhat similar fern, which may be the young state of *A. scandens*; and yet another from the late General Munro, from Jamaica (no name), also apparently the young state of some species of climbing *Acrostichum*.

The note under *Davallia achilleifolia*, Sp. Fil. Vol. I. p. 195, may be read with interest; from it I extract what follows. "Mr. J. Smith finds similar productions on specimens of his *Stenochlæna (Acrostichum) scandens* from Cumming, and remarks, These abnormal fronds are usually about 3 inches in length and tripinnatifid, not unlike some delicate multifid species of *Davallia* or *Cheilanthes*. They are found on a lengthened rachis, like parts of the rhizome. There can be no doubt that it is a peculiar growth, common to more than one species of the genus." To this I would add a suggestion that possibly this is the normal and not the abnormal growth of all species of the *Stenochlæna* group of *Acrostichum*. It is, I think, not unlikely that they all begin life in this delicate form, gradually developing their coarser and robuster features as they grow up.

A. (EGENOLFIA) APPENDICULATUM, Willd.

A common fern in rocky places; and if all its differing forms are to be lumped together under the name here given (as they are in the Synopsis), certainly a very polymorphous one. Many ferns have been raised to the rank of species upon less ground than some of the varieties of this one may claim. The common form may be thus described. Caudex erect or slightly repent; stipes more or less tufted in consequence. That of the barren frond is 3-6 inches long, sealy; frondose portion 1 foot or more, simply pinnate; pinnae numerous, 1½-2 inches by ½ inch wide; sessile, sometimes crenate only, with a prominent lobe on the upper side close to the rachis, and sometimes deeply pinnatifid, in which case the lobe is less apparent. Fertile frond longer, both in the stipes and the frondose portion: sori sometimes covering the back of the very much narrowed pinnae, as in the crenate form; sometimes, as in the pinnatifid form, appearing as little lumps of fructification only, on a much attenuated mid-rib.

Egenolfia (sometimes also called *Polybotrya*) *Hamiltoniana* is a var. of larger growth. *E. costulata* is a most elegant and apparently distinct variety, which I find abundantly in only one spot that I can recollect. This is at the 'tsakan immediately before you begin the ascent of Dauna-toung, starting from "Christian Village." Here is what Hooker says of it. "A still more remarkable form than any of those" (previously described) "I have added to the number as var. *costulata*; especially that state found by Mr. Parish, distinguished not only by the deeply pinnatifid pinnae, but by the lower pair, both in the sterile and fertile fronds, being again pinnate. The Khasya specimens, however, exhibit quite intermediate forms."—Sp. Fil. Vol. V. p. 252.

A. (GYMNOPTERIS) COSTATUM, Wall.

A. (Gymnopteris) virens, var. Synopsis.

A handsome fern, frequently met with at the base of old Pagodas, is *A. costatum*, Wall., var. *undulatum (Jenkinsia undulata* of Hook. Gen. Fil. t. 75). Caudex stout, slightly repent; stipes 1-1½ foot long, slightly furfuraceous; fronds about the same length, simply pinnate, 18-20 pairs, with a terminal one; barren ones ovate-lanceolate, pointed, about 5 inches long by 1½ broad, crisped and wavy at the margins;

fertile fronds shorter and narrower, sometimes entirely covered with the confluent sori, but sometimes again these are in a broad marginal band, with a tendency to run down between the main veins towards the costa or mid-rib.

A. (CHRYSONIDIUM) AUREUM, *Linn.*

Caudex stout, erect; stipites tufted, 1-2 feet long, strong, glossy; fronds varying much in size, 3-4 feet long, or even more, and 1-2 feet broad, simply pinnate; pinnae broad, strap-shaped, sometimes a foot long and 2-3 inches broad, blunt at the end, the upper ones alone fertile and closely covered with the sori. Frequent in salt-water creeks.

A. (HYMENOLEPIS) SPICATUM, *Linn.*

Rhizome slightly repent; stipes 1-2 inches, fronds 5-6 inches long, bearing the sori on their suddenly contracted narrow apex. On trees, Madremacani, Mergui.

PLATYCERIUM¹ WALLICHII, *Hook.*

Fronds of two very distinct kinds, the one sessile and erect, the other pendulous. Barren erect frond always found appressed against the trunk of a tree, deeply lobed, with sinuous forked divisions; fertile fronds, a pair, from a common axis, pendant, each (generally but not always) in two main divisions, in the sinus of which, where they again divide, is situated a semicircular shield, 3-4 inches in diameter, wholly covered on the under side with the fructification imbedded in a thick mat of soft tomentum; beyond this the fronds divide and subdivide again in a bifarious manner. Substance very thick and tough, and soft, with a tawny pubescence underneath, dull green above. Frequent, especially on trees about Toung-wine, near Maulmain.

P. BIFORME, *Blume.*

A grand and striking fern, always on trees, generally on a stout horizontal bough. Fronds also of two distinct kinds as in the foregoing species. Barren fronds erect, sessile, deeply lobed and sinuate, several, sometimes forming a complete circle, entirely enveloping the bough on which it grows, and forming a huge nest or basin, filled with a mass of tawny fibrous roots, and with the decayed matter of the old sessile fronds, the substance of which is often an inch thick, which are also renewed and thus form a fresh layer, every year. Fertile fronds pendulous, 6-7 times dichotomous, pedicelled at the base, divisions ligulate, like long leather straps, 2 inches broad. Fructification covering the inside—the whole concavity—of a distinct leathery *half-cup*, which is pedicelled, and arises from the fork of one of the primary divisions of the pendulous frond. As the sessile fronds are several, and each has a central axis of growth of its own, emitting its own pendulous fronds, there is sometimes seen a complete circle of such fronds, arching out from the huge round boss formed by the united masses of sessile fronds; a sight to be seen in order to be appreciated. The sessile fronds often measure 4 feet from tip to tip of their lobes, while the pendulous ones are 6 feet long! When I first beheld one, nearly this size, in the year 1854, at Mergui, in the Kulween jungle, I was in raptures, and did not leave the spot until I had it down, lopping the bough short off on both sides, and putting it on a Burman's shoulders (a weight he could with some difficulty carry), brought it home in triumph. This same plant adorned my fernery in Maulmain for many years. I was at last tempted to send it to England, but it died *en route*.

Loc. Mergui and the islands of the Archipelago. I never saw it farther North.

OSMUNDA² JAVANICA, *Blume.*

Fronds tufted on a short erect caudex, which I find always elevated on a conical

¹ Platycerium. *πλατύς*, broad; and *κεράς-αρος*, a horn.

² Osmund, *Osmund Royal*, or *Osmund the Waterman*, apparently a corruption of *grass moon-kraut*, greater moon-wort, representing its ancient officinal name, *lunaria major*. There are other derivations of it, such as that by Beckmann, from the name of some person; by Nennich, on the authority of Houttuyn, from *os*, mouth, and *mundare*, to cleanse; by others from *os*, bone, and *mundare*, to cleanse. The *Waterman* would seem to be its Flemish name, *Waterman*. The *Royal* refers, we are told by Lobel (*Kruydb. i. p. 991*), to its great and excellent virtues.—Prior, *Popular Names of British Plants*, p. 171.

mass of tangled roots a foot or more high; they (the fronds) are simply pinnate, 1-2 feet long, and droop in a graceful curve outwards from a common centre. The pinnae are long, narrow and acute, some of the middle or lower ones being fertile, and thereby contracted into small bundles of sori on the costa. This fern affects a peculiar habitat, rocks and stones just above the high-water level of mountain torrents, in the rocky beds of which I have invariably found it. Among other localities I recollect one—at the foot of the fine waterfall that descends from No-ala-bo, visible from Tavoy. Here it grows abundantly in company with fine specimens of *Cibotium glaucescens*.

As our European *Osmunda regalis* is found in the Nilghiris, it may possibly grow also in Burma, though I never met with it.

SCHIZEA¹ DIGITATA, Sw.

A singular little terrestrial fern, with barren fronds just like a blade of grass, 8 inches to a foot long, $\frac{1}{2}$ or $\frac{1}{4}$ broad only. The fertile fronds have their fructification at the end, which is divided into a number of narrow linear spikes about $1\frac{1}{2}$ inch long. As it grows in the ground among other vegetation, it may easily escape notice.

Loc. Madremacam, Mergui, near the top of Patau.

LYGODIUM,² Sw.

A genus of climbing and twining ferns of elegant habit. I find three species: *L. scandens*, *L. pinnatifidum*, and *L. polystachyum*. The first two are common and must have attracted the attention of all persons of observation who have taken their walks abroad in Burma. The last is a rarer plant. One locality is Madremacam, Mergui.

ANGIOPTERIS³ ERECTA, Hoffm.

A large smooth lively green fern, very common on the banks of streams throughout Burma. In the Synopsis it is described as having a caudex (or trunk) 2-6 feet high, and fronds 6-15 feet long. As it has been found in many widely separated parts of the world, this general description is no doubt correct; but it certainly does not develop these large proportions in the Tenasserim Provinces. As I know it, it has little or no caudex, the fronds springing from near the ground, and being 6 or 8 feet long. The stipites are round, smooth and swollen at the base, and have "two large leathery auricles," one on either side. The fronds are bipinnate; pinnae 1-2 feet long, also swollen at their base; pinnules 6-8 inches long by 1 inch broad, oblong and acuminate, the edge generally toothed. Whole plant smooth and shining. The sori consist of a few rather large sporangia, some dozen or so, arranged in an oblong form, and are set in rows contiguous to the edge of the pinnules. I have observed that when suffering from temporary drought, as in a hot midday sun, the swollen parts, above mentioned, become relaxed, and allow the fronds and the pinnules to fall back and droop in a flaccid manner; but that they resume their right position on the return of moisture to the air; thus behaving in a directly opposite manner to the swollen petioles of *Bauhinia*, which allow the leaves to fall back and fold in the damp night air, but are rigid in the daytime.

¹ Schizoa. σχίζω to split, from the character of the fructification.

² Lygodium. I presume from λόγος, a flexible twig, and εἶδος, appearance, from the twisted or twining habit of the genus. Ulysses bound the Cyclops rams "together" λύγουςι, in his device to escape from that interesting monster:

"Τοὺς ἄκεόν συνέργον εὐστρεφέεσσι λύγουςιν,"

Σύντρεις ἀνύμενος.—Odyssey, ix. 427.

"These, three and three, with osier bands we tied."—Pope.

³ Angiopteris. ἄγγος, a vessel or pitcher; and πτερίς, from the form of the sporangia, or spore-cases.

OPHIOGLOSSUM,¹ *Linnaeus*.

Two species are found; one small and terrestrial, 2-3 inches high, and another long and epiphytal. The first, *O. nudicaule*, has a small tuberous root-stock, with two or three fleshy roots, a single ovate or lanceolate frond (or two) on a slender stipes, the fructification forming a two-ranked spike at the end of a long slender distinct peduncle, which springs from the base of the frond. The second, *O. pendulum*, has a long pendulous simple or divided strap-shaped frond, 2-3 feet long by 1-2 inches broad, with a short spike of fructification issuing from it more than half-way down. This spike is 2 or 3 inches long. The latter is to be found at Mergui, on trees.

O. NUDICAULE, L.

O. PENDULUM, L.

Nicobars (K.). Mergui (P.)

HELMINTHSTACHYS,² *Kaulfuss*.

A singular plant. Rhizome creeping, of the thickness of a cedar pencil, emitting short fleshy roots from its under-part. Fronds single, on a stipes 12-16 inches long, palmato pinnate, *i.e.* divided into pinnae somewhat in the form of an outspread hand. Pinnae 4-6 inches long by 1½-2 broad, simple or divided. Fertile spike arising from the point of union of the barren segments, peduncle 4-6 inches long, fructification 3-4 inches.

H. ZEYLANICA, Hook.

Growing in the rich mould which is formed in the hollows of the limestone rocks about Maulmain (P.). Kamorta and Milor (K.).

¹ Ophioglossum. ὄφεις, a snake or adder; and γλῶσσα, a tongue.

² Helminthostachys. ἕλμινθς-μινθος, a worm; and στάχυς, a spike of corn, from the form of the fructification.



CATALOGUE OF FERNS
SYSTEMATICALLY ARRANGED.

Order FILICES. FERNS.

Sub-order I. *OPHIOGLOSSACEÆ*.

OPHIOGLOSSUM, *Linnæus*.

- O. NUDICAULE*, L. Terrestrial.
O. PENDULUM, L. On trees. Tavoy. Houng-drau. Nicobars, Kurz.

HELMINTHSTACHYS, *Swartz*.

- H. ZEYLANICA*. Limestone Rocks, Tenasserim. Kamorta, Kurz.

Sub-order II. *MARATTIACEÆ*.

ANGIOPTERIS, *Hoffm.*

- A. EVECTA*, Hoffm. Common in shady jungles by the side of streams.

Sub-order III. *SCHIZÆACEÆ*.

SCHIZEA, *Smith*.

- S. DIGITATA*, Sw. Rare. Near the top of Patau, Mergui.

LYGODIUM, *Sw.*

- L. SCANDENS*, Sw. Common.
L. PINNATIFIDUM, Sw. Frequent.
L. POLYSTACHYUM, Wall. Rather rare. Island of Madremacam, Mergui.

Sub-order IV. *OSMUNDACEÆ*.

OSMUNDA, *L.*

- O. JAVANICA*, Bl. In the bed of streams descending from No-ā-la-bo, Tavoy.

Sub-order V. *POLYPODIACEÆ*.

Tribe I. *ACROSTICHEÆ*.

PLATYCERIUM, *Desvoux*.

- P. WALLICHII*, Hook. Common about Toung-wine, Maulmain.
P. BIFORME, Bl. Mergui and the Islands of the Archipelago.

ACROSTICHUM, *L.*

- A. (HYMENOLEPIS, Kaulf.) SPICATUM*, L. Mergui.
A. (CHRYSODIUM, Fée) AUREUM, L. Frequent in salt-water creeks.
A. (CHRYSODIUM, Fée) AXILLARE, Cav. On trees, in shady jungles.
A. (CHRYSODIUM, Fée) LANCEOLATUM, Hook. On trees, in shady jungles.
A. (GYMNOPTERIS, Bernhard) VIRENS, Wall. On trees, in shady jungles.
VAR. *COSTATUM* = *JENKINSIA UNDULATA*, Wall. Base of old Pagodas.
A. (GYMNOPTERIS) FLAGELLIFERUM, Wall.
A. (GYMNOPTERIS) VARIABLE, Hook.

- A. (EGENOLFIA, Schott) APPENDICULATUM, Willd. On rocks and stones in dry places in the jungles.
 var. β . HAMILTONIANUM, Wall. On rocks and stones in dry places in the jungles.
 var. γ . COSTATUM, Hook. On rocks and stones in dry places in the jungles.
 var. δ . LUDENS, Wall. On rocks and stones in dry places in the jungles.
 var. ϵ . BIPINNATUM (*vide* Beddome). At the 'tsakan,¹ at foot of Dauna-toung.
 A. (STENOCHLENA, J. Smith) SCANDENS, J. Sm.
 A. (STENOCHLENA) SORBITOLIUM, L. Paekchan.
 A. VISCOSUM, Sw.
 A. CONFORME, Sw.

Tribe II. GRAMMITIDEE.

HEMIONITIS, *Linnaeus*.

- H. CORDATA, Roxb. Limestone rocks, Tenasserim Provinces.

DRYMOGLOSSUM, *Presland*.

- D. PILOSEOIDES, Presl. On trees, frequent. Abundant about Tavoy.

TLEXITIS, *Swartz*.

- T. BLECHNOIDES, Sw. Frequent: on the hill behind Maulmain.

VITTARIA, *Smith*.

- V. LINEATA, Sw. Common on trees.
 V. MINIMA, Hook. Sp. Fil. Vol V. p. 183. Ascent of Kala-ma-toung.
 V. AMBOYNSIS, Fée. Sp. Fil. V. p. 177. Ascent of Kala-ma-toung.

ANTROPHYUM, *Kaulfuss*.

- A. CORIACEUM, Wall. Common on trees.

MENISCIUM, *Schreber*.

- M. CUSPIDATUM, Bl.
 M. TRIPHYLLUM, Sw.

BRAINEA, *Hooker*.

- B. INSIGNIS, Hook. Yunzalin mountains at 4-5000 feet.

GYMNOGRAMME, *Desvaux*.

- G. (SELLIGUEA, Bory) ELLIPTICA, Baker=G. DECURRENS, Hook.
 G. (SELLIGUEA) CAUDIFORMIS, Hook. Bot. Mag. t. 5328.
 G. (SELLIGUEA) INVOLUTA, Don.=S. WALLICHIANA, Hook. Icon. t. 204.
 G. JAVANICA, Bl.

POLYPODIEE.

POLYPODIUM, *Linnaeus*.

- P. (PHYMATODES) HIMALAYENSE, Hook. Mountains, Dauna-toung.
 P. (PHYMATODES) LEHMANNI, Mettenius. Dauna-toung.
 P. (PHYMATODES) JUGLANDIFOLIUM, Don.
 P. (PHYMATODES) PALMATUM, Bl.=P. PARISHII, Beddome.
 P. (PHYMATODES) LONGISSIMUM, Bl.
 P. (PHYMATODES) DILATATUM, Wall.
 P. (PHYMATODES) NIGRESCENS, Bl. Tee-wa-phado, ascent of Mooloc-it.
 P. (PHYMATODES) PHYMATODES, L.
 P. (PHYMATODES) TRIFIDUM, Don.=P. OXYLOBUM, Wall. Dauna-toung.
 P. (PHYMATODES) PTEROPUS, Bl.

¹ A halting or camping place in the jungles.

- P. (PHYMATODES) HEMIONITIDEUM, Wall.
 P. (PHYMATODES) TRIOIDES, Lam. Common on trees.
 P. (PHYMATODES) MEMBRANACEUM, Don. Kala-ma-toung, Martaban.
 P. (PHYMATODES) RHYNCHOPHYLLUM, Hook. Dauna-toung.
 P. (PHYMATODES) NORMALE, Don. Mergui.
 P. (PHYMATODES) ZOSTEREFORME, Wall. On rocks under water in mountain streams.
 P. (PHYMATODES) SUPERFICIALE, Bl.
 P. (PHYMATODES) LONGIFOLIUM, Mett. Mergui.
 P. (PHYMATODES) SINUOSUM, Wall. Mergui, on trees: rare.
 P. (PHYMATODES) LINEARE, Thunberg=P. LORIFORME, Wall.
 P. (PHYMATODES) ROSTRATUM, Hook. Dauna-toung.
 P. (DRYNARIA, Bojy) CONJUGATUM, Lam.=P. CORONANS, Wall. Rather scarce.
 Shan border, south-east of Maulmain.
 P. (DRYNARIA) QUERCIFOLIUM, L. Everywhere on trees in the plains.
 P. (NIPHOBOLUS, Auct.) PENANGIANUM, Hook.
 P. (NIPHOBOLUS) FISSUM, Baker=P. POROSUM, Wall.
 P. (NIPHOBOLUS) NUMMULARIFOLIUM, Mett. On trees, Tavoy.
 P. (NIPHOBOLUS) STIGMOSUM, Sw.=P. COSTATUM, Wall.
 P. (NIPHOBOLUS) LINGUA, Sw. Common on trees.
 P. (NIPHOBOLUS) ACROSTICHOIDES, Forst. Common on trees.
 P. (NIPHOBOLUS) ADNASCENS, Sw.
 P. (NIPHOBOLUS) GARDNERI, Mett. Mergui.
 P. (GONIOPHLEBIUM, Bl.) SUBAURICULATUM, Bl.
 P. (GONIOPHLEBIUM) PUBERULUM, Baker. Shan border, south-east of Maulmain.
 P. (EU-POLYPODIUM) SUBDIGITATUM, Baker=P. DAVALLIOIDES, Mett.
 P. (EU-POLYPODIUM) DAREEFORME, Hook. Rare. Dauna-toung.
 P. (DICTYOPTERIS, Presl.) DIFFORME, Bl.
 P. (DICTYOPTERIS) TENERIFRONS, Hook. In the debris of Limestone rocks.
 P. (GONIOPTERIS, Presl.) TROPHYLLUM, Wall.
 P. (GONIOPTERIS) PROLIFERUM, Presl.
 P. (PHEGOPTERIS) OBSCURUM, Hook.¹

ASPIDIÆ.

OLEANDRA, Cavanilles.

- O. NERIFORMIS, Cav. On rocks. Rare. *Loc.?*
 O. LONGIPES, Hook.=O. CUMINGII, J. Smith. var. On rocks. Toung-wine.

NEPHROLEPIS, Schott.

- N. ACUTA, Presl. Frequent. Kamorta. Katchall, Kurz.
 N. EXALTATA, Schott. Common. Old wall at Martaban.
 N. CORDIFOLIA, Baker=N. TUBEROSA, Hook.

NEPHRODIUM, Richard.

- N. (SAGENIA, Presl.) GIGANTEUM, Baker.
 N. (SAGENIA) GRIFFITHII, Baker. Burma, Griffith.
 N. (SAGENIA) CICTARIUM, Baker=S. COADUNATA, Wall?
 N. (SAGENIA) DECURRENS, Baker. Kamorta, fide Kurz.
 N. (SAGENIA) VARIOLOSUM, Baker.
 N. (SAGENIA) ZOLLINGERIANUM, Baker. Tenasserim. Helfer.
 N. (SAGENIA) POLYMORPHUM, Baker.
 N. (SAGENIA) SUBTRIPHYLLUM, Baker.
 N. (PLEOCNEMIA, Presl.) LEUZEANUM, Hook. Dongg-kon-laya, Ascent of Moolce-it.
 N. (EU-NEPHRODIUM) TRUNCATUM, Presl.
 N. PUNCTATUM, Par. Beddome, Ferns Brit. India, Tab. 131.

¹ Under this fern Baker, Synopsis Filicum, p. 308, remarks: "Very like a non-involucrate form of *Nephrodium sagenioides*." He is undoubtedly right. It is this and nothing else.—P.

- N. MOLLE*, Desv. Ubiquitous.
 var. *didymosorum*, Par. Bedd. Ferns S.I. Tab. 84.
N. ARBUSCULA, Desv. = *N. HOOKERI*, Wall.
N. EXTENSUM, Hook.
N. UNITUM, R. Br.
N. PTEROIDES, J. Sm. = *N. TERMINANS*, Hook.
N. PLATYPUS, Hook. ?
N. (LASTREA) SETIGERUM, Baker = *N. TENERICAULE*, Hook. Sp. Fil.
N. (LASTREA) RECEDENS, Hook.
N. (LASTREA) MEMBRANIFOLIUM, Presl.
N. (LASTREA) PARISHII, Hook.
N. (LASTREA) ODORATUM, Baker = *N. ERIOCARPUM*, Hook. Sp. Fil. Zwa-ka-bin.
N. (LASTREA) SPARSUM, Don. = *N. PURPURASCENS*, Hook. Sp. Fil.
N. (LASTREA) FLACCIDUM, Hook.
N. (LASTREA) PRESLI, Baker = *N. PROPINQUUM*, Hook. Sp. Fil.
N. (LASTREA) FILIX-MAS, var. *COCHLEATUM*, Don. Top of Zwa-ka-bin.
N. (LASTREA) SYRMATICUM, Baker = *N. SPECTABILE*, Hook. Sp. Fil.
N. (LASTREA) SAGENIODES, Baker = *N. MELANOPUS*, Hook. Sp. Fil.
N. (LASTREA) PROLIXUM, Baker. Kamorta, *vide* Kurz.
N. (LASTREA) CALCARATUM, Hook = *N. FALCIBOUM*, Hook. Sp. Fil.
N. (LASTREA) GRACILESCENS, Hook. Madremacam, Mergui.
N. (LASTREA) HIRTIPES, Hook = *ASP. ATRATUM*, Wall.

ASPIDIUM, Swartz.

- A. (POLYSTICHUM, Roth) ARISTATUM*, Sw.
 var. *conifolium*, Wall.
A. (POLYSTICHUM) ACULEATUM, Sw. Mountains. Top of No-a-la-bo.
 var. *bi-aristatum*, Bl.
A. (POLYSTICHUM) SEMICORDATUM, Sw.

DIDYMOCHLENA, Desvaux.

- D. LUNULATA*, Desv. Only found by me in a damp hollow on Ta-ök.

ASPLENIEÆ.

ASPLENIUM, Linnaeus.

- A. (ANISOGONIUM, Presl.) ESCULENTUM*, Presl. Swampy spots in jungles. Tceyang.
A. (DIPLAZIUM, Sw.) LATIFOLIUM, Don.
A. (DIPLAZIUM) POLYPODIODES, Mett.
A. (DIPLAZIUM) JAPONICUM, Thunb. = *A. SCHUCHII*, Hook. Sp. Fil.
A. (DIPLAZIUM) TOMENTOSUM, Hook.
A. (DIPLAZIUM) SYLVATICUM, Presl.
A. (DIPLAZIUM) BANTAMENSE, Baker = *A. FRAXINIFOLIUM*, Wall.
A. (DIPLAZIUM) PALLIDUM, Bl.
A. TENUFOLIUM, Don. Kala-ma-tonng. Martaban.
A. NITIDUM, Sw. On trees in wet jungles.
A. HETEROCARPUM, Wall. Zwa-ka-bin.
A. RESECTUM, Wall. Common on trees in mountainous places. Ta-ök.
A. MACROPHYLLUM, Sw. Kamorta, Kurz.
A. FALCATUM, L. Ta-ök.
A. HIRTUM, Kaulf. Madremacam, Mergui.
A. ERECTUM, Bory. Ta-ök.
A. TENERUM, Forst.
A. LONGISSIMUM, Bl.
A. NORMALE, Don. Ta-ök.
A. ENSIFORME, Wall. Ta-ök.
A. (THAMNOPTERIS, Presl.) GREVILLEI, Wall. On Tavoy Island.
A. (THAMNOPTERIS) NIDUS-AVIS, L. On trees in wet jungles, sometimes with fronds 6 feet long.

BLECHNEÆ.

BLECHNUM, *Linnaeus*.

- B. ORIENTALE, L. Common. On the hill behind Maulmain.

PTERIDEÆ.

LOMARIA, *Willdenow*.

- L. ADNATA, Bl.

CERATOPTERIS, *Brongniart*.

- C. THALICTROIDES, Brong.

PTERIS, *Linnaeus*.

- P. (LITOBROCHIA, Presl.) TRIPARTITA, Sw.
 P. (DORYOPTERIS, J. Sm.) PEDATA, L. On limestone rocks near Maulmain.
 P. (DORYOPTERIS) LUDENS, Wall. On limestone rocks near Maulmain.
 P. (CAMPTERIA, Presl.) WALLICHIANA, Agardh.
 P. (CAMPTERIA) BIAURITA, L.¹
 P. (PÆSIA, St. Hilare) AQUILINA, L. On all mountains at 4-5000 ft., and on the top of Patau, Mergui, only 800 ft.
 P. (EU-PTERIS) PELLACENS, Ag.
 P. EXCELSA, Gaudichaud.
 P. LONGIPINNULA, Wall.
 P. QUADRIACRITA, Retz. Common.
 P. QUADRIACRITA, var. SETIGERA, Hook.
 P. QUADRIACRITA, var. ARGYREA, Moore. Jungles on Shan border.
 P. SEMIPINNATA, L. Mergui, up the Tenasserim River.
 P. HETEROMORPHA, Fée.
 P. PELLUCIDA, Presl.
 P. LONGIFOLIA, L. Common everywhere. Nicobars, Kurz.

ONYCHIMUM, *Kaulfuss*.

- O. AURATUM, Klé. Very frequent in deserted Toung-yas.

CHEILANTHES, *Swartz*.

- C. FARINOSA, Klé. Zwa-ka-bin. On rocks about Kulwee. Beloo-gewn.
 C. ARGENTEA, Hook. Zwa-ka-bin.
 var. *chrysophylla*, Hook. Zwa-ka-bin.
 C. RUFa, Desv. Zwa-ka-bin.
 C. TENCIFOLIA, Sw. Frequent. On the hill behind Maulmain.
 C. VARIANS, Hook. Frequent. On the hill behind Maulmain.
 C. FRAGILIS, Hook. Limestone rocks near Maulmain.

ADIANTUM, *Linnaeus*.

- A. FLABELLULATUM, L. Mountains of the Yunzalin.
 A. CAPILLUS-VENERIS, L. On rocks in the Megatha River. South-east frontier.
 A. CAUDATUM, L. Mya-wa-dee.
 A. SOBOLIFERUM, Wall. Probably a var. of *caudatum* or *lunulatum*.
 A. LUNULATUM, Burm. Ubiquitous in the plains.
 A. PARISHII, Hook. Zwa-ka-bin.

LINDSAYEÆ.

LINDSAYA, *Dryander*.

- L. LANGUINOSA, Wall. On Palmyra trees, Tavoy. Extremely rare.
 L. TRAPEZIFORMIS, Dry.
 L. FLABELLULATA, Dry.

¹ *Pteris repandula*, Link, of Kurz's collection = *Pt. aurita*.

- L. *CULTRATA*, Sw. Common, in stony or rocky places.
 L. *LOBBIANA*, Hook. Doubtfully distinct from preceding. Madremacam, Mergui.
 L. *ENSIFOLIA*, Sw. Common. On the hill, Manlmain.
 var. *Griffithiana*, Hook. An undeveloped state of *ensifolia*.

DAVALLIEÆ.

CYSTOPTERIS, *Bernh.*

- C. *SETOSA*, Beddome. Ferns Brit. Ind. tab. 312. A doubtful plant. By the spring, at the top of Moolee-it, 6000 feet.

DAVALLIA, *Swartz.*

- D. (*STENOLOMA*, Fée) *TENUFOLIA*, Sw. Mountains. Rare. Dauna-toung, 5000 feet.
 D. (*MICROLEPIA*) *SPELUNCEÆ*, Baker = D. *POLYPODIOIDES*, Hook.
 D. (*MICROLEPIA*) *STRIGOSA*, Sw. = D. *KHASIYANA*, Hook. Ascent of Nò-a-la-bo.
 D. (*MICROLEPIA*) *PINNATA*, Car. Mergui, Archipelago.
 D. (*EU-DAVALLIA*) *BULLATA*, Wall. On trees, Mergui.
 D. *ELEGANS*, Sw. Common. Abundant on Cocoa-nut and Palmyra trees, Mergui.
 D. *SOLIDA*, Sw. Common. Abundant on Cocoa-nut and Palmyra trees, Mergui.
 D. *GRIFFITHIANA*, Hook. Mergui.
 D. *DECURRENS*, Hook. Mergui.
 D. (*LEUCOSTEGIA*) *CHEROPHYLLA*, Wall. Kala-ma-toung. Martaban.
 D. (*LEUCOSTEGIA*) *IMMERSA*, Wall.
 D. (*LEUCOSTEGIA*) *HYMENOPHYLLA*, Parish. Limestone rocks. Maulmain.
 D. (*HUMATA*, Crv.) *PEDATA*, Sm. Mergui, thence southward.
 D. (*HUMATA*) *PARALLELA*, Wall. Mergui, thence southward.

HYMENOPHYLLEÆ.

TRICHOMANES, *Smith.*

- T. *RIGIDUM*, Sw.
 T. *JAVANICUM*, Bl. On wet banks by streams. Madremacam. Mergui.
 T. *PYXIDEFERUM*, L.
 T. *HUMILE*, Forster, *vide* Kurz. Nicobars.
 T. *FILICULA*, Bory. Common.
 T. *PUSILLUM*, Sw.
 T. *MUSCOIDES*, Sw., *vide* Kurz. Katchall.
 T. *HENZAIANUM*, Parish. On trees about Henzai basin.

HYMENOPHYLLUM, *Smith.*

- H. *DENTICULATUM*, Sw.
 H. *TUNBRIDGIENSE*, Smith.
 H. *POLYANTHOS*, Sw.
 H. *JAVANICUM*, Spreng.
 H. *ENSERTUM*, Wall.
 H. *PARVIFOLIUM*, Baker. Toung-ky-a-'tsakan, between Kankareet and Mya-wa-dee.

DICKSONIÆ.

DICKSONIA, *L'Heritier.*

- D. (*CIBOTIUM*, Kaulf.) *BAROMETZ*, Link. Madremacam, Mergui.

CYATHIÆ.

DIACALPE, *Blume.*

- D. *ASPIDOIDES*, Bl. Abundant at 5-6000 feet on the ground.

ALSOPHILA, *Brown.*

- A. *LATEBROSA*, Hook. Tree Ferns. Mountainous districts.

- A. GLABRA, Hook. Tree Ferns. Mountainous districts.
 A. CONTAMINANS, Wall. Tree Ferns. Mountainous districts.
 A. COMOSA, Hook. Tree Ferns. Mountainous districts. Near Tecmibông,
 ascent of Moolee-it.
 A. ALBOSETACEA, Boddome, Suppl. Ferns B. India. Nicobars, Kurz.

Sub-order VI. *GLEICHENIACEÆ*.GLEICHENIA, *Smith*.

- G. DICHTOMA, Willd. Frequent. Road to Kulween, Mergui. Amherst Cliff.
 G. LONGISSIMA, Bl. Mountains. Nattoung.

Order MARATTIACEÆ.

ANGIOPTERIS, *Hoffm.*

- A. ERECTA, Hoffm. Wet jungles, Toung-wine, near Maulmain.

The following brief account of the classification of the Acotyledonous orders is condensed from Maout and Decaisne's work, the arrangement of the Alge spurie being by Sir J. D. Hooker.

Class THALLOGENS.

Order ALGÆ.

Alge spurie are divided into five Tribes.

CRYPTOCOCCIÆ.

These organisms are minute colourless globules found in vinegar and other fluids, and are probably only mycelia of certain fungi.

VOLVOCINIÆ.

Minute fresh-water Alge consisting of a number of permanently active zoospore-like bodies, associated in various forms, and surrounded by a gelatinous coat, with or without an enveloping membrane.

This order embraces three genera, *Volvox*, *Stephanosphæra* and *Gonium*. *Volvox* is a pale greenish globule one-fiftieth of an inch in diameter. It consists of a membranous sac, studded with green points, and clothed with innumerable cilia. It is found in ponds and is in a state of constantly rolling motion. The green points consist of layers of zoospore-like bodies, coating the inside of the sac, with two cilia which project through the holes in the sac, and are further provided with delicate filaments, that extend from their sides and meet similar filaments, from the adjoining bodies. The zoospores are pyriform, have a reddish eye spot, and transparent contractile vacuole. Young *Volvoxes* occupy the centre of the sphere. *Stephanosphæra* has eight biciliated green cells placed at equal distances along the equator of a spherical cell. *Gonium* presents a flat frond of about sixteen cells. They display two forms of cells, an active and passive, the former having each a pair of vibratile cilia projecting through their hyaline envelope.

PALMELLACIÆ.

Gelatinous or powdery crusts found on damp surfaces, and in fresh or salt water, composed of globular and elliptic cells aggregated in a gelatinous matrix. Reproduction by cell-division and ciliated zoospores.

This tribe embraces six genera—*Chlorococcus*, *Palmella*, *Protococcus*, *Trypethallus*, *Glaucopsis*, and *Hormospora*. *Palmella cruentata* forms rose-coloured patches on damp walls. *Protococcus nivalis* is the celebrated red-snow of Arctic and Alpine regions. *Protococcus* includes various unicellular *Palmellaciæ*, which increase by division into two or four parts, which separate, but are connected by a semigelatinous layer. Sometimes its cells give rise to four-ciliated zoospores of two sizes, the larger of

which settle down and develop a cellulose coat, whilst the further development of the smaller is unknown.

NOSTOCHINIEÆ.

Plants growing on damp moss or earth, and on stones in freshwater. They consist of slender moniliform tranquil or oscillating filaments, composed of cells placed end to end, immersed in a dense gelatinous matter, formed by the fusion of the gelatinous sheaths of the filaments. Reproduction by cell division.

This order embraces seven genera—*Nostoc* (*Hormosiphon*), *Aphanizomenon*, *Spharozygga*, *Anabania*, *Spermoseira*, *Trichodesmium*, and *Monormia*.

A group of obscure plants, resembling *Collema* amongst Lichens, found all over the globe, even on ice or snow, often occurring in detached masses. *Monormia* forms floating jelly-like masses on brackish water, sometimes of great extent.

Nostoc edule is sold in China dried, and is used as an ingredient in soups. *Trichodesmium Ehrenbergii* resembles chopped straw, and floats on the ocean, and also on the surface of the Red Sea.

OSCILLATORIEÆ.

Plants growing in fresh and brackish pools, hot springs, rivers and vegetable infusions. They are formed of transversely-striated filaments, sometimes spirally curled or sheathed in mucus, exhibiting a serpentine motion. Reproduction by transverse division. The order embraces fourteen genera: Oscillatoria, Ulothrix, Enactis, Spirulina, Calothrix, Leptothrix, Microcoleus, Sclerothrix, Bacterium, Lyngbya, Rivularia, Vibrio, Scytonema, Gloeotrichia. Vibrios are minute, colourless, active, jointed bodies, that abound in decomposing infusions, and like the still simpler Bacteria, which are mere inflexible rods, are probably rudimentary states of other Algæ.

The knowledge that the presence in the blood of man and animals of microscopic rod-like bodies in various diseases, each disease having its concomitant and distinguishable organism, is likely to prove of practical advantage. For example, a horse is attacked with certain symptoms, which may be of no dangerous import, or may be the forerunner of the dangerous and highly contagious disease, termed 'Ludiāna,' in Northern India. A drop of blood drawn from the sick animal is placed under the microscope, and if the organisms which are associated with the disease 'Ludiāna' are seen to be present in the blood, the horse is at once slaughtered and buried, thereby probably arresting the spread of the disease to other animals; but if these organisms are not visible, the animal is simply watched, and may eventually prove to be only suffering from a trifling or curable ailment.

ALGÆ (Proper).

Cellular acotyledonous plants, aquatic or growing on damp ground, always exposed to the light. Reproduction either asexual by means of zoospores, or by means of atheridia and sporangia, monœcious or diœcious, and mostly producing motionless spores solitary or quaternary in the same sporangium.

True *Algæ* are divided by DeCaisne into six orders, some of the lowest forms, however (*Diatomeæ*), have been referred to the animal kingdom.

DIAMOMIEÆ.

Microscopic organisms living in fresh or salt water, generally prismatic and rectangular, free, sessile, or pedicelled, naked, or immersed in mucilage, and divided into polymorphic fragments (frustules). The envelope is rigid, siliceous, two-valved, and finely striated.

Besides their multiplication by spores (as in *Desmidiæ*) *Diatomeæ* are reproduced by fissuring. On the centre of each frustule, in the solitary species, and of each segment or joint in the aggregated forms, there is frequently visible on the young Diatom a line dividing it into two (or more) frustules, which become distinct and similar individuals. Certain species are parasitic; others form flakes or gelatinous

masses on rocks; others live in fresh and pure spring water; others cover the soil with a thick brown sticky layer. Diatoms abound in *guano*, and are often abundant in the crops of lamellirostrate birds, which resort to mud flats to feed, and wherever water collects in holes in wood or stone, the slime from such situations requiring only to be scraped up and dried, and the Diatoms it contains can then at any time be prepared for the microscope by boiling in sulphuric acid. Diatoms abound in a fossil state, and Ehrenberg discovered that '*Tripoli*,' or rotten stone, was entirely composed of the microscopic siliceous shells of these organisms, and they constitute considerable deposits in various parts of the world.

SYNSPORIÆ, Decaisne.

Conjugatæ, Linklater.

Freshwater Alga, composed of cells of various forms, or chambered tubes, filled with green matter, either granular or disposed in spiral plates. Reproduction is effected by the union of the contents of two contiguous cells, by the effacement of their walls, simple or compound spores resulting from this fusion.

Sub-tribe DESMIDIEÆ.

Microscopic green Alga, composed of two hemispherical corpuscles, free, basally united or associated in flat or spiral bands enveloped in mucilage, varied and elegant, always symmetrical, and with either smooth or sculptured surface. Reproduction either by conjugation, as in *Synsporiæ*, or by fissuring, or by means of sporangia. The green matter of *Desmidiæ* is said to possess a circulation analogous to that of *Chara*.

SAPROLEGNIEÆ. (MYCOPHYCEÆ, Kützing.)

Colourless, aquatic, filamentous plants, growing on decomposing organic matter, resembling *Faucheria* in structure. Reproduction by rounded mobile zoospores, resembling the spores of *Conferræ* and *Faucheria*; and also by sporangia, containing spherical oogonia.

Saprolegnia is a minute *Alga*,¹ usually found coating the bodies of drowned animals with hyaline filaments, and is sometimes developed on the bodies of living fish. The filaments are filled with granules, which eventually become converted into zoospores, which are discharged from the end of the filament at first with impetuosity, and afterwards more slowly. These zoospores are turbinate in shape and biciliate. The filaments also produce lateral sacs, bearing sporangia, thereby illustrating two methods of reproduction in the same plant.

FAUCHERIEÆ.

Green fragile Alga, formed of simple, not septate filaments. Reproduction as in *Saprolegnia*, either by zoospores, or by a sporangium which, after receiving the antherozoa, becomes detached and sinks into the mud, where it gives birth to a fresh individual.

CHLOROSPORIÆ, Thuret.

CONFERVÆ, Agardh.

Green Alga, marine or freshwater. Reproduction by means of zoospores produced by the concentration of the green matter, and with or without the formation of antheridia.

Sub-Tribe EDOGONIEÆ.

Green Alga, very simple in structure, consisting of a series of simple or branched cells.

Sub-Tribe CONFERVIEÆ.

Section a. *Unicellulares*.

Each cell producing several spores furnished with vibrating hairs.

Section b. *Conferræ*.

Tubes or cells containing ovoid spores, furnished with 2-4 vibrating hairs.

¹ Some authors have classed *Saprolegnia* among *Fungi*.

PHLEOSPOREÆ AND FUCACEÆ. Thuret.

(Aplouspora, Dene. Melanospora, Harv.)

Marine Algæ, brown or olive-coloured, mucilaginous, variable in shape. Frond with or without nerves, entire, or variously cut, sometimes pierced with holes, or twisted into a spiral or furnished with floating bladders, or with a fistular stem. Reproduction by sporangia, with or without the development of antheria.

Section a. Fucaciæ.

Reproductive organs male and female, contained in conceptacles. Spores motionless.

Section b. Laminariæ.

Reproductive organs superficial *sori*. Spores usually mobile, germinating without previous fertilization. In the section *Laminariæ* the *sporangia* are irregularly distributed over the surface of the frond, giving birth to ovoid *zoospores*, endowed with active motion, and which germinate immediately they become fixed. In the other section *Fucaciæ* ('wrack') the fructification usually corresponds to tubercles, dispersed over the frond, or united in special organs in terminal or axial racemes. Each tubercle indicates a fructiferous cavity or *conceptacle* in the thickness of the frond. This *conceptacle* is filled with mucilage, and bears on its inner wall a number of transparent ciliated cells. At the season of reproduction such of these cells as are to fructify, swell and give rise to numerous reproductive bodies which escape by a minute central orifice, and soon divide into two, four or eight spores, which quickly germinate. Sometimes the *antheridia* are developed on the same *conceptacle* with the *sporangia*, sometimes on distinct individuals, as the species may be monoecious or dioecious. The *conceptacles* are generally recognizable by their orange colour. On the *antheridia* being discharged from the *conceptacle*, each gives birth to numerous lageniform *antherozoa* marked with a single red granule, forming a dorsal protuberance, and moving briskly by means of two unequal very mobile hairs or cilia, the shortest in front and the other extending behind. When the *antheridia* and *sporangia* occupy the same *conceptacle*, the latter are found at the bottom, whilst the former line the upper half near the central aperture or point of issue.

FLORIDIÆ, Lamouroux.

(Rhodospiræ, Harv. Choristospora, Dene.)

Marine or very rarely freshwater Algæ. Rose, violet, purple, reddish-brown, or rarely greenish, often mucilaginous, and variously formed, either of simple or branched filaments (Dasya), or tubes united into a simple filamentous stem (Polysiphonia), or of irregular membranous fronds (Porphyra), or apparently foliaceous (Desmoria), or cartilaginous (Iridea), with or without nerves, entire or latticed (Hemitrema, Thuretia), or umbellate (Constantinia), or tomentaceous (Catenella), or Jungermannoid (Lewillea, Polyzonia), or sometimes encrusted with lime and fragile (Corallina). Reproductive organs monoecious or dioecious. Sporangia either superficial or sunk in the frond, and contained in variously-shaped conceptacles. Spores rounded or oblong, solitary or in fours. Antheridia variously formed or constituting part of the tissue of the frond, composed of colourless cells each containing an antherozoid without vibratile hairs, and incapable of motion. In place of hairs, however, each antherozoid is furnished with a tubular organ called 'trichogyne.'

FUNGALES.

Usually terrestrial polymorphous plants, sometimes subterranean, often parasitic, destitute of chlorophyll or starch, of most varied form, colour, and consistence, sometimes reduced to a few filaments or cells. Vegetative organs consisting of a *mycelium*, or tissue of slender simple threads. Spores most minute, sometimes superficial, at others borne upon projections called *basidia*, at others enclosed in cells or sacs.

Fungi are divided into six tribes.

ARTHROSPORIEÆ.

Receptacle filamentous, fistular, simple, branched or almost obsolete; contiguous or chambered. Spores naked, terminal, jointed end to end, continuous or chambered, separating more or less easily.

Arthrosporiceæ embrace minute forms, a few only of which are of economic importance to man, as *Torula cererisicæ*, the yeast plant, developed during the manufacture of beer, and indispensable thereto. The *Oidium Tuckeri* is an equally well-known example, and the scourge of the vine cultivator all over Europe. *Fumarago* is another familiar example of a microscopic fungus, which coats the surface of public buildings, statues, and the like with a dark film something like a coating of soot.

TRICHOSPORIEÆ.

Receptacles filamentous, simple or branched, fistular, continuous or chambered. Spores very various in form, simple or compound, clustered, at the extremity of the branches or around the receptacle.

Trichosporiceæ also include a multitude of microscopic fungi, some of them extremely formidable to man, as *Peronospora infestans*, the proximate cause of the potato disease, and *Botrytis Bassiana*, whose presence in the body of the silkworm gives rise to the formidable disease of that insect, *Muscardine*, for which no remedy seems known save isolation, and which has in some years almost ruined the silk producing industry in some parts of France.

CYSTOSPORIEÆ.

Receptacles flocculent, continuous or chambered, simple or branched, terminated by a vesicular sporangium.

Cystosporiceæ are minute organisms or moulds, which find a habitation on decaying vegetable substances or the excrements of animals, and claim no particular notice—though they well repay the trouble of studying their forms and development.

CLINOSPORIEÆ.

Spores springing from a clinodium, covering wholly or partially the surface of the receptacle, or enclosed in a conceptacle. Two sections are recognized.

a. (*Endoclinal*) *Conceptacle membranous, more or less thick, fleshy, coriaceous or horny, sessile or pedicelled, opening variously and enclosing the clinodium.*

b. (*Ectoclinal*) *Receptacle fleshy, sessile or pedicelled, convex or concave, covered by the clinodium.*

Clinosporiceæ are common fungi, some of which, known as 'rust' or 'smut,' have a special interest as affecting various cereals used for food. The 'smut,' *Ustilago segetum*, attacks the ovule, floral envelopes, and spikelets, reducing them to a black powder, and wheat, barley, oats, millet, and sorghum are all liable to be attacked by it. The only useful member of this tribe is the Ergot of Rye (*Secale cornutum*), which is a valuable uterine stimulant in tedious labours, and of service in arresting undue hæmorrhage. It is however, when accidentally consumed in flour made from affected grain, extremely injurious, and gives rise to formidable results and even death in some cases.

THECASPORIEÆ.

Spores usually contained by eights in cells (thecæ, sporangia), covering wholly or partially the surface of a receptacle, or the interior of a conceptacle. Thecæ, accompanied or not by paraphyses, and opening at the top by an inconspicuous operculum for the emission of simple or chambered spores.

Two sections are recognized—

- a. *Endothecal.* *Thecæ rounded, ovoid, clavate or cylindric, enclosed in a conceptacle.*
- b. *Ectothecal.* *Thecæ elongated, covering the surface of a receptacle.*

Thecasporiceæ are of prime importance, as embracing some of the most highly valued of the edible species, as, for example, the common Morel (*Morchella esculenta*) and the Truffle (*Truber cibarium*). The truffle, however, so lauded by the Roman

poets, was (as I am informed by C. E. Broome, Esq.) an allied smooth yellow species, called *Terfez* by the Arabs, and *Terfezia leonis* by botanists. It is this species to which Juvenal alludes—

“Tibi habe frumentum, Alledius inquit
O Libye: disjunge boves, dum tubera mittas!”—*Sat. V.* 118.

We know, however, from Martial that in the esteem of some they held a place gastronomically speaking below mushrooms:

“Rumpimus altricem tenero quæ vertice terram
Tubera,—boletis poma secunda sumus.”

Another curious member of this tribe is the genus *Sphæria*, which germinates within the body of a caterpillar, giving rise to the foolish idea entertained by some of the change of the animal into a vegetable growth, as in the *S. Robertsii* from New Zealand.

BASIDIOSPORIÆ.

Spores simple, borne on rounded semielliptic or conical cells, named basidia, which terminate in 2-4 points (sterigmata), each bearing a spore; the basidia are often accompanied by other large projecting cells, transparent, acute, or obtuse, always deprived of sterigmata, to which have been given the name of cystides. The basidia are borne on the gills, folds, veins and processes of the receptacle; sometimes in conceptacles, the cavities of which they line.

Basidiosporiæ embrace the familiar ‘puff-balls’ and the common mushroom, *Agaricus campestris*, the only species which is habitually and easily cultivated. Several species of this tribe are edible, and some are very poisonous; but it is a tolerably safe plan to follow the indications afforded by the natives of a country, who generally are well aware of the properties of the edible species, though in England far more ignorance on this matter prevails among its rustic inhabitants than among a similar class in foreign countries. The edible fungi of Burma are, however, as yet hardly known, or the place where they are found, or the vernacular names they are known by.

Order LICHENES.

Terrestrial plants. Thallus coriaceous and irregularly lobed, or erect, or a mere crust, various in colour and consistence. Fruetification of two sorts. 1. *Apothecia*, which are superficial, marginal, or sunk in the fronds, and contain or consist of vertical densely-packed tubes or sacs (*sporangia*), containing two to four spores. 2. *Spermogonia*, which are spherical bodies sunk in the substance of the frond, whose inner surface is lined with filaments (*sterigmata*), which support slender transparent corpuscles called *spermatia*, the functional homologues of the *antheridia*.

The systematic position of Lichens has given rise to much discussion, and some botanists hold that their separation from *Fungi* is uncalled for. This view is supported by the curious behaviour of antherozoids of *Lichens* and *Fungi* under the influence of electricity from an induction coil (for static and Voltaic currents do not excite the phenomena), nothing like which is observable in the *antherozoids* of *Hepaticæ* and *Mosses*. Observed in water, under the microscope, these bodies execute two extremely quick movements, one oscillatory, the other progressive, though no vibratile hairs can be detected. To observe the effects of electricity, the glass plate for the object should be traversed by two grooves, crossing at right angles; in each groove a metallic thread should be firmly cemented, and the thread leave in the middle of the glass a free space, wherein the corpuscles swim. The induction apparatus is a reel, the generator being a simple cell of bichromate of potash. Now with *antherozoids* of *Hepaticæ* and *Mosses* in the field of the microscope, no result in their movements is produced by the induced current, and their relative positions remain unchanged, even when on the direct path of a strong current. Very different, however, is the behaviour of the *antherozoids* of *Lichens*

and *Fungi*. The moment the small embedded threads on the object glass are connected with the points of the induction coil, the corpuscles visible in the field of the microscope place themselves parallel to the current, that is, with their longest diameter in a straight line between the points, their progressive movement is wholly arrested and their oscillatory motion is but feebly maintained. If the current is now passed in a perpendicular direction, the corpuscles, instead of end to end, range themselves side by side. If the current is arrested, the corpuscles resume their irregular motions, and again fall into line as soon as its influence is perceptible.

Class ACROGENS.

MUSCALES.

Plants composed of cellular tissue only. No *prothallus*.

Order HEPATICÆ.

Stems leafy, with alternate or distichous leaves, or frondose. *Antheridia* consist of delicate open sacs, full of cells, each enclosing an *antherozoid*. The *archegonia* consist of a flask-shaped body enclosing a vesicle which, after fertilization, develops a stalked urn-shaped *sporangium*, full of spores. Both *antheridia* and *archegonia* may be terminal, axillary, attached to the under-surface of a stalked disk, or embedded in the substance of the frond. *Spores* usually mixed with spiral filaments called *elaters*.

Hepaticæ are divided into five tribes.

ANTHOCERIEÆ.

Sporangium, siliculose, 2-valved, furnished with a central *columella*, covered with *elaters*.

MARCHANTIEÆ.

Sporangium furnished with *elaters*, but no *columella*.

RICCIEÆ.

Sporangium without *columella* or *elaters*.

MONOCLEIEÆ.

Sporangium solitary, opening longitudinally, without *columella*; the *elaters* carried away with the spores.

JUNGERMANNIEÆ.

Sporangium furnished with *elaters*, but no *columella*: *archegonia* and *antheridia* developed at the extremity of the stem.

Order SPHAGNA.

Moss-like plants, differing from mosses in their regular fasciated branches, arising from the stem by the sides of the leaves, by some peculiarities in the structure of the stem and leaves, and stalk of the *sporangium*, and by having dimorphic *spores*.

Order MUSCI.

Stems leafy, leaves alternate or distichous. *Antheridia* consisting of delicate open sacs full of cells, containing an *antherozoid*. *Archegonia* consisting of a flask-shaped body, enclosing a vesicle which, after fertilization, develops a stalked urn-shaped *sporangium* full of spores.

ANDREÆCIEÆ.

Schistocarpons mosses. Capsule borne on a *pseudopodium* not operculate, but opening by four longitudinal fissures, forming four valves cohering by their lips (*Andræa*) or free (*Acroschisma*).

BRYACEÆ.

Mosses proper. Capsule sessile or pedicelled, indehiscent, or with a separable operculum. Mouth with or without an annulus, naked, or with a simple or double peristome.

Order CHARACEÆ.

Aquatic branched plants, with whorled branches, consisting of a series of long superimposed fascicles of inarticulate tribes. *Antheridia* consisting of spherical vesicles containing articulate tubes, each joint (cell) of which contains an *antherozoid*. *Archegonia* consisting of a single spore, covered with spirally arranged tubes, and fertilized in situ.

Order FILICALES.

Plants with both cellular and vascular tissue. *Antheridia* or *archegonia*, or both, formed on a *prothallus* that is developed from the spore on its germination.

a. Spores of two kinds, one containing *antherozoids*, the other developing a *prothallus*, with *archegonia*.

ISOETEÆ.

Submerged or terrestrial plants, with a tumid caudex, clothed with the sheathing bases of elongated fronds. *Sporangia* enclosed in the bases of the fronds, those of the outer frond bearing macrospores, of the inner, microspores. In germinating, the macrospores produces a *prothallus* bearing *archegonia*.

Order LYCOPODIACEÆ.

Stem simple or branched, erect, prostrate, pendulous, or sometimes with a creeping rhizome, covered with small uniform or biform leaves, rarely leafless. *Sporangia* solitary, placed at the base of the leaves, or in the scales of terminal cones bi- or trivalved, containing either quaternary microspores full of *antherozoids*, or sub-globose macrospores, with a trirural mark on one hemisphere, and developing on germination a *prothallus*, which produces *archegonia*.

The uses to man of the *Lycopodiaceæ* are few and unimportant. The dust filling the *sporangia* of some species is called, from its inflammability, vegetable sulphur, and is used to produce theatrical lightning, and also as a desiccator, or substitute for violet powder, to mitigate and prevent excoriation of the skin of infants. Medical properties are attributed to some, but they do not deserve enumeration.

Order SALVINEÆ.

Fronds floating; margins recurved in veneration. *Sporangia* and *antheridia* contained in separate capsules produced at the base of the fronds. *Prothallus* producing a single *archegonium*.

Order MARSILIACEÆ.

Fronds slender, from a creeping rhizome, simple and filiform, or with four terminal wedge-shaped leaflets, circinate in veneration. *Sporangia* and *antheridia* together, contained in coriaceous globose capsules, produced on the rhizome. *Prothallus* as in *Salvinææ*.

b. Spores of one kind. *Antheridia* and *archegonia* both produced upon a *prothallus*.

Order EQUISETACEÆ.

Cylindric, jointed, leafless plants, with hollow internodes, terminated by a toothed sheath. Fructification a cone of peltate scales, which bear on their under-surface several dehiscent *sporangia*. Spores furnished with two filaments that are at first coiled round them. *Prothallus* unisexual.

Equisetum is in most cases dioecious. The *prothallus*, which bears well-developed *archegonia*, rarely bears *antheridia* as well; and if *archegonia* occur on a *prothallus* bearing *antheridia*, the former are generally sterile.

Order OPHIOGLOSSÆ.

Fronds straight in vernation. *Sporangia* globose, coriaceous, bivalved, arranged in a peduncled or sessile spike. *Prothallus* bisexual.

Ophioglosseæ are separated from true ferns by the nature of their rhizome, or by their fronds not being rolled up in vernation, crozier-fashion, but straight, and by their *sporangia* being arranged longitudinally on a sort of scape, forming either a simple terminal spike (*Ophioglossum*) or a raceme (*Botrychium*).

The *sporangia* have no ring, and contain smooth triangular spores indicating an alliance with *Lycopodiaceæ* through *Phylloglossum*.

Order FILICES.

Fronds circinnate in vernation, bearing *sporangia* on their under surface, or margins, or on separate fronds. *Prothallus* bisexual.

Ferns embrace eight tribes, and, according to some authors, in round numbers, three thousand species.

MARATTIÆ.

Sporangia free, appressed, in 2 rows, or in a circle or confluent, and together resembling a several-celled capsule, deprived of rings, each opening by a slit or pore.

OSMUNDIÆ.

Elastic ring embracing a part of the circumference of the *sporangium*, or reduced to a small disk of cells with thick walls.

LYGODIÆ.

Sporangia sessile, ovoid, or turbinate. Elastic ring replaced by a sort of cap with radiating stricæ, occupying the end of the *sporangium*, opposite to the point of attachment.

GLEICHENIÆ.

Sporangia solitary, or grouped in definite numbers (2-3), sessile, globose. Elastic ring perfect, but not corresponding to the point of attachment of the *sporangium*.

CERATOPTERIDIÆ.

Elastic ring large, formed of vertical cells, not completely surrounding the *sporangium*, which is sessile.

HYMENOPHYLLIÆ.

Elastic ring oblique and completely surrounding the *sporangium*, and on a plane nearly perpendicular to the point of attachment of the *sporangium*. *Sporangia* nearly globose.

CYATHACIÆ.

Elastic ring nearly as in *Hymenophylliæ*. *Sporangium* often compressed, sessile, or pedicelled, not continuous with the ring.

POLYPODIACIÆ.

Elastic ring generally narrow, prolonged from one side of the rather long pedicel, interrupted at the top or the opposite side near the pedicel.

Sub-Kingdom II. PHÆNOGAMS,
COTYLEDONOUS OR FLOWERING PLANTS.

Plants furnished with flowers, and propagated by seeds.

CLASS III. MONOCOTYLEDONS.

STEM, WHEN WOODY, UNIFORMLY CONSISTING OF BUNDLES OF FIBRES IRREGULARLY IMBEDDED IN CELLULAR TISSUE, WITH A FIRMLY ADHERENT BARK ON THE OUTSIDE. EMBRYO WITH ONE UNDIVIDED COTYLEDON, THE YOUNG STEM BEING DEVELOPED FROM A SHEATH-LIKE CAVITY ON ONE SIDE. FLORAL PARTS USUALLY TRIPLE, THE CALYX AND COROLLA, IF PRESENT, USUALLY ALMOST CONFORM IN STRUCTURE, FORMING OFTEN A SEX-PARTITE PERIANTH.

Division A. OVARY SUPERIOR.

Sub-division *a*. OVARY SYNCARPOUS.

(rarely apocarpous in some Palms).

GLUMALES.¹

Flowers on the axils of scales, which are arranged in spikelets. Perianth none, or of minute scales, or hairs or bristles. Stamens 3, rarely more. Ovary 1-celled and 1-ovuled. Fruit a caryopsis.

Albumen fleshy or flowery. Embryo immersed, or not. Grasses or grass-like herbs.

Order GRAMINEÆ.

Flowers glumaceous, in spikelets, usually hermaphrodite. *Perianth* none. *Spikelets* 1-floral or many-floral, with 1 or 2 bracts or glumes at their base, glumes rarely wanting. Reproductive organs naked, or surrounded by 2 or 3 minute scales called 'lodicules' enclosed between two oppositely alternating chaff-like concave scales, called upper and lower valves, or '*paleas*'; those of the lower, or the uppermost ones often barren or suppressed altogether. *Stamens* hypogynous, usually 3, rarely reduced to 1 or 2, or (in bamboos chiefly) increased to 6 and more. *Anthers* versatile, 2-celled. *Ovary* 1-celled, with 1 ovule; *style* bi- or tri-lobed, or more frequently divided down to the base into 2 or 3 more or less feathery styles. *Fruit* 1-seeded and seed-like, called usually a *caryopsis*, free or adhering to the persistent upper

¹ Dr. Mason's list of rushes and grasses is meagre in the extreme, embracing only 5 species of the former and 25 of the latter plants. The list given now is also very defective, especially as regards the Cyperaceæ, and is made up from the following sources. Kurz's list of the Bamboos of Burma and his other papers already quoted, and some additional species from Munro's Monograph communicated to me by the Rev. C. Parish; A list of Asiatic Panicaceæ in Balfour's Cyclopædia of India, from which I have extracted such species as seemed probably Burmese; the generic character, nomenclature, and synonymy of all species ranging to China and Ceylon, being given from Thwaites' 'Enumerators Plantarum Zeylanicæ,' and Bentham's Flora Hongkongensis, whilst the characters of the Tribes are those adopted by Maout and Decaisne. From these sources a tentative list of 52 Cyperaceæ and 182 Gramineæ is now offered.

valve, or enclosed within both hardened valves. *Pericarp* very thin, adhering to the seed, or rarely loose, coriaceous or crustaceous, or fleshy, or very rarely opening into 2 valves. *Embryo* small at the base of a mealy albumen. Herbs, or rarely shrubs or trees, with hollow stems, interrupted by solid septiform nodes. *Leaves* alternate, distichous, parallel-veined, sheathing the branches with their bases, or rarely (chiefly in bamboos) on longer or shorter petioles jointed with the sheath, the latter split open to the very base, and often terminating in a small scarious, fringed, or naked appendage called a *ligule*. *Spikelets* variously arranged in terminal *spikes*, *racemes* or *panicles*.

TRITICIEÆ.

Spikelets all fertile or rarely polygamous, spicate, sessile or sub-sessile on the notches of the usually veined rachis. One to many-flowered, the upper flower usually arrested. *Glumes* two, rarely one, variable in length. *Glumelles* herbaceous, or sub-coriaceous, rarely membranous, the lower awned, at or below the top, or mucous; lower glumelle of the base of the spikelet answering to the lower glume. *Stamens* three, rarely one. *Stigmas* sessile or sub-sessile, divergent, protruding from the sides, and often towards the base of the flower. *Caryopsis* with a linear hilary spot.

MANISURIS, *Linnaeus*.

M. sp.

Nicobars (K.).

TRITICUM, *Linnaeus*.

1 * T. SATIVUM, L. (M.)

Gyung-sa-bā. Wheat.

Wheat does not grow in Pegu, but it grows largely in the neighbourhood of Ava.

HORDEUM, *Linnaeus*.

* H. HEXASTICHON. (M.)

Mu-yan.

This is the species said by Craufurd to grow in the Malay countries, but not to be generally known by the natives. Mason observes: "Notwithstanding this testimony, the Burmese have a name for Barley, which frequently occurs in their books. It constitutes one of their seven kinds of *sa-bā*, or cereal grasses, and its corresponding Pali name is identical with the Sanscrit name of barley."

Barley, the main source of European beer, belongs to this tribe, but barley is not the only grain beer can be made from. The process of preparing beer from a cereal is as follows: The grain is first steeped and exposed to moist heat till it germinates, thereby converting its starch into sugar. Germination is now arrested by drying it in a kiln, and the dried and saccharine product, or malt, is then infused in boiling water, whence results sweet wort. To this a bitter decoction of some sort is added, that of hops being the best, and the whole is then subjected to a gentle fermentation, and the result is beer. Distillation of the fermented grain yields a spirit variously known as arrack, whisky, or brandy as the case may be.

ROTTBOELLIA, *Linnaeus*.

R. EXALTATA, L.

India.

R. GLABRA, Roxb.

Bengal.

PELTOPHORUS.

P. (MANISURIS) GRANULARIS, L.

India.

P. MYRUS, L.

Coromandel Coast.

ORHURUS, *R. Browne*.

Spikelets 1-flowered, awnless, singly sessile in notches on alternate sides of a simple spike, the axis articulate at each node. *Lowest* empty glume hard, the two

1 * distinguishes cultivated or introduced species.

next empty ones, the *flowering glume*, and the *palea* all very thin and transparent, and completely enclosed under the outer one.

O. CORYMBOSUS, Gaert.

THYRIDOSTACHYUM.

T. PERFORATUM, Nees.

Bengal.

OROPEHIUM, Trinius.

O. THOMÆUM, Trin.

HEMARTHRIA, R. Browne.

Spikelets 1-flowered, usually awnless, inserted in pairs, one sessile, the other pedicellate in notches on alternate sides of a simple spike, the axis not articulate. *Lowest* empty glume keeled, rigid, several-nerved; the second similar, but more pointed in the pedicellate flower, thinner and half-transparent in the sessile one, and more or less cohering to the concave pedicel of the other; the third *empty glume*, *flowering glume* and *palea* all very thin and transparent.

H. COMPRESSA, R. Br.

Bengal.

H. FASCICULATA, Kth.

South China.

FESTUCIÆ.

Spikelets all fertile, pedicelled, or rarely sub-sessile, in a branched, spreading, or spicate panicle, or more rarely in a raceme or spike, 2- to many-flowered, the upper or lower flower often rudimentary or male. *Glumes* 2, often shorter than the contiguous flower. *Glumellis* 2, membranous, or somewhat coriaceous, the lower awned at, or below the top. *Awn* not twisted or muticous. *Lower glumelle* of the flower at the base of the spikelet answering to the lower glume. *Stamens* 3, rarely 2-1. *Stigmas* usually sessile or sub-sessile, divergent, protruding at the sides, and usually towards the base of the flower. *Caryopsis* with a linear or punctiform hilary spot.

Bamboos, with articulate-inserted petioled leaves and woody stems.

* *Stamens* 3. *Shrubby Bamboos*.

ARUNDINARIA, Palisot de Beauvois.

Spikelets 2, many-flowered, the florets imbricately distichous. *Glumes* 2, distinct, or the lower one aborted. *Valves* 2, the inner one bicarinate on the depressed and channelled back. *Stamens* always 3. *Lodicules* 3. *Stigmas* sessile or nearly so, 2 or 3, plumose. *Caryopsis* sessile, terete, with a furrow along the front.

A. ELEGANS, Kz.

Khakyen Hills. Nat-toung and hills east of Toung-ngoo at 5000 to 7500 feet.

An evergreen, tufted, shrubby bamboo; leaves linear, 4 to 5 inches long by $\frac{1}{2}$ an inch broad, with about 4 nerves at each side, conspicuously tessellate, and spinulose-rough along the cartilaginous margins. *Spikelets* often steel blue on the sunny side, long and slender (to 1 inch), pedicelled, variable in the number of florets and forming a glabrous panicle-like raceme at the end of the leafy branchlets. *Glumes* 2, the outer 3-3 $\frac{1}{2}$ lines long, the inner narrower and shorter. *Outer palea* nearly 4 lines long, smooth and glossy, the nerves faint. *Inner palea* shorter, boat-shaped, pilose along the keels towards the bifid apex of the channelled back. *Lodicules* 2. *Stigmas* white. *Antthers* purple.

Caryopsis small, wheat-like, with a membranous pericarp closely adnate to the seed, the style caducous. *Filaments* free. *Stamens* 6 or more.

BAMBUSA, Schreber.

Spikelets 5, many-flowered. *Florets* distichous, the upper and lower ones incomplete, or the last altogether empty. *Glumes* none, or several, conform to the

paleas, but smaller. *Inner palea* of the hermaphrodite floret bicarinate on the back. *Lodicules* 3, fewer, or none. *Stamens* 6, the filaments long and free. *Ovary* naked, the style elongate, simple, or bi- or trifid, caducous. *Caryopsis* with a membranous testa, mucronate.

Stigmas white. *Shoot-sheaths* not, or obscurely, auricled at the mouth.

Unarmed bamboos.

* *B. NANA*, Roxb.

A native of China and Japan, cultivated about Rangoon and Maulmain.

Pu-lau-pinan-wā (Kurz).

Wā, generic for Bamboo. Leaves small, whitish pruinose beneath.

Internodes $\frac{1}{2}$ a foot long or more. *Lodicules* 3, longer than the ovary, entire. *Filaments* elongate, exerted. *Anthers* yellowish, with purplish streaks, pendulous. *Ovary* rough at the apex. *Style* very short, persistent. *Stigmas* 3, pilose, white.

Shoot-sheaths conspicuously auricled, or the blade decurrent into an auricle-shaped appendage. *Auricles* polished, without fringes.

B. AFFINIS, Munr. (p. 93).

Eng forests East of the Tsit-toung-

Thaik-wā (Kurz).

Mouth of leaf-sheaths long, produced, the ligule as produced and as long as the petiole. Outer palea more than 20-nerved, inner one 7-nerved, between the 2-fringed angles of the depressed back. *Lodicules* 3, the 2 larger often united. *Ovary* nearly hairy at the apex, and tapering into a 3-cleft style.

Auricles large, strongly fringed.

B. TULDA, Roxb. (p. 91).

Arakan, Pegu and Tenasserim, cultivated in Chittagong.

Thaik-wā.

Shoot-sheaths white-powdered, or almost pruinose, the appressed bristles scanty, brown. *Anthers* yellow, angles of inner palea ciliate. *Spikelets* clustered, 2 or more; the lower 2 or 3 paleas gemmiparous, all the others hermaphrodite or rarely one of the lower ones male. *Anthers* yellow, blunt. *Style* short, trifid. *Stigmas* long, white, pilose.

B. POLYMORPHA, Munr. (p. 98).

Pegu and Martaban.

Kya-thōn-wā (Kurz).

Shoot-sheaths green and yellow, the appressed bristles white. *Anthers* purple; angles of inner palea quite smooth. *Spikelets* with 3 to 5 small empty glumes at the base, polished, steel-blue on the sunny side, the lower one or two florets reduced to empty paleas, the upper one female with a long, pedicelled rudimentary floret. *Styles* white, pilose.

B. VILLOSULA, Kurz.

Limestone hills of Upper Tenasserim.

Ta-dein-wā (Kurz).

Flowers unknown. Leaves whitish-glaucous and pubescent beneath. Leaf-sheaths long, and slenderly caudiculate.

Stigmas purple.

Thorny bamboos.

B. ARUNDINACEA, Willd.

Chittagong and all over Burma.

Kyā-kat-wā.

Shoot-sheaths glossy, smooth, purple to scarlet. Leaves small. Angles of inner paleas tomentose-ciliate. *Anthers* yellow. *Branchlets* armed with recurved spines.

In Munro's monograph some other species occur not recognized by Kurz.

B. MARGINATA, Munr. (p. 114).

Wā-ni.

B. REGIA, Thomson (p. 116).

Hti-wā.

“This is a most elegant bamboo on account of the regularity of the nodes. It is brought to Maulmain in great quantities and used as handles for umbrellas.”—*Brandis*.

B. SPINOSA, Roxb. (p. 105).

Mergui. Martaban. Pegu.

B. VULGARIS, Wendl. (p. 107).

Filaments connate in a tube.

GIGANTOCHLOA,¹ Kurz.

Spikelets crowded, quinquefloral to multifloral. *Glumes* none or conform to the lower paleas. *Inner palea* of fertile florets, boat-shaped. *Lodicules* none or incomplete. *Stamens* 6, or occasionally 7 to 9. The filaments united in a tube and exerted. *Ovary* membranous, the style simple, or bifid or trifid, caducous.

Spikelets white-hairy. Stigmas white.

G. (OXYTENANTHERA) ALBO-CILIATA, Munf. (p. 129). All over Pegu and Tenasserim.

Wā-hpyu-ga-le (Kurz).

Shoot-sheaths almost one-fourth the length of the internodes, spreading, tawny-hispid. Ligule nearly half an inch long, cross-toothed. Angles of inner palea white, pilose. Anthers yellow.

G. (OXYTENANTHERA) NIGRO-CILIATA, Munf. (p. 128). Martaban.

Not recognized by Kurz, and perhaps therefore regarded as a var. of the last.

Spikelets black or brown-hairy.

G. (DENOCHLOA) ANDAMANICA, Kz.

The Andamans and Nicobars.

Spikelets $\frac{2}{3}$ to 1 inch long. Shoot-sheaths densely appressed, black-setose on the sides. Auricle smooth and polished, nude.

G. AURICULATA, Kz.

Southern Pegu. Cultivated in Arakan.

Ta-ja-ku-wā (Kurz).

Like the last, but sheaths sparingly tawny-setose.

G. MACROSTACHYA, Kz.

Tree forests of Tenasserim, and

Wā-net.

cultivated in Arakan and Pegu.

Spikelet $1\frac{1}{2}$ to 2 inches long. Shoot-sheaths densely appressed, black-setose. Auricles large, strongly tawny-fringed. Anthers purple. Stigmas white.

Caryopsis often rather large, the pericarp separating before ripening, into an outer firmly coriaceous or thick fleshy wall (epicarp), the inner cellular tissue in a dried state, more or less closely embracing the seed. The style persistent, rarely caducous.

Inner palea boat-shaped and 2-carinate, or deplanate with a 2-keeled apex.

Caryopsis rather small.

DENDROCALAMUS, Nees von Esenbeck.

Differs from *Bambusa* in the pericarp of the caryopsis being coriaceous or hard.

Outer paleas terminated by a pungent bristle or point. Anthers yellow. Stigmas purple.

¹ “Genus *Oxytenanthera*, Munro (excepta *O. Thwaitesii*) nullā notā differt a *Gigantochloa* nisi caryopside elongatā; valvula interior in omnibus speciebus a me examinatis deplanata et bicarinata evadit. *Gigantochloa* genus valde artificiale et filamentis connatis vix, ac ne vix a *Bambusa* differt. Habitus et spicularum structura in generibus *Bambusa* et *Gigantochloa* simili modo variat, et species ex habitu artissime affines, e.g. *B. polymorpha* et *Gigantochloa aspera* spiculis omnino inter se differant.”—Kurz, J.A.S.B. 11, 1873, p. 251.

² Kurz remarks, “*Caryopsis Dendrocalami* non est baccata nec perigynio circumdata, sed epicarpium plane coriaceum vel subcrustaceum, nec membranaceum uti in *Bambusa* sensu stricto.”—J.A.S.B. 11, 1873, p. 250.

D. STRICTUS, Nees (p. 148). All over Burma.

Myin-wā.

Shoot-sheaths more or less pruinose, slightly tawny, appressed-setose, the mouth truncate. Angles of inner palea fringed. Bristle of outer palea nearly 2 lines long.

D. CRITICUS, Kz. Summit of Kambala-toung in the Pegu Range.

Shoot-sheaths minutely appressed, silvery-setose. Auricles large, bristly-fringed, one turned upwards, the other downwards.

D. MEMBRANACEUS, Munro (p. 149). Tree forests of Martaban.

Shoot-sheaths appressed, dark brown-setose. Auricle wavyly decurrent, stipose-setose inside. Angles of inner palea ciliate. Outer palea pungent-pointed.

Outer paleas cucullate-mucronate, but not pungent. Spikelets green, membranous. Spikelets only 2½-4 lines long. Anthers yellow. Stigmas purple.

D. BRANDISH, Munro (p. 109). Eastern slopes of Pegu Range up to 3500 feet.

Kyet-u-wā or Wā-bō (Kurz).

Shoot-sheaths appressed, tawny-setose. Auricles wavy-decurrent, stipose-fringed inside. Ligule narrow. Angles of inner palea minutely ciliate.

D. LONGISPATHUS, Kz. Arakan, Pegu and Martaban.

Wā-yā.

Shoot-sheaths narrow, and nearly as long as the internodes, appressed dark-brown setose, only at one side of the mouth, with a small nude auricle. Ligule conspicuous, bristly-fimbriate. Angles of inner palea slightly pilose.

Spikelets rather large, 6-7 lines or more. Leaves very large. Shoot-sheaths not known.

D. CALOSTACHYUS, Kz. Bhamo and Khakyen Hills at 3500 feet.

Mouth of leaf-sheaths not produced in an auricle. The ligule conspicuous, entire, or fimbriate. Angles of inner palea white-fringed. Anthers yellow. Stigmas purple.

D. (BAMBUSA) GRIFFITHIANUS, Munro (p. 99). Mō-goung, Upper Burma.

Mouth of leaf-sheaths with large lunate, strong fimbriate auricles. Ligule large, usually ruptured. Angles of inner palea smooth. Lodicules long, fimbriate.

D. GIGANTEUS, Munr. (p. 150).

Wā-bō.

CEPHALOSTACHYUM, Munro.

Style long, stiff, and persistent. Caryopsis somewhat compressed. Inner palea deplanate, or complicate on the back, or towards the apex bicarinate. Lodicules 3. Ovary and the long style indurated, flask-shaped, and long-beaked. Stigmas 3, rarely 2, short, pilose. Caryopsis crustaceous or coriaceous, long-beaked.

Spikelets very densely flowered, the rachilla very short or reduced, 12-14 lines long in dense terminal heads.

C. PALLIDUM, Munr. (p. 139). Patkaye Range (Ava) at 5000 feet.

Spikelets glabrous.

Spikelets ½ inch long, white-pilose, rarely pubescent; in dense clusters, forming interrupted spikes or panicles.

Stigmas white.

C. PERGRACILE, Munr. (p. 141). Pegu and Tenasserim.

Hti-wā.

Shoot-sheaths very short, black, from dense appressed bristles. Auricles large, stipose-fringed. Anthers purple.

C. FLAVESCENS, Kurz. Pegu.

Shoot-sheaths appressed, white-setose. Auricles large, long-fringed, one bent downwards, the other upwards. Anthers pale yellow.

C. (MELOCANNA) VIRGATUM, Munr. (p. 133). Mo-goung.

Spikelets pilose, glabrescent. Anthers yellow. Stigmas purple.

Spikelets glabrous, lary, and sometimes almost remotely flowered, the rachillæ more or less elongate. Auricles more or less elongate, long, white-fringed.

C. SCHIZOSTACHYOIDES, Kz. Tree forests of South Andaman.

Spikelets cylindrical, $\frac{1}{2}$ inch long. Inner palea smooth. Anthers purple. Stigmas white.

C. (TEINOSTACHYUM) GRIFFITHII, Munr. (p. 143). Chittagong and Wallaboon forests (Upper Burma).

Spikelets almost pedicelled, 2-3 lines long, almost remotely 7-8-flowered. Inner palea on the keels at apex, whitish-ciliate. Anthers yellow.

Caryopsis the size of a wood apple, irregular, globular.

PSEUDOSTACHYUM, Munr.

Inner palea deplanate, and boat-shaped. Caryopsis very large, globular, the pericarp thin and coriaceous. Seed large, mealy-fleshy.

Large semi scandent tufted bamboos, which die off after flowering.

C. COMPACTIFLORUM, Kz. Hills East of Toung-ngoo at above 4000 feet.

Culms very strong, shoot-sheaths quite smooth. Auricles lunate, reflexed, stiff-fringed. Ligule very narrow, entire. Spikelets 2-2 $\frac{1}{2}$ lines long, clustered. Caryopsis irregular, globose. The size of a wood-apple (*Feronia*). Anthers yellow. Stigmas white.

P. (BAMBUSA) HELFERI, Munr. (p. 114). The Pegu Range and Martaban up to 3000 feet.

Culms very hollow, and weak. Shoot-sheaths minutely white-setose. Auricles very small, long-fringed. Ligule conspicuous, 2-4 lines long, fringed.

Inner palea concave or convolute. Caryopsis very large, thick-fleshy, acuminate-beaked.

MELOCANNA, Trinius.

Inner palea convolute. Stamens 6. Bamboos with very large fruits and uni-lateral spikelets in panicles.¹

M. HUMILIS, Kurz. Arakan and Pegu.

Low bamboos, 8-20 feet high. Leaves roughish, pubescent beneath.

M. (BAMBUSA) BACCIFERA, Roxb. (p. 132). Chittagong Hills and Tenasserim.

M. bambusoides, Trin.

An arboreal bamboo 50 to 70 feet high. Leaves quite glabrous. Caryopsis ovate, the size of a guava or small pear. This is, I think, the Bamboo I found covering large areas in the Arakan Range. When I observed it, the fruit was formed, and pretty closely resembled a green guava, and internally was rather harder than a potato. This bamboo was reported by the natives to flower every 30 years. I again crossed this bamboo tract with some difficulty as it was on fire, and it was ticklish sort of work threading the lanes of crackling bamboos, as in places the heat and smoke were terrific; indeed I only got through with a few personal servants, my coolies, being more heavily laden, were cut off and separated from me till the next day, by what, ere they arrived at the

¹ Kurz remarks: "*Melocanna* a *Schizostachyo* differt caryopsidis epicarpio crasse carnosio et perigyinii absentia."—J.A.S.B. 11. 1873, p. 252.

spot, was a veritable wall of fire, blocking all progress. The appearance a few days after of the ground was curious in the extreme. The entire face of the hills had been clean swept, and save an occasional smouldering stump, the ground where a dense forest had previously stood, was as bare as a fallow field in winter, the white ashes simulating with most weird effect a thick fall of snow. The next rainy season would see the ground covered with a dense growth of young Bamboos, and then for 30 years or so (if the natives may be credited) no such scene will be re-enacted, till the next dying-off of the Bamboo forest. Such a spectacle is of course only presented where the whole forest consists of Bamboos, as was the case in this particular area.

M. KURZ, Munr. (p. 134).

Andamans.

This species is not recognized by Kurz, and may be therefore synonymous with some other.

Caryopsis rather small, dry and coriaceous.

DINOCILLOA, Buse.

Inner palea concave, short. Caryopsis terete, ovate, acuminate.

Climbing Bamboos.

D. ANDAMANICA, Kz. (p. 153). Tree forests of South Andaman.

D. Tjangkorreh, Buse, apud Munro.

Spikelets in a dried state straw-coloured, hardly a line long. Shoot-sheaths fugaceously white-setulose, not auricled, and narrowed towards the mouth.

Kurz remarks: "*D. Tjangkorreh affinis, sed spiculis multo minoribus pallidis, (nec brunneis), filiis multo majoribus et ligulâ vaginalium differt. Specimina ex insulis Philippinis valvulâ interiore ciliatâ gaudentia, et a el Munro cum D. Tjangkorreh conjuncta, mihi est species nova, et etsi eam non vidi D. ciliatum nomino.*"—Kurz, J.A.S.B. II. 1873, p. 253.

D. (BAMBUSA) MACCLELLANDII, Muuro (p. 114). Chittagong and Eastern slopes of the Pegu Range, and Martaban.

Shoot-sheaths fugaceously silvery, not narrowed upwards, at the mouth thickened and polished green.

In Burma, as in most tropical countries, the bamboo is in great demand, and to the mass of the people is invaluable. Of bamboo alone a complete and comfortable house, absolutely proof against the tropical downpour of rain, can be erected, in a space of time that is incredibly short to those who have not witnessed the facility with which a Burman or Karen handles his 'dah,' or heavy knife, when working on such congenial material as bamboo. A roof made of large bamboos split in half and laid over and under, like tiles, is absolutely waterproof, should the days of Deucalion (as a Burmese mousoon sometimes seems to threaten) return. The drawback, however, of bamboo as a house material is, that it lasts but a few years, and is of course simply swept away by fire; but to a native of a country abounding in bamboos, from which in three days he can reconstruct his dwelling, this is a trifle. In cities, however, the use of bamboo in building is properly discouraged. Other every-day uses are scaffolding, bridging, fencing, and decoration, carts, boats, fittings, matting, and domestic utensils, and a variety of industrial and economic purposes too numerous to detail. A fine mat of split bamboo forms the basis of the exquisite Burma boxes, the one industrial speciality of Upper Burma. The young shoots of bamboo are edible and pickled by the Chinese, whilst the softer wooded species yield a highly promising material for the manufacture of paper. Silica is contained in large quantity in both the leaves and stem of bamboos, and is held in solution in the fluid contained in the growing stems of many species. This fluid is often limpid, and a grateful drink when no other water is procurable in the forest, but as it dries up it becomes milky, and finally deposits a cake of gelatinous opaline silica, at the bottom of the joint, known as 'tabasheer,' possessing curious optical properties. These little disks of 'tabasheer' may often be picked up in a bamboo forest, after

the bamboo which yielded it has decayed; and when a bamboo forest has been destroyed by fire, these white calvined disks form quite a noticeable feature of the ground, especially when a shower of rain has removed the white pulverulent ash.

Among other uses to which the bamboo is applied in Burma, not the least useful is that of producing fire by friction. For this purpose a joint of thoroughly dry bamboo is selected, about one and a half or two inches in diameter, and this joint is then split in halves. A ball is now prepared by scraping off shavings from a perfectly dry bamboo, and this ball being placed on some firm support, as a fallen log or piece of rock, one of the above halves is held by its ends firmly down on it, so that the ball of soft fibre is pressed with some force against its inner or concave surface. Another man now takes a piece of bamboo a foot long or less, and shaped with a blunt edge something like a paper-knife, and commences a sawing motion backwards and forwards across the horizontal piece of bamboo, and just over the spot where the ball of soft fibres is held. The motion is slow at first, and by degrees a groove is formed, which soon deepens, as the motion increases in quickness. Soon smoke arises, and the motion is now made as rapid as possible, and by the time the bamboo is cut through, not only smoke, but sparks are seen, which soon ignite the materials of which the ball beneath is composed. The first tender spark is now carefully blown, and when well alight the ball is withdrawn, and leaves and other inflammable materials heaped over it, and a fire secured.

This is the only method that I am aware of for procuring fire by friction in Burma; but on the hills and out-of-the-way parts, that philosophical toy, the 'pyrophorus,' is still in use. This consists¹ of a short joint of a thick woody bamboo, neatly cut, which forms a cylinder. At the bottom of this, a bit of tinder is placed, and a tightly-fitting piston inserted composed of some hard wood. The tube being now held in one hand or firmly supported, the piston is driven violently down on the timber by a smart blow from the hand, with the result of igniting the tinder beneath.

CENTOTHECA, *Desaux.*

C. LAPPACEA, R. and S.

Kamorta. Katchall. Trice and Track (K.).

ERAGROSTIS, *Palisot de Beauvois.*

Spikelets several-flowered, flattened, awnless, numerous, in a spreading or compact panicle. *Glumes* keeled, very regularly distichous, obtuse or pointed, but not awned, the 2 outer empty ones not longer, and often one or both smaller than the others. *Paleas* prominently 2-ribbed, often persistent after the glumes have fallen. *Axis* of the spikelet not hairy, and very rarely articulate.

E. (POA) UNIOLOIDES, Retz.	Kamorta (K.) (scarce). Ceylon.
<i>E. amabilis</i> , Wight and Arnott.	India. S. China.
E. ZEYLANICA, Nees.	Kamorta (K.) (common). Ceylon. India. S. China.
E. PLUMOSA, Link.	Katchall. Great Nicobar (K.). S. China. Ceylon.
<i>Poa amabilis</i> , L.	
<i>P. viscosa</i> , Kth.	
E. (POA) NUTANS, Retz.	Bengal. Ceylon.
<i>Poa Koenigii</i> , Kth.	
E. (POA) TENELLA, L.	Bengal. S. China.
<i>E. tenuissima</i> , Schrad.	
<i>E. aurea</i> , Steud.	
<i>E. verticillatus</i> , Nees.	
E. (POA) PILOSA, L.	India. S. China.
<i>E. verticillata</i> , Cab.	
E. BROWNEI, Nees.	

¹ It is also made of a solid cylinder of Buffaloes' horn, with a central hollow of three-sixteenths of an inch in diameter and three inches deep burnt in it. The piston, which fits very tightly in it, is made of iron-wood or some wood equally hard.

Poa polymorpha, Br.Perhaps a var. of *E. orientalis*, Trin.

E. (POA) DIARRHENA, R. et Schl.	India.
E. (POA) ELEGANTULA, Kth.	Bengal.
E. (POA) ROXBURGHIANA, Schultz.	Bengal.
E. (POA) PUNCTATA, L.	Bengal.
E. (POA) CYNOSUROIDES, Retz.	Bengal.

The Kusa grass, sacred to Siva, and which plays so important a part in the observances and sacrifices of the Hindus.

CÆLACHNE, *R. Browne*.

Spikelets 2-flowered, awnless, small and numerous, in a contorted panicle. The upper flower unisexual, usually female; the lower hermaphrodite. *Glumes* very concave and obtuse, the 2 outer empty ones smaller than the flowering ones. *Palea* rather smaller, 2-nerved. *Axis* of the panicle not hairy.

C. PULCHILLA, Br.	Tavoy. India. Ceylon. S. China.
<i>Panicum simpliciusculum</i> , W. et. A.	

LOPHATHERUM, *Brongniart*.

Spikelets 1-flowered, sessile on alternate sides of the simple branches of a panicle. *Glumes* keeled, green, with scarious edges, 2 outer empty ones obtuse or slightly pointed, the third or flowering one similar, but with a short stiff awn, and several smaller empty ones, with short awns terminating the axis. *Palea* transparent, folded, with 2 prominent green ribs. *Caryopsis* free.

L. GRACILE, Brong.	India. Ceylon. S. China.
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AVENIEÆ.

Spikelets all fertile, pedicelled or sub-sessile, in a branched spreading or spicate panicle, more rarely in a raceme or spike; 2, many flowered, the upper or lower flower often male or rudimentary. *Glumes* large, sub-equal or unequal, usually completely embracing the flowers. *Glumelles* membranous or somewhat coriaceous, the lower usually awned. *Awn* usually dorsal, geniculate and bent below. *Lower glumelle* of the flower at the base of the spikelet, answering to the lower glume. *Stamens* 3, rarely 2. *Stigmas* sessile, or sub-sessile, divergent, protruding from the side of the flower. *Caryopsis* with a linear or punctiform hilary spot.

ERIACHNE, *Nees von Essenbeck*.

E. CHINENSIS, Hance.	Kamorta, abundant (K.)
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CHLORIDIEÆ.

Spikelets all fertile, in unilateral digitate or paniced spikes, sessile on the inner face of a continuous rachis, laterally compressed, sometimes with several flowers, the 1 to 3 lowest hermaphrodite, the upper rudimentary, sometimes only one hermaphrodite flower, with or without the rudiment of a second. *Glumes* unequal, shorter than the flowers. *Glumelles* membranous, the lower answering to the lower glume. *Stamens* 3. *Stigmas* usually elongate, erect, protruding near the top or above the middle of the flower. *Caryopsis* with a punctiform hilary spot.

CYNODON, *Persoon*.

Spikelets 1-flowered, awnless, singly sessile in 2 rows on one side of the slender spike-like, almost digitate branches of a simple panicle. Outer empty glumes 2-keeled. Flowering glume thinner and broader. *Palea* narrower, folded, with a small bristle at its base, being the prolongation of the axis, and sometimes bearing a rudimentary glume.

C. (PANICUM) DACTYLON.	Burma, Kamorta (K.).
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The Dub grass of Bengal and Northern India.

This grass is found in England, where it is called the 'dog's-tooth grass,' and is held in little esteem. In India, however, despite its somewhat dry and uninviting look, when grubbed up as is the fashion by the roots, it is the best grass for horses usually procurable, and such is its tenacity of life that it is not easily extirpated, though the grass-cutters are really in this instance 'grass-rooters,' grubbing up any and every particle of the plant that appears above the soil, and the roots as well. The resulting heap of bits is now well beaten by a stick to free the roots from the earth which adheres to them, and in this state, or better still after being well rinsed in water (though this is unusual), horses and cattle devour it greedily and thrive well on it.

DACTYLOCTENIUM, *Willdenow.*

Spikelets 2 or more flowered, very flat and closely imbricated along one side of the spike-like digitate branches of a simple panicle. *Glumes* spreading, keeled and compressed, transparent but stiff, the lowest smaller, the second shortly awned, the flowering ones gradually smaller and less pointed, the terminal one usually barren or rudimentary. *Palea* smaller, folded.

D. ÆGYPTIACUM, Willd.

Kamorta (K.). India. S. China.

ELEUSINE, *Gaertner.*

Spikelets 2 or more flowered, awnless, sessile, in 2 rows along one side of the spike-like, almost digitate branches of a simple panicle. *Glumes* keeled, usually obtuse, the 2 outer empty ones unequal, and shorter than the flowering ones. *Paleas* rather small, folded. *Axis* usually slightly continued beyond the last one. *Seed* transversely wrinkled.

E. INDICA, Gaert.

Kamorta and Katchall (K.).

Hsen-ngo-myit.

India, S. China.

E. STRICTA, Roxb.

E. CALCYNA, Roxb.

Coromandel.

CHLORIS, *Linnaeus.*

Spikelets with 1 or rarely 2 fertile flowers, and 1 or more empty or rudimentary glumes above it, singly sessile on one side of the spike-like digitate branches of a simple panicle. *Glumes* keeled, 2 outer empty ones pointed or shortly awned, the others usually awned, or the upper empty ones awnless. *Caryopsis* free.

C. BARBATA, Sw.

India. Bengal. S. China.

MICROCHLOA, *R. Browne.*

Spikelets 1-flowered, awnless, singly sessile on one side of a slender simple spike. *Outer glumes* 2, nearly equal, the lowest with a double nerve, the second keeled. *Flowering glume* and *palea* small, very thin, and transparent.

M. SETACEA, Br.

India. S. China.

ARACHNE.

A. VERTICELLATA, W. et A.

India.

LEPTOCHLOA, *Palisot de Beauvois.*

Spikelets 2 or more flowered, awnless, sessile or very shortly pedicellate, along one side of the slender or spike-like branches of a long panicle. *Glumes* keeled, pointed or obtuse, the two outer ones empty, the axis ending in a short pedicle above the last flower, bearing sometimes a rudimentary glume.

L. CHINENSIS, Nees.

India. Burma. S. China.

ARUNDINIEÆ.

Spikelets all fertile, in a branched or spicate panicle, sometimes with 1 hermaphrodite flower, with or without the pedicelled rudiment of an upper flower; sometimes many-

flowered. *Glumes* equalling or longer than the flowers. *Glumelles* usually surrounded at the base with long hairs, membrano-herbaceous, as are the glumes, the lower awned, or mucicous, and facing the lower glume. *Stamens* 3 or rarely 2. *Stigmas* sessile or sub-sessile, protruding from the sides or towards the base of the spikelet. *Caryopsis* with a punctiform or linear hilary spot.

ARUNDO, *Linnaeus*.

Spikelets 2 or more flowered, with long silky hairs on the axis and flowering glumes, all pedicellate in a large much-branched panicle. *Glumes* thin, keeled, distichous, and distant, 2 outer ones empty, the flowering ones as long or rather longer, pointed or shortly awned, the terminal one small, empty or rudimental. *Palea* small. Tall reeds.

A. MADAGASCARIENSIS, Kth. India. S. China. Philippines.

PHRAGMITES, *Trinius*.

Characters of *Arundo*, only no silky hairs on the glumes, and the lowest flower is usually male.

P. (ARUNDO) ROXBURGHII, Kth. Kamorta. Kar Nicobar (K.). Ceylon.
A. karka, Roxb.
P. Nepalensis, Nees.

AMPHIDONAX, *Nees von Essenbeck*.

A. BENGALENSIS, Nees.

A. BIFARIA, Lind.

Mason gives the following vernacular names for species of *Phragmites* (*Arundo*), though observing that the same names are sometimes applied to species of *Saccharum* also: Phoung. Pyu. Kyu. Lai. A-lo-kyu.

STIPEÆ.

Spikelets all fertile, sub-cylindric or compressed, in panicles containing one hermaphrodite flower. *Glumes* subequal or unequal, equalling or longer than the flower. *Glumelles*, when ripe, coriaceous, the lower answering to the lower glume, often convolute, awned at the tip. *Awn* simple or trifid, rarely mucicous. *Stamens* 3. *Stigmas* protruding laterally, towards the base of the spikelet. *Caryopsis* with a linear hilary spot; towards its middle or near its top.

CILETARIA.

C. HYSTRIX, Beauv. India.

ARISTIDA, *Linnaeus*.

A. sp. (M.)

AGROSTIDIEÆ.

Spikelets all fertile, more or less laterally compressed in a branched or spiked panicle, with a single hermaphrodite flower, rarely accompanied by the pedicelled rudiment of a second upper flower. *Glumes* subequal or unequal, usually longer than the flower. *Glumelles* and glumes between chartaceous and herbaceous, the lower mucicous or aristate. *Awn* usually dorsal and facing the lower glume. *Stamens* 3, rarely 1 or 2. *Stigmas* usually sessile, protruding laterally at the base of the spikelet.

SPOROBOLUS, *R. Broune*.

Spikelets small, 1-flowered, awnless, in a loose spreading, or rarely spike-like panicle. *Outer glumes* 2, keeled, one or both usually shorter and never longer than the acute flowering glume. *Palea* nearly as long, usually 2-nerved. *Caryopsis* free, short, deciduous, the seed separating from the thin pericarp.

S. sp. (*vide* *Diedrichsen*). Nicobars (K.).
 S. DIANDER, Beauv. Bengal.
 S. INDICUS, Br. S. China.

PHALARIDIEÆ.

Spikelets hermaphrodite, monœcious, or polygamous, in a spicate panicle, or in spikes with 2 flowers, hemaphrodite, female or male, or with 2 or 3 flowers, the upper only fertile. Glumes usually equal. Glumelles more or less hardened after flowering. Lower glumelles of the fertile flower facing the lower glume. Stamens 3 or 2. Caryopsis with a linear or punctiform spot. Stigmas long or filiform, protruding at the top or sides of the flower.

ZEA.

* Z. MAYS.

Pyoung-bi. Maize. Indian Corn.

COIX, *Linnaeus*.

C. LACRYMA, L.

Burma. Ceylon.

Job's tears.

Dr. Mason enumerates several vernacular names for species of *Coix*: Ka-le-thi. Ka-le-pouk-pouk. Ka-le-hmen. Ka-le-shi. Ka-le-theing. And in *Sgau Karen*, Ben-wai-thu.

The *Coix* affords a good example of the results of cultivation on a wild plant, the seed of which is of a stony hardness, but which is soft in the cultivated form and the kernel sweet. It is much cultivated by the Red Karens, and may be often seen for sale parched in the bazaars. Dr. Mason adds: "The Karens in the Southern Provinces cultivate one or two species of Job's tears for the seed. The Pwos plant a species with round seeds, which are used to ornament the borders of their tunics, but they are never seen on a woman's gown. The Sgaus on the contrary cultivate a species bearing an oval seed and use them merely for embroidering female dresses. In Amherst Province, the Pwos seldom appear in their native costume, and many deny that their tribe ever had any other than that which they now wear, which is Burmese."

C. GIGANTEA, Kon.

Bengal.

C. AQUATICA, Roxb.

Bengal (Srirampur).

C. HETEROCLITA, Roxb.

Bengal (Srirampur).

CHIONACHNE, *R. Browne*.

C. (COIX) KOENIGII, Spreng.

India. Ceylon.

Coix barbata, Roxb.

ORYZIEÆ.

Spikelets all fertile, in a raceme or panicle, one-flowered, often with arrested glumes, or 2 or 3-flowered, the lower neuter, with 1 glumelle, the terminal only fertile. Glumelles chartaceous, stiff. Stamens usually 6, often 3 or 4, rarely 1. Caryopsis with a linear hilary spot. Stigma divergent, protruding at the sides of the flower.

ORYZA, *Linnaeus*.

* O. SATIVA, L.

Sa-bā. Rice.

"Rice (Dr. Mason remarks) is universally cultivated, and its cultivation has produced many varieties. The Karens have distinctive names for more than forty, and Karen mountain rice is preferred by many to that which is raised by the Burmese on the low lands, yet it is said not to be so nutritious, and on this account bears a less price in the Bazaar. It is of all colours, from ivory-white to coal-black. Of the black rice the Karens prepare a kind of bread, which to them supplies the place of gingerbread. A portion of scathed rice is poured into a large mortar with a prodigious quantity of sesamum seeds. Two women then take their strong ebony pestles and pound it, striking alternately till it becomes a light-bounding mass. It is then thrown upon the eating stand, when the whole family seat themselves round it, in Oriental style, and dissever it with their sabres.

“The Karens have another mode of preparing this kind of rice, which is particularly convenient for travellers. A quantity unboiled is thrust into joints of a small bamboo, a little water added, and the orifice closed up. It is then roasted, and if eaten with butter and salt is most delicious. The Karens select only two varieties of Bamboo for this purpose, and these impart to the rice a sweet delicate flavour.”

The Burmese adopt a similar plan with other sorts of rice. The dry rice and a little water is put into the joint of a bamboo, which when plugged is then set on a large fire. The rice in cooking swells, and when cold, the bamboo is broken away and a solid cylinder of cooked rice extracted like a sausage, which is frequently carried, as a convenient form, on a journey.

Rice can be sown broadcast in inundated fields, but the more common plan is to transplant it when some six inches high. For this purpose the seed is sown very thickly in nurseries, from which it is removed, and hand planted in the mud of the prepared field root by root. In the hills the Karens, however, raise rice just as other grains are raised, by dibbling the seeds in holes made with a spud, and as this mode of cultivation is commonly practised on the virgin soil of a hill clearing, well manured with the ashes of the burnt forest, the yield is very abundant.

Rice contains a much less per-centage of nitrogenous compounds than wheat and many other cereals; hence rice flour is certainly not so well adapted for infants' food as the flour of other cereals, and particularly that known as entire wheat flour, which is richer in phosphates than ordinary flour. At the same time rice flour has some recommendations, as, from its translucent gelatinous appearance when cooked, it is extremely well adapted for pretty and ornamental dishes like blanchmange and puddings. Whoever has travelled in Ceylon will doubtless recall to mind the transparent ‘hoppers’ or white gelatinous pancakes made of rice flour, and will at once recognize the familiar rice flour in many of the well-puffed ‘Corn flours,’ which the public are urged to consume. Many may have seen the denunciatory advertisements of rival ‘Corn flours.’ “*Rice flour is not corn flour;*” “*Rice flour is corn flour,*” which forces one to question if wholesale equivocation does not pay better than simple truth. Of course, if by ‘corn,’ we mean cereals in general, then the flour of Rice or Maize is corn flour; but if, as most English people understand the word, ‘corn’ is used to signify wheat (when not otherwise specified), then I fear greatly that many vaunted Corn flours have small claim to the title which they bear. Let every one judge for himself. If a corn flour, when mixed into a thin paste and cooked on a ‘griddle’ like a Ceylon ‘hopper,’ which we know is made of rice flour, produces an article identical in appearance, we shall not be far wrong in the conclusions we draw from the experiment, the more so if we compare the article in question with the similar one made of what we know to be genuine flour of wheat. By all means therefore let careful parents make as much blanchmange and puddings as they choose of ‘Corn flour,’ but see that their children are fed on the flour of wheat.

For an interesting account of the various legends and superstitions connected with rice, consult ‘*Mythologie des Plantes,*’ by Angelo de Gubernatis, who remarks: “Le riz joue, dans les croyances populaires orientales, à peu près le même rôle que le blé dans la tradition européenne: il est essentiellement un symbole de vie, de génération, d’abondance.”—II. p. 311. A familiar example of the use of rice, as a symbol, is where in modern weddings it is showered over the bride, as a token of the fruitfulness her friends hope she will display. This custom of throwing grain over a bride is very old, and is alluded to in the curious ballad of the ‘Wedding of the Cid,’ translated by Lockhart—

“Then comes the bride Ximena, the King he holds her hand;
And the Queen, and, all in fur and pall, the nobles of the land;
All down the street, the ears of wheat are round Ximena flying,
But the King lifts off her bosom sweet, whatever there is lying.”

It may, however, be questioned if all our modern fine ladies who join in the fun of rice-throwing, fully comprehend the meaning and significance of their own act.

HYGRORYZA, *Nees von Esenbeck.*

- H. (LEERSIA) ARISTATA, Roxb. India. Ceylon.
Potamochoila Retzii, Griff.
 H. CILITIA, Nees.

PANTICIEÆ.

Spikelets all fertile in a spicate, or branched, sometimes digitate panicle composed of an upper hermaphrodite and a lesser male or neuter flower. Glume, the lower smaller than the upper, often minute or arrested. Glumelles usually cartilaginous, shining. Lower glumelle as in Andropogoneæ. Stamens 3. Caryopsis with a punctiform hilary spot. Stigmas as in Andropogoneæ.

PANICUM,¹ *Linnaeus.*

Spikelets usually small, 1-flowered, or with a second male flower below it, awnless or rarely awned, either along one side of the simple branches of a panicle, or in a loose branching or close and spike-like panicle. Glumes always 4, the lowest small, sometimes very minute and empty, the next usually larger and always empty, the third empty, or with an imperfect or male flower, in its axis, the innermost or flowering glume of a firmer texture, smoother and more faintly 3-nerved. Palea like the flowering glume, but smaller, and more or less 2-nerved. Caryopsis inclosed in the hardened flowering glume and palea.

* P. JUMENTOSUM, Pers. (M.). Cultivated.

Nan-ka-than-hau. Guinea grass.

An excellent and luxuriant fodder, but which requires constant watering, and when well weeded and kept, may be cut every two months, or even more frequently. It is easily propagated, and thrives best when planted in tufts a couple of feet apart. When cut, the stalks should be left about 9 inches long.

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| P. GLAUCUM, L. | Kamorta (K.). Ceylon. S. China. |
| P. COLONUM, L. | Kamorta (K.). Ceylon. |
| P. JAVANICUM, Pers. | Kar Nicobar (K.). Ceylon. |
| <i>Urochloa panicoides</i> , Beauv. | |
| P. HUMILE, Nees. | Kamorta (K.). Ceylon. |
| P. SANGUINALE, L. | Maulmain (P.). Ceylon. |
| <i>Ægyptiacum</i> , Retz. | |
| P. BELOPUS, Trin. | Bengal. Ceylon. S. China. |
| <i>Urochloa pubescens</i> , Kth. | |
| P. COMPOSITUM, L. | Kamorta. Katchall (K.). Ceylon. S. China. |
| P. LANCEOLATUM, Kth. | Bengal. |
| P. BURMANI, Retz. | Bengal. Ceylon. |
| P. FRUMENTACEUM, Roxb. | Bengal. |
| P. STRICTUM, Schultz. | Bengal. |
| P. CRUS-GALLI, L. | India. Ceylon. S. China. |
| <i>O. stagninum</i> , Kth. | |
| var. β. <i>P. colonum</i> , L. | |
| P. DISTACHYUM, L. | India. S. China. |
| P. SARMENTOSUM, Roxb. | Assam. China. Philippines. |
| P. MONTANUM, Roxb. | India. Burma. China. Philippines. |
| P. OVALIFOLIUM, Pers. | S. China. India. |
| P. CURVATUM, L. | Ceylon. |
| P. COMMUTATUM, Nees. | Bengal. S. China. |
| P. CORYMBOSUM, Roxb. | Coromandel. |
| P. REPENS, L. | Bengal. Ceylon. S. China. |
| <i>P. paludosum</i> , Roxb. | |
| <i>P. ischamoides</i> , Retz. | |

¹ Digitaria, *Juss.* Ophimcnus, *Beauv.* Setaria, *Beauv.*

P. FLUITANS, Retz.	Bengal. Ceylon.
<i>P. affine</i> , Nees.	
P. BRIZOIDES, L.	Bengal. Ceylon.
<i>P. flavidum</i> , Retz.	
P. HISPIDULUM, Retz.	Bengal.
P. HELVOLUM, L.	Bengal.
P. INTERRUPTUM, Willd.	Bengal. Ceylon.
P. MILIACEUM, L.	Ceylon.
<i>P. miliare</i> , Lam.	
P. Plicatum, Lam.	Ceylon. S. China.
<i>P. Nepalense</i> , Spreng.	
<i>P. costatum</i> , Roxb.	
P. EXCURENS, Trin.	S. China. Himalayas.
P. TRIGONUM, Retz.	Kamorta and Pulu Milu (K.).
<i>P. radicans</i> , Retz.	
<i>P. filipes</i> , Nees.	
P. NODOSUM, Kth.	India. Ceylon. S. China.
<i>P. Arnottianum</i> .	
P. TOMENTOSUM, Roxb.	
P. UGINOSUM, Roxb.	
P. MYURUS, Lam.	India. Ceylon.
<i>P. serrulatum</i> , Roxb.	
Thwaites remarks: "I can find no sufficient specific difference between the Ceylon plant and a specimen of <i>P. myurus</i> from Guiana."	
P. INDICUM, L.	China. Ceylon.
<i>P. angustum</i> , Trin.	
<i>P. contractum</i> , Nees.	
P. BARBATUM, Kth.	India. S. China.

PASPALUM, *Linnaeus*.

Spikelets 1-flowered, not awned, not callous at the base, solitary, or in pairs, along one side of slender spikes, either forming the branches of a simple panicle, or rarely solitary. *Outer glumes* 2, both empty. *Flowering glume* concave, of a firmer texture. *Palea* like the flowering glume, but smaller, and usually 2-nerved. *Caryopsis* inclosed in the hardened palea and flowering glume.

P. BREVIFOLIUM, Flügge.	India. S. China.
<i>Chinense</i> , Nees.	
P. SCROBICULATUM, L.	Kamorta (K.). Ceylon. S. China.
<i>P. Kora</i> , Willd.	
<i>P. orbiculare</i> , Forst.	
P. FLEXUOSUM, Klein.	Kamorta (K.).
P. CONJUGATUM, Retz.	Kamorta (K.).
P. FILIFORME, Roxb.	Kamorta. Katchall (K.). Ceylon.
<i>P. filiculme</i> , Nees MS.	

Kurz refers this species to *Digitaria*, J.A.S.B. II. 1876, p. 160.

THYSSANOLENA, *Nees von Esserbeck*.

Spikelets 1-flowered, minute, awnless, crowded along the slender branches of a large panicle. *Glumes* 4, the 2 outer empty, and very short, the third also empty, but much longer and more pointed; the flowering glume rather smaller and thinner, with a very small point, and edged with long spreading hairs.

T. ACARIFERA, Nees.	Kamorta. Nankowry. Kar Nicobar (K.).
<i>Melica latifolia</i> , Roxb.	S. China. Himalayas.
<i>Agrostis maxima</i> , Roxb.	

ISACHNE, *R. Brongn.*

Spikelets 2-flowered, the upper flower female, or rarely hermaphrodite, the lower male, or sometimes hermaphrodite, and both articulate on the rachis. *Outer empty glumes* 2, nearly equal and often very deciduous. Both the flowering glumes, as well as the palea, of a firmer consistence than the outer ones, all awnless. *Caryopsis* inclosed in the glumes and palea, as in *Panicum*, but very frequently those of both flowers obtain maturity.

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| I. PULCHELLA, Roth. | Burma. India. Ceylon. China. |
| I. MYOSOTIS, Nees. | Kamorta. West of Enaca (K.). |
| I. AUSTRALIS, R. Br. | Ceylon. |
| <i>I. miliacea</i> , Auct. (non Roth?) | |
| <i>T. Batavicum</i> and <i>Benjamini</i> , Steud. | |
| var. <i>humilis</i> . | Kamorta (K.). |
| I. PULCHELLA, Roth. | India. Silhet. Ceylon. S. China. |

THOUAREA, *Persoon.*

Spikelets in short one-sided androgynous spikes, in the axil of a sheathing bract. Upper spikelets with 2 male flowers, lower one with a terminal hermaphrodite and lower male flower, and all with only one outer empty glume.

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| T. SARMENTOSA, Pers. | Beaches on West coast of Katchall (K.). |
| <i>Ornithocephalochloa arenicola</i> , Kz. | Ceylon. China. |

SPINIFEX, *Linnaeus.*

Spikelets diœcious, sessile, awnless. Barren ones in spikes, each one with 2 male flowers, and 2 outer empty glumes. Fertile spikelets solitary, with 2 outer empty glumes, the third empty, or with a male flower, the terminal one with a hermaphrodite flower. *Spikes* in the male plants, and single flowers in the fertile ones, collected in dense globular clusters, intermixed with long, stiff, often prickly bracts.

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| S. SQUARROSUM, L. | Sandy shores of Burma and China. |
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Of this plant Dr. Mason remarks: "The sea pink or ground rattan is one of the most curious grasses in the country. It may be seen on all the sandy beaches, but more particularly at Moumagon, where it covers the sands with its creeping stems and spiny leaves, and its loose umbels running about like things of life. The male spikes congested into an umbel (says Dr. Cleghorn) are carried by the wind to the female flowers, which are fasciated on a distinct plant, and being light and spherical, the Dutch call them 'wind-ball.' Rumphius alludes to this plant, as being connected with a superstition among the natives, who seeing the *capitula* (umbels) carried along the shore by the sea-breeze, think they are propelled by the Devil. This grass is cultivated on the sea-beach at Madras for the sake of its sand-binding properties and for its tendency to increase the land."

According to Dr. Mason the Burmese books recognize seven kinds of *Sabā* or cereals, in which however they include beans. They are Rice (*Sabā*), Wheat (*Gyungsa-bā*), Barley (*Mu-yau*), Millet (*Pyoung-leh-kouk*), Paspalum (*Lu*), Sorghum (*Pyoung*), and Peas and Beans (*Peh*).

ANDROPOGONIÆ.

Spikelets geminate or in threes, polygamous, the lateral male or neuter, very rarely all fertile. Fertile spikelets composed of a hermaphrodite flower with a lower male flower. *Glumes* subequal, or rarely unequal, the lowest largest. *Glumelles* membranous, rarely cartilaginous, lower glumelle of the hermaphrodite flower facing the upper glume. *Stamens* 3. *Caryopsis* with a punctiform hilary spot. *Stigmas* long, protruding at or under the top of the flower.

ANDROPOGON, *Linnaeus.*

Spikelets 1-flowered, in pairs, 1 sessile, the other pedicellate, on a simple spike or along the spike-like branches of a simple or compound panicle, the rachis articulate at

each pair, and at the terminal article 2 pedicellate spikelets, one on each side of the sessile one. *Sessile spikelets* hermaphrodite, the lowest glume stiff, with 2 of the lateral nerves most prominent, the second keeled, third empty glume very thin and transparent. *Flowering glume* small and transparent, with a long twisted awn. *Palea* very small and thin, or none. *Caryopsis* inclosed in the outer glumes.

* <i>A. MURICATUS</i> , Retz. (M.).	Burma. Ceylon. India.
Pan-yen.	The Khus Khus grass of India.
* <i>A. ESCULENTUS</i> , MacClell. (M.).	Burma.
Sa-ba-len.	
<i>A. MARTINI</i> , Roxb.	India. Ceylon. S. China.
<i>A. flexuosus</i> , Nees.	
Yields the Ceylon Lemon-grass oil.	
<i>A. GLABER</i> , Roxb.	Bengal.
<i>A. PERTUSUS</i> , Willd.	Bengal. Ceylon.
<i>A. punctatus</i> , Roxb.	
<i>A. fascicularis</i> , Roxb.	
<i>A. SCANDENS</i> , Roxb.	Bengal.
<i>A. TRISPICATUS</i> , Schultz.	Bengal.
<i>A. BLADHII</i> , Retz.	Bengal.
<i>A. BREVIFOLIUS</i> , Sw.	Silhet. S. China.
<i>A. MONTANUS</i> , Roxb.	India. S. China. Philippines.
<i>A. TROPICUS</i> , Spreng.	India. S. China. Ceylon. Philippines.
<i>A. ROXBURGHIANUS</i> , Schultz.	Bengal.
<i>A. CONJUGATUS</i> , Roxb.	Bengal.

Andropogon Schananthus (a native of Arabia, and the source of the true 'lemon grass oil') is cultivated all over India for the stimulating and scented oil yielded by it. *A. muricatus* affords the fragrant roots of which the screens and tatties are made, which in the hot winds of Upper India so largely contribute to make life endurable to the European settler, the beneficial effects being proportionate to the heat and dryness of the air, so that, although much used in Calcutta, their efficiency and value there is not to be compared with that developed in the parched and drier region of Upper India. Other 'lemon grass oils' are yielded by *A. calamus-aromaticus*, *A. esculentum*, and *A. javanica*, the last furnishing the celebrated *Rosa grass* oil, and the first the grass oil of Nimar. The perfume of these oils is very refreshing, and the oil itself is valuable in rheumatism if well rubbed into the affected part by the palm of the hand, with a little common oil to form a liniment. Ceylon 'lemon oil' is distilled, says Thwaites, from the leaves of a cultivated variety of *A. Martini*, Roxb. Lemon grass cut up small is also used by some people to flavour tea with, and if the tea happens to be musty and poor, it may perhaps improve it by disguising its shortcomings and musty taste.

CHRYSOPOGON, *Trinius*.

Spikelets 1-flowered, narrow-lanceolate, 3-together, terminating the branches of an erect panicle, the central one sessile and hermaphrodite, the 2 lateral ones pedicellate and male. *Glumes* and flowers of *Andropogon*, from which this genus differs in all the spikes being reduced to the terminal article.

<i>C. ACICULATUS</i> , Trin.	Kamorta. Ceylon. India.
<i>Rhaphis trivialis</i> , Lour.	S. China. Philippines.
<i>Andropogon acicularis</i> , Retz.	
<i>A. (Rhaphis) Javanicus</i> , Nees.	

Ngung-myit. Spear-grass.

A coarse grass which cattle will scarcely touch, and one of the most notable pests in India to people who wear clothes or stockings, from the certainty with which its ripe barbs penetrate to the skin, causing distressing irritation, and even sores if

neglected. Corduroy or canvas clothes and leather leggings are the best protection from the annoyance caused by this pestilent plant.

HETEROPOGON, *Persoon.*

Spikelets monœcious, 1-flowered, in pairs, in a simple 1-sided spike, the rachis articulate, at least towards the top. *Female spikelets* sessile, cylindrical, turned to one side of the spike, the outer glume hard and convolute, the second keeled, the third very thin and transparent, the flowering glume reduced to a long, stiff, twisted awn. Palea small or none. *Male spikelets* lanceolate, herbaceous, awnless, imbricate on the other side of the spike on short pedicels. At the base of the spike, the spikelets are often all male or neuter.

- H. (ANDROPOGON) CONTORTUS, L. Kamorta (K.). Ceylon. S. China.
H. hirtus, Pers.
 H. TENELLUS, Schultz. Bengal.

PEROTIS, *Aiton.*

Spikelets 1-flowered in a simple spike-like raceme. *Outer empty glumes* 2, linear, stiff, with terminal awns. *Flowering glume* and *palea* very small, thin, and transparent. *Caryopsis* longer than the flowering glume, inclosed in the two outer ones.

- P. LATIFOLIA, Ait. Ceylon. India. S. China.
P. patula, *longiflora* and *hordciformis*, Nees.
P. glabrata, Steud.

SPODIOPOGON, *Trinius.*

Spikelets in pairs, 1 sessile, the other pedicellate, in simple, branched or paniculate spikes, both 2-flowered, the lower flower male, the rachis angular and articulate, at least at the top. *Outer glumes* stiff, the lowest convex, the second keeled. *Flowering glumes* and *palea* very thin and transparent, the glume of the fertile flower with a twisted awn.

- S. OBLIQUIVALVIS, Nees. Bengal. Ceylon. S. China.
Andropogon malacophyllus, Hochs.
A. Macraei, *Blumei* and *bifidus*, Steud.
Ischæmum geniculatum and *tenellum*, Roxb.

Kurz records a smooth species of *Spodiopogon* from Kar Nicobar, and a villous species from Kamorta, perhaps belonging to the above very variable species.

SCHIZACHYRIUM.

- S. BREVIFOLIUM, Nees. Kamorta (K.).

ISCHÆMUM, *Linnaeus.*

Spikelets in pairs, 1 sessile, 2-flowered, the lowest flower male, the other pedicellate, usually male or rudimentary, in a simple spike, or in the spike-like sessile branches of a simple panicle. The *rachis* articulate, at least towards the top. *Outer glumes* 2, stiff and awnless, the lowest with 2 prominent lateral nerves, the second keeled. *Flowering glumes* and *paleæ* smaller, thin and transparent, all awnless, or the glume of the terminal flower with a twisted awn.

- I. BARBATUM, Retz. China and Archipelago.
Meoschium lodiculare, Nees.
M. Meyenianum, Nees.
 I. MUTICUM, L. Nicobars (K.). Ceylon.
 I. RUGOSUM, Salis. Bengal. Ceylon.
I. segutum, Trin.
Andropogon tong-dong, Steud.

DIMERIA, *R. Browne.*

Spikelets 1-flowered, almost sessile, inserted singly on the alternate notches of slender unilateral spikes, which are either solitary or more frequently 2 or 3 together on a terminal peduncle. *Rachis* not articulate, and a tuft of short hairs under each spikelet. *Outer empty glumes* 2, linear, stiff, keeled, not awned; *third empty glume* smaller, thin and transparent, not awned; *flowering glume* thin and transparent, notched, or 2-lobed, with an intermediate awn, twisted at the base, and bent back at or below the middle. *Palea* minute or none. *Seed* free, but inclosed in the outer glume.

D. FUSCESCENS, Trin.
D. sp.

Nipal. Ceylon. S. China.
Kamorta (K.).

UPLUDA, *Linnaeus.*

Spikelets with 1 fertile and 1 male flower, sessile, between 2 flattened pedicels, bearing each a rudimentary glume, or one of them a perfect spikelet, the whole embraced by a sheathing bract, the bracts clustered on the branches of a leafy panicle. *Lowest glume* of the sessile spikelet concave and striate, the second keeled, transparent but stiff; *flowering glumes* very thin and transparent, the terminal one often awned. In the pedicellate flower both the glumes concave and striate.

A. MUTICA, L.
A. ARISTATA, L.
A. rostrata, Nees.
A. GENCULATA, Roxb.

India. S. China.
Bengal. Ceylon.
Bengal.

ZOYSIA, *Willdenow.*

Spikelets 1-flowered, awnless, nearly sessile in a simple spike, the axis not articulate. *Outer empty glume* 1-keeled, stiff, shortly pointed, the edges often united below round the flower. *Flowering glume* much shorter, thin and transparent. *Palea* very small or none. *Caryopsis* free, but inclosed in the outer glume.

Z. FUNGENS, Willd.
Z. tenuifolia, Willd.
Z. Japonica, Steud.
Z. aristata, Browni, Griffithiana, and seloides, C. Muell.

S. China. Ceylon. Australia.

ANTHISTIRIA, *Linnaeus.*

A. CILIATA, Retz.
A. POLYSTACHYA, Roxb.
A. SCANDENS, Roxb.
A. HETEROCLITA, Roxb.

India. Ceylon.
Bengal.
Bengal.
Bengal. Ceylon.

IMPERATA, *Cyrtilli.*

Spikelets 1-flowered, awnless, mostly pedicellate, in a dense cylindrical spike-like panicle. *Rachis*, not articulate. *Glumes* all thin and transparent, 2 outer empty ones keeled, covered with very long silky hairs, third also empty, smaller, without hairs; *flowering glume* and *palea* still shorter, often jagged at the top. *Caryopsis* free, inclosed in the outer glumes.

I. CYLINDRICA, Beauv. (M.).
Thek-keh-nyen. Thatching grass.
I. ARENDINACEA, Cyr.
I. Koenigii, Beauv.

Kamorta (K.). Ceylon. S. China.

RATZEBURGIA, *Kth.*

R. PULCHERRIMA, Kth. (M.).

Burma.

SORGHUM.

* *S. VULGARE*, Pers. (M.).

Pyoung. Red Jowar of India. Cholam in Tamil.

* *S. SACCHARATUM* (M.).

Valaiti Jowar of India. Deo-dhān of Bengal. Imphee of Natal.

This is one of the most estimable food and fodder plants we have, and when carefully cultivated, a promising source of sugar. One remarkable character it is said to possess is that it is not attacked by white ants, which are so troublesome to the sugar-cane. It is said, too, that this crop is fit to cut in less than four months, after which another will spring from the same roots, in the same time, and occasionally even a third. The yield of sugar per acre is two tons. As a fodder plant it is unsurpassed, and it has been said to yield as much as nine tons of dry fodder per acre. The plant is hardy, and will thrive wherever Maize will grow. In good soil and when well watered, it will run up to 16 feet in height. (See article in Balfour's Cyclopædia of India.)

SACCHARUM, *Linnaus*.

Spikes 1-flowered, awnless, surrounded by long silky hairs, in pairs, both sessile, or 1 pedicellate along the branches of a large panicle. *Rachis* articulate at each pair. 2 outer *empty glumes* keeled, thin but rather stiff. Third *empty glume*, *flowering glume*, and *palea*, all smaller and very thin and transparent.

* *S. OFFICINARUM*, L. (M.).

Cultivated. Unknown wild.

Kyan. Sugar-cane.

* *S. VIOLACEUM*, Tussac. (M.).

Cultivated.

Otaheity cane.

S. SPONTANEUM, L. (M.).

Burma. Kar Nicobar (K.). Ceylon.

S. ægyptiacum, Willd.*S. semidecumbens* and *caudiculatum*, Roxb.

Thek-keh-gyi. Greater thatching grass.

S. PROCERUM, Roxb.

Bengal.

S. CANALICULATUM, Roxb.

Bengal.

S. SARA, Roxb.

Bengal.

Sāra or Sarpat of India.

S. FUSCUM, Roxb.

This species yields the best native pen or *kalam*, and the stems are also used for light fences.

S. MUNJA, Roxb.

Bengal.

This grass is largely employed in India for ropes, the leaves forming the *munj* rope, and the culms that called *sirki*. Before making up, the leaves are wetted and beaten, so as to separate the fibres, and the ropes are supposed to stand alternate wetting and drying well, but to require to be kept moistened, and the same remarks apply to other species, as *S. sara*, *S. procerum*, and others.

Dr. Mason also gives other vernacular names for different species of *Saccharum*. Ia-man-myit. Kaing. Kyān-mai. Kyān-men. Bōng-kyān. Hti-pō-ka-hsu-hsā. The "*Kaing*" grass is what Europeans commonly call Elephant-grass, and is, I think, correctly referred to a species of *Saccharum*, rather than to *Typha*, as Elephant-grass is called in Balfour's Cyclopædia—a confusion probably arising from the specific name of *T. elephantina*!

BATRATHERIUM.

B. LANCEOLATUM, Schultz.

Coromandel.

LIPOCERCIS.

L. SELRATA, Trin.

Bengal.

The Order Gramineæ is of all others the most useful to man, furnishing, as it does, the chief sustenances of the human race, and rendering civilization, which has ever gone hand in hand with agriculture, possible. The cereal grasses, besides starch, sugar, and mucilage, afford certain azotized matters essential to the sustenance of animals, as *fibrine*, *casscin*, and *albumine*, together with phosphate of lime, so valuable in the formation of bone in young and growing animals. The principal cereals cultivated in temperate regions are wheat, *Triticum sativum*; rye, *Secale cereale*; barley, *Hordeum vulgare* and *H. distichum*; oats, *Avena sativa*; whilst in warm countries rice, *Oryza sativa*, and millets, *Panicum miliaceum*, *P. frumentaceum*, *P. pilosum*, and *Eleusine coracana*, take their place as the chief staples. *Zea Mays*, a native of America, is now spread over the whole world, whilst *Sorghum vulgare*, *S. saccharatum*, and *Penicillaria spicata*, are chiefly cultivated by the negro races of Africa.

The cultivation of food grains dates from the remotest antiquity; and when we consider that different regions of the earth have each their appropriate plants, rice, wheat, barley, maize, rye, and so on, we must suppose that the art of agriculture was spontaneously developed at different spots under the pressure of Necessity, guided by Intelligence. Ovid, in the Fourth Book of 'Fasti,' describes Ceres as first teaching the cultivation of corn:

"Prima Ceres, homine ad meliora alimenta vocato
Mutavit glandes utiliore cibo.
Illa iugo tauros collum præbere coegit
Tum primum soles eruta vidit humus."—Fasti IV. 401.

But the whole passage, though matchless as a poetic picture, is a wide deviation from the old original Myth, as embodied in the Hymn to Dēmētēr, which records, not the gift to man of corn by Ceres, but the institution of the Eleusinian Mysteries at that time when, in anger with Zeus and all the immortals, she traversed the earth, sorrowing for her lost daughter, the slender-ankled Persephone, till, hiding the tearless eyes of Divinity in mortal guise, she at last entered in humble capacity the house of Cēleus:¹

Χωσαμένη ἐὶ ἔπειτα κλεινεφῆϊ Κρονίωνι
νοσφισθεῖσα θεῶν ἀγορήν καὶ μακρὸν Ὀλυμπον
ἄχετ' ἐπ' ἀνθρώπων πόλιος καὶ πύονα ἔργα
εἴδος ἀμαλίνουσα πῶλιν χρόνον οὐδέ τις ἀνθρώπων
εἰσορῶν γέγνωσκε, βαθυζώνων τε γυναικῶν
πρὶν γ' ὅτε ἐῖ Κελεῶιο εὐέθροτος ἵκετο ἑῶμα
ὅς τ' ὅτ' Ἐλευσίνος θουόσσης κοίματος ἦεν.

Hymn to Demeter, l. 91.²

Here the wife of Keleos, the fair girdled Metanira, proffers her by way of welcome a cup of wine, which the sorrowful Goddess rejects, but asks in its stead for a draught of water, mingled with flour and Penny royal (*Mentha pulegium*), which was at once given to her:

Τῇ δὲ ἐέπας Μετάνειρα εἴδων μολιγῆος οἴνον
πλήσασ' ἢ ε' ἀρένευσ' οὐ γὰρ θυμῶν οἱ ἔφασκεν
πίνειν οἶνον ἐρυθρόν ἀνωγε ε' ἄρ' ἄλφι καὶ ὕωρ
εἶναι μίξασαν πύμεν γλήχωνι περινή.

Hymn to Demeter, l. 206.³

¹ See also Mythology of the Aryan Nations, by Rev. G. W. Cox.

² Then indeed, in dudgeon with Kronion, king of the clouds, did she withdraw herself from the assembly of the Gods, and from high Olympus, and went forth among the cities and fruitful husbandries of men for a long space, disguising her beauty, so that none that looked upon her knew her (for a goddess) either of men or deep-girdled women, till it came to pass she reached the house of the prudent Keleos, who in those days was a leading chief in fragrant Eleusis.

³ To her Metanira proffers a brimming cup of honey-sweet wine; but she declines it, saying it was not meet for her to quaff the red wine, but begs (in its place) may be given her a draught of water mixed with meal and (flavoured with the herb) "penny royal."

Whilst therefore we see the use of flour was well known at this time, no mention is made in the Hymn of the introduction of cereals by the Goddess. Farther on, the Hymn describes the effect which the anger and retirement of the Goddess from all exercise of her beneficent functions had on the fruits of man's industry.

For though Demeter is not described, even in that sub-kingdom of History as it may be called which is occupied by myth, as actually revealing to man the cultivation of cereals; yet as Goddess of Agriculture, she no sooner abdicated her functions in wrath, than Earth felt the shock, and had her anger remained unappeased, the human race it was believed would have perished:

Λιγώτατον ἐ' ἐπιειπὼν ἐπὶ χθόνα πολυβοτάνην
 ποίησ' ἀνθρώποις καὶ κένταυρον, ἀέε' τι γαῖα
 σπέρι' ἀνέε' κρέπτεν γῆρ' ἑστέφανος Δημήτηρ.
 Πολλὰ δὲ καυπύλ' ἄροτρα μάτην βόας ἔλαον ἀρότρας
 πολλὸν δὲ κρή λευκὸν ἐτίωσιον ἕπιτσι γαίῃ.

Hymn to Demeter, l. 306.¹

It is indeed not a little suggestive of the vast antiquity of the culture of cereals that no specific Myth exists regarding the introduction of most of them like that which records the origin of maize in the legend of 'Hiawatha,' or the origin of the olive and horse as the direct gifts to man respectively of Pallas and Poseidon. We may therefore safely conclude that at the dawn of history, the origin of the cultivation of cereals for food was as much shrouded in the dim past as it is to ourselves.

From the earliest ages down to our own, harvest time has always been regarded as one of rejoicing and thankfulness, and Virgil gives a charming picture of the observance paid to Ceres at the time of gathering in the harvest in his day.

Imprimis venerare deos, atque annua magnæ
 Sacra refer Cereri, lactis operatus in herbis,
 Extremæ sub casum hyemis, jam vere sereno.
 Tunc agni pingues, et tunc mollissima vina;
 Tunc somni dulces, densæque in montibus umbræ.
 Cuncta tibi Cererem pubes agrestis adoret.
 Cui tu lacte favos, et miti dilue Baccho,
 Terque novas circum felix eat hostia fruges:
 Omnis quam chorus et socii comitentur ovantes,
 Et Cererem clamore vocent in tecta. Neque ante
 Falcem maturis quisquam supponat aristis
 Quam Cereri, tortâ redimitus tempora quereu,
 Det motus incompressos, et carmina dicat.—I. Georgie, l. 338.

Doubtless the crown of oak leaves was to commemorate the change from acorns to corn, as the 'motus incompressi,' such as are seen in the fri-sky gambols of a young kid, were to illustrate the heartfelt delight of the pious rustic at the good gifts of a kindly Power.

Order CYPERACEÆ.

Flowers glutaceous, hermaphrodite or didinate. *Perianth* none, or replaced by bristles. *Stamens* hypogynous, usually 3 or 2. *Anthers* basifixed. *Ovary* 1-celled, 1-ovuled. *Styles* 3 or 2. *Ovule* basilar, anatropous. *Achene*. *Seed* albuminous. *Embryo* minute. *Stem* usually angular, without nodes, often hypogeal, solid when young, fistular when adult. *Leaves* grass-like; sheath very rarely split. *Flowers* in spikes.

CARICINIEÆ.

Flowers monœcious or diœcious, in spikes with glumes imbricate in several rows.

¹ Dire to man and terrible, were the days which she now caused to ensue throughout the fruitful earth, nor any longer can the soil yield seed, which gloriously-crowned Demeter withholds. Many were the crooked ploughs which the oxen fruitlessly dragged through the cornlands, and fruitlessly did much white barley fall to earth from the hand of the sower.

Perianth none. Male spikes simple. Stamens 3 or 2. Female spikes simple or compound. Pistil embraced by an inner scale with its back to the axis, bicarinate (analogous to the upper glumelle of the Graminaeae), with edges usually joined, and thus forming an envelope, persistent and accrescent, and enclosing either the ovary only, or the ovary accompanied by a sterile setiform pedicel.

CAREX, *Linnaeus.*

Flowers unisexual, the males and females in distinct spikelets, or in different parts of androgynous spikelets. Glumes imbricated all round the axis. Stamens 3, or rarely fewer, without scales or bristles. Ovary enclosed in a bottle-shaped or inflated utricle, contracted at the top, with a small oblique or 2-toothed opening, through which protrudes the style, which is 2- or 3-cleft. Achene enclosed in the persistent utricle. Leaves grass-like, mostly radical, or on the lower part of the stem. Spikelets either solitary or few, one terminal, the others mostly distant, or stalked, or forming a terminal compound spike or panicle.

C. LONGIARISTATA, Boott.
C. BENGHALENSIS, Roxb.
C. CRYPTOSTACHYA, Brong.

Tillanchong (K.).
India. S. China.
Pinang. S. China.

SCLERIEÆ.

Spikelets dichinous, the male many-flowered. Glumes imbricate in 2 or several rows, the lower ones sometimes empty. Perianth none. Stamens 1 or 3, rarely 5. Female spikelets 1-flowered, with glumes imbricate in several rows. Perianth none. Style trifid, equal at the base. Achene bony or crustaceous, usually seated on a trilobed disk.

SCLERIA, *Linnaeus.*

Flowers unisexual, in unisexual or androgynous spikelets, with several empty glumes below the flowering ones. Male spikelets several-flowered. Stamens 3, rarely fewer. Females 1-flowered. Style 3-cleft. Androgynous spikelets with the lowest flower female, the others male. Nut bony or brittle, seated on a thickened entire or 3-lobed disk. Grass-like herbs with leafy stems. Ligule, or projection of the leaf-sheath opposite the blade often very conspicuous. Spikelets in clusters, or small corymbose or oblong panicles, terminal, and in the upper axils, forming either an oblong leafy panicle, or an interrupted spike.

S. LATRIFLORA, Boeck.
VAR. GLABRA.

Kamorta (K.).

S. LITHOSPERMA, Willd.

Kamorta. Katchall (K.). Ceylon. India and S. China.

S. SUMATRENSIS, Retz.

Kamorta (K.). Ceylon.

S. LEVIS, Retz.

Kamorta (K.). Ceylon. S. China.

S. TESSELATA, Willd.

India. Ceylon. S. China.

S. *Stuedeliana*, Miq.

S. CHINENSIS, Kth.

Bengal. S. China.

S. *ciliaris*, Nees (non Mich.).

RHYNCHOSPORIÆ.

Spikelets usually few-flowered. Glumes imbricate in 2 or several rows, the lower empty. Flowers usually polygamous. Perianth none, or composed of 6 bristles, rarely less and very rarely more. Stamens 3 or 6. Achene often beaked by the persistent base of the style.

RHYNCHOSPORA, *R. Browne.*

Spikelets 1-2- (rarely 3-) flowered, oblong, more or less pointed. Glumes imbricate all round, several outer ones shorter and empty. Hypogynous bristles 6, sometimes more. Stamens 3, or fewer. Style 2-cleft. Nut globular or rarely flattened, crowned by the persistent continuous base of the style. Stems usually leafy. Spikelets usually clustered, and of a rich brown, in terminal or axillary heads or corymbs, sometimes forming large terminal leafy panicles.

- R. GRACILLIMA, Thwaites. Kamorta (K.).
 R. AUREA, Vahl. Kamorta (K.). Ceylon. S. China.
 R. WALLICHIANA, Kth. Kamorta (K.). Ceylon. India. S. China.
 R. Honkei, Presl.
 Morisia Wallichii, Nees.
 Haplostylis Meyenii, Nees.
 R. LAXA, Br. India. S. China.
 R. chinensis, Nees.

CLADIUM, *R. Browne.*

Characters of *Rhynchospora*, only the *nut* has a thick, almost fleshy outer coating, tapering at the top into the style, but without any distinct beak.

- C. MARISCUS, Br. India. S. China.
 C. Chinense, Nees.

HYPOLYTRIEÆ.

Spikelets 1-flowered, agglomerated in capitate heads or cymose panicles. *Flowers* hermaphrodite, each with 2, 4 or 6 closely imbricate glumes. *Perianth* none. *Stamens* 2 to 3, or 6 to 8. *Style* bi- or trifid, deciduous or the base persistent.

HYPOLYTRUM, *Rich.*

Spikelets 1-flowered, densely crowded in ovoid or cylindrical spikes, resembling spikelets, the imbricated glume-like bracts under each spikelet as long as the spikelets themselves. *Glumes* 2, very flat, acutely keeled. *Flowers* hermaphrodite, without hypogynous scales or bristles. *Stamens* 3, or fewer. *Style* 2- or 3-cleft. *Nut* slightly compressed, or coarsely 3-angled, falling away from the glumes when ripe. Herbs usually coarse. *Spikes* brown, resembling the spikelets of *Scirpus*, pedicellate in corymbose panicles, like those of *Rhynchospora*.

- H. LATIFOLIUM, Rich. Kamorta (K.). Ceylon. S. China.
 H. giganteum, Wall.
 H. trinervium, Kth.
 Albikkia seirpoides, Presl.
 H. TRINERVIUM, Wall. Great Nicobar (K.).

SCIRPIEÆ.

Spikelets usually many-flowered. *Glumes* imbricate in several rows, very rarely distichous (*Androtrichum*, *Abilgaardia*), some of the lower often empty. *Flowers* hermaphrodite. *Perianth* none, or represented by bristles. *Achene* usually pointed or beaked by the persistent base of the style.

SCIRPUS, *Linnaeus.*
(*Eleocharis*, *Br.*)

Spikelets several-flowered, the glumes imbricate all round, only 1 or 2 of the lowest empty. *Flowers* hermaphrodite. *Hypogynous bristles* usually 6. *Stamens* 3 or fewer. *Style* 2- or 3-cleft, either not thickened at the base, or breaking off above a small bulbous thickening which remains attached to the nut. *Stem* leafy, or leaves all radical, or reduced to a sheath at the base of the stem. *Spikelets* solitary or clustered, in terminal, or apparently lateral heads, or simple or compound umbels.

- S. SUBULATUS, Kth. Nicobars (K.).
 S. CAPITATUS, Willd. S. China. India.
 S. (ELEOCHARIS) AFFLATUS, Steud. (apud Bentham). Khasi Hills. S. China.
 S. CHINENSIS, Muir. Khasi Hills. S. China.
 S. JUNCOIDES, Roxb. India. Ceylon. S. China.

FURENA, *Linnaeus.*

Characters of *Scirpus*, except there are 3 obovate or obcordate hypogynous scales, and sometimes 3 bristles alternating with them. *Stems* leafy. *Spikelets* green, often

hairy and squarrose with the spreading tips of the glumes, usually in dense clusters, forming an irregular terminal narrow panicle.

- F. UMBELLATA, Rottb. Kamorta (K.). Ceylon. India.
F. pentagona, W. et A.
 F. GLOMERATA, Lam. S. China. Asia. Africa. Australia.
F. Rottboellii, Nees.

ISOLEPIS, *R. Browne.*

Characters of *Scirpus*, except there are no hypogynous scales.

- I. BARBATA, Br. S. China. Asia. Africa. Australia.
Scirpus monander and *antarcticus*, Roxb.
 I. sp. Kamorta (K.).
 I. (SCIRPUS) SUPINA, L. S. China. India. Ceylon.

FIMBRISTYLIS, *Vahl.*

Spikelets several-flowered, the glumes imbricate all round, only 1 or 2 of the lowest empty. *Flovers* hermaphrodite, without hypogynous scales or bristles. *Stamens* 3, or fewer. *Style* 2- or 3-cleft, usually thickened at the base, and articulate on the nut below the bulb. *Leaves* usually radical, or sheathing the stem at its base, sometimes all reduced to sheaths. *Spikelets* solitary on the scape, or more frequently on the rays of a simple or compound umbel, one always sessile, or rarely clustered in a single head, or on the rays of the umbel.

- F. ACUMINATA. Nipal. S. China. Java.
F. setacea, Benth.
 F. PODOCARPA, Nees. India. S. China.
 F. FERRUGINEA, Vahl. S. China. India.
F. arvensis, Vahl.
 F. SQUARROSA, Vahl. S. China. India.
 F. FESTIVALIS, Vahl. Burma (M.). S. China.
 F. WIGHTIANA, Nees. Bengal. S. China.
F. junciformis, Munr. (not Nees).
 F. MILLACEA, Vahl. Kamorta (K.). Ceylon. India.
F. (Scirpus) tetragonus, Roxb.
 F. COMPLANATA, Link. Kamorta (K.). Ceylon. S. China.
 F. DIPHYLLA, Vahl. Kamorta (K.). Ceylon. S. China.
F. tomentosa, Vahl.
F. Rageniana, var. *a* et *β*, Nees.
F. communis, Kth.
 F. OVALIS, Nees. Kamorta (K.). Ceylon.
 There are two forms, a glabrous and a densely villous one (Kurz).
 F. NUTANS, Vahl. Kamorta (K.). Ceylon. Silhet.
 F. GLOBULOSA, Wall. Kamorta (K.). Ceylon.
 F. SCHENOIDES, Vahl. India. Ceylon. S. China.

ANOSPORUM.

- A. CEPHALOTIS, Vahl. Nicobars (K.).

ABILDGAARDIA, *Vahl.*

Characters and habit of *Fimbristylis*, only differs in having distichous glumes.

- A. MONOSTACHYA, Vahl. India. S. China. Ceylon.
A. Rottboelliana, Nees.
 A. ERAGROSTIS, Vahl. Khasi Hills. S. China. Ceylon.
Fimbristylis quinqueangularis, Munr.
 A. FUSCA, Nees. Nipal. Ceylon. S. China.
A. cinnamometorum, Thwaites.

CYPERIÆ.

Spikelets usually many-flowered. Glumes distichous, imbricate, some of the lower often empty. Flowers hermaphrodite. Perianth none, or represented by hispid bristles. Style very rarely swollen at the base, deciduous.

KYLLINGIA, *Linnaus.*

Spikelets 1-flowered, or with a second male flower, closely imbricate in globular or oblong heads, or short spikes resembling spikelets; the bracts under each spikelet very small, or altogether wanting on the interior of the spike. Glumes distichous, 1, 2, or 3 empty ones below the flowering one. Flowers hermaphrodite, without hypogynous scales or bristles. Stamens 3 or fewer. Style 2-cleft. Nut flattened. Spikes usually solitary or few together, sessile or shortly pedunculate within 2 or 3 long leafy bracts.

K. MONOCEPHALA, L. Great Nicobar (K.). Ceylon. S. China.
K. TRICEPS, Rottb. Burma (M.). Ceylon.

LIFOCARPHA, *R. Browne.*

*Spikelets 1-flowered, closely imbricate in globular or oblong heads, or short spikes resembling spikelets, the glume-like bracts under each spikelet as long as the spikelets themselves. Glumes 2, very thin and transparent, concave and scarcely keeled, one or both falling off with the nut, when ripe. Flowers hermaphrodite, without hypogynous scales or bristles. Stamens 3 or fewer. Style 2- or 3-cleft. Nut slightly compressed or obtusely 3-angled. Herbs with the habit of *Kyllingia*. Spikes usually 3 or 5, rarely solitary, sessile, between leafy bracts.*

L. ARGENTEA, Br. India. S. China. Ceylon.
L. *levigata*, Nees.

REMIREA, *Aubl.*

R. MARITIMA, Aubl. Kamorta (K.).

CYPERUS, *Linnaus.*

Spikelets several-flowered (very rarely 2- or 3-flowered). Glumes distichous, all nearly equal, with 1 flower in each, or 1 or 2 lowest rarely empty. Flowers hermaphrodite, without hypogynous scales or bristles. Stamens 3, or fewer. Style continuous with the ovary, not bulbous at the base. Spikelets in clusters, heads, or spikes, which are usually several together, in a simple or compound irregular umbel.

C. ERAGROSTIS, Vahl. Singapore. S. China.
C. POLYSTACHYUS, Roxb. Kamorta (both varieties) (K.). S. China. Ceylon.
var. *C. strictus*, Roxb.
C. VULGARIS, Kth. Kamorta (K.). S. China.
C. RASPAK, L. Kamorta (K.). Ceylon. S. China.
C. *tenuispica*, Steud.
C. IRIA, L. Kamorta (K.). Ceylon. S. China.
C. MOESIUS, Nees. Kamorta and Katchall (K.).
C. PILOSUS, Vhl. Kamorta (K.). Ceylon. S. China.
C. *obliquus*, Nees.
C. *piptolepis*, Steud.
C. MARGINELLUS, Nees. India. S. China.
Perhaps, thinks Thwaites, a var. of the last.
C. RADIANUS, Nees. Sikkim. Singapore. S. China.
C. *radicans*, Kunth.
C. UMBELLATUS, Benth. Tillanchoung (K.). Typical form
Mariscus cyperinus, Vahl. in S. China. Ceylon.
var. *b. leucostachya*. var. β Katchall (K.).
C. PENNATUS, L. India. Ceylon. S. China. Nicobars (K.).
C. *canescens*, Vahl.

C. ROTUNDUS, L.	S. China.
<i>C. hexastachyus</i> and <i>tenuiflorus</i> , Rottb.	
<i>C. pertenuis</i> , Roxb.	
<i>C. bulbosus</i> , Vahl.	
C. DISTANS, L.	S. China. Ceylon. India.
C. PYGMEUS, Vahl.	Burma (M.).
C. DILUTUS, Vahl.	Kamorta (K.). Ceylon.

Some species of *Cyperus* yield an esculent root, which is of value in times of scarcity, as *C. esculentus* and *C. bulbosus*, which last species grows near the sea in Southern India, and is pleasant to the taste. *C. hexastachyus* is another species, sufficiently fragrant to be sought for its perfume. Other species may probably produce edible roots, as Mason mentions one, which is occasionally seen in Burma, which tastes something like filberts. *C. inundatus* is found on mud banks in Bengal, which it helps to protect from the wasting action of the water. In other respects the utility to man of reeds and rushes is not great, but some species can be woven into mats, and it was from a species of this family, *Papyrus antiquorum*, an inhabitant of tropical Africa, that the earliest substitute for paper was made by cutting the culm into thin slices, very much as *shola* (*Æschynomene paludosa*) is now used in India for various industrial purposes, or the so-called rice paper of China, the pith of *Fatsia papyrifera*, on which the soft and brilliant water-colour paintings of Chinese subjects are made.

Mason gives the native names of several species of *Cyperaceæ* as follows: Wet-myt-u; Myit-kyet-thwōn; Tor-kyet-lē-hli; and in Sgau, Hsgai-ka-tho; The-ki-kho; O-bo, and Ta-pro.

RESTIALES.

Flowers hermaphrodite or unisexual, regular or not. *Perianth* of 4 or 6 glumaceous, scarious or membranous segments in 1 or 2 series, or reduced to scales or wanting. *Stamens* 1 to 3, free or united into a cup. *Ovary* usually 3-celled. *Ovules* solitary, pendulous, orthotropous. *Fruit* capsular, rigid or membranous. *Embryo* outside the base of the albumen.

Order ERIOCAULONEÆ.

Flowers monœcious or diœcious. *Perianth* inferior, double, the outer bi- or tri-phyllous, the inner subtubular, trifid or bifid. *Stamens* double the number of the perigonial leaflets, inserted on the inner, the alternate often sterile. *Ovary* superior, of 2 or 3 uni-ovular cells. *Ovules* pendulous, orthotropous. *Capsule* bi- or tri-celled, loculicidal. *Seeds* albuminous.

ERIOCAULON, *Linnaeus*.

Flowers sessile, in androgynous (rarely diœcious) heads, with imbricated bracts, 1 under each flower, and a few outer ones empty. *Male flowers*, perianth of 6 or 4 segments, the outer free, or united, inner ones basally united into a solid stalk. *Anthers* 2-celled. *Female flowers*, perianth segments all distinct, or the inner shortly united. *Style* single, with 3 or 2 stigmas. *Capsule* 3- or 2-lobed, opening at the angles. Aquatic or marsh plants.

E. LONGIFOLIUM, Nees.	Kamorta (K.).
E. TRUNCATUM, Ham.	Kamorta (K.). Ceylon. Silhet.
E. WALLICHIANUM, Mart.	Tavoy (M.). Ceylon. S. China.
<i>E. Cantonense</i> , Hook.	
<i>E. longifolium</i> , Nees (?).	
E. SETACEUM, L.	Tavoy. Ceylon.
<i>E. intermedium</i> , Kœrnicke.	
E. CRISTATUM, Mart.	Khasi Hills. Ceylon.
<i>E. miserum</i> , Kœrnicke.	

Order FLAGELLARIEÆ.

Flowers hermaphrodite. *Perianth* of 6 subequal segments, in two series. *Stamens* 6, hypogynous, free. *Anthers* 2-celled, introrse. *Styles* 3, papillose throughout. *Berry* 1- or 2-seeded. Sedge-like herbs. *Leaves* with long sheaths and parallel nerves.

FLAGELLARIA, *Linnaeus*.

F. INDICA, L.

Great Nicobar (K.).

Myouk-kyeing.

COMMELYNALES.

Flowers hermaphrodite, spiked, paniced, solitary, or capitate. *Perianth* regular, or not, of 6 segments in 2 series, 3 outer herbaceous and 3 inner very different, petaloid, coloured. *Style* usually trifid. *Embryos* outside the albumen, or in a distinct cavity in its side.

Order NYRIDEÆ.

Flowers in terminal solitary heads of densely imbricating, 1-flowered, rigid scarious bracts. *Capsule* 1-celled, and 3-valved. *Seeds* numerous, angled, or globose. Rush-like, usually erect and rigid plants, growing in swampy places.

NYRIS, *Linnaeus*.

Perianth of 2 lateral outer segments, keeled and compressed, a third broader and more petal-like, enveloping the 3 inner petal-like segments or lobes. *Stamens* 3, fertile, opposite the inner segments, and sometimes 3 sterile penicillate filaments between them. *Placentas* parietal. Rush-like herbs.

X. INDICA, L. (M.).

Burma. Ceylon.

X. PAUCIFLORA, Willd. (M.).

Burma. Ceylon. S. China.

Order COMMELYNEÆ.

Flowers hermaphrodite. *Perianth* inferior, double. *Sepals* 3. *Petals* 3. *Stamens* 6, hypogynous. *Ovary* superior, with 3 few-ovuled cells. *Ovules* orthotropous. *Capsule* with 3-2 cells, loculicidal. *Seeds* albuminous. *Leaves* alternate. This family is of small use to man, though the tubers of some species are edible when cooked.

CYANOTIS, *Don*.

Flowers regular. *Sepals* united at the base. *Petals* united more or less by their claws, in a 3-lobed corolla. *Stamens* 6, filaments bearded towards the top. *Anthers* uniform. *Ovary* with 2 ovules in each cell, attached to its centre. *Capsule* 3-valved. *Seeds* 1 erect, the other pendulous. Creeping or ascending herbs.

C. AXILLARIS, Roem. et Sch. (P.).

Tenasserim. India. Ceylon. S. China.

C. FASCICULATA, Roem. et Sch.

India. Ceylon. S. China.

POLLIA, *Thunberg*.

Flowers regular. *Perianth* segments free, one petal rather narrower. *Stamens* 6. *Anthers* all with 2 parallel cells, but 3 usually barren. *Ovary* 3-celled, with numerous ovules in each cell. *Fruit* globular, slightly succulent, indehiscent, shining and brittle when dry. *Seeds* angular. Stem erect. *Leaves* large. *Flowers* in terminal panicles. *Bracts* small.

P. (ANILEMA) BIDYMA, Ham.

Khasi Hills.

P. sp. (P.).

Tenasserim.

FLOSCOPA, *Loureiro*.

Flowers nearly regular. *Perianth* segments free, one petal usually narrower. *Stamens* 6, all fertile. *Ovary* contracted at the base or stalked, 2-celled, with 1

ovule in each cell. *Capsule* flattened, didymous, 2-valved. *Seeds* laterally attached by the broad truncate base. Erect or ascending herbs. *Flowers* small, in terminal panicles. *Bracts* small.

- F. PANICULATA, Hassk. India. Malayan Peninsula. S. China.
F. rufa, Hassk.
Dithyrocarpus capensis and *Meyerianus*, Kth.
D. petiolatus, *Rothii* and *undulatus*, Wight.
Ancilema hispidum, Don.

ANEILEMA, *R. Browne.*

Flowers nearly regular. *Perianth segments* free. *Stamens* 6 or 4, of which 3 or 2 have differently-shaped barren anthers. *Ovary* 3-celled, with 2 to 5 ovules in each cell. *Capsule* 3-valved. *Flowers* usually small in terminal panicles. *Bracts* small.

- A. ENSIFOLIUM, Wight. Swampy rivulet in Kamorta (K.).
A. UNDFLORUM, Br. Kamorta (K.). India. Ceylon. S. China.
A. debile, Wall.
A. diandrum, Ham.
A. compressum, Dalz.
A. HERBACEUM, Wall. Burma (M.).

COMMELYNA, *Linnaeus.*

Perianth irregular, 2 sepals larger than the third, and one petal differently shaped or more sessile than the 2 others. *Stamens* 6, or rarely fewer, of which 3 are fertile, 1 of them larger than the others, 3 barren, with deformed anthers. *Ovary* with 1 1-ovuled and 2 2-ovuled cells. *Capsule* 2-valved. *Flowers* few, on 2 peduncles enclosed in a folded cordate or peltate-turbinate oblique bract, or spathe, which is usually pedunculate from a split leaf-sheath opposite the blade.

- C. COMMUNIS, L. Kamorta (K.). India. S. China.
C. CESPITOSA, Roxb. Burma (M.).
Hsat-le-kyoung, or Mā-gywōt.
C. SALICIFOLIA, Roxb. India. Malay Peninsula. S. China.
C. BENGHALENSIS, L. India. S. China.

PONTEDERALES.

Flowers hermaphrodite, spiked, paniced or capitate. *Perianth* of 2 segments or of 6 biseriate segments, all petaloid or 3 outer, herbaceous or coriaceous. *Style* single. *Stigma* sub-entire. *Embryo* immersed in copious albumen, not external or in a lateral cavity. Marsh plants.

Order PONTEDERIACEÆ.

Perianth inferior, petaloid, sex-partite, irregular, persistent. *Stamens* inserted on the perianth, 6, or 3 opposite to the inner segments. *Ovary* superior, of 3 many-ovuled cells, or 2 sterile, and 1 fertile, and 1-ovuled cell. *Fruit* or capsule enveloped by the fleshy perianth. *Albumen* mealy. Marsh plants.

MONOCHORIA, *Presl.*

(*Pontederia.*)

Perianth nearly regular, divided to the base into 6 spreading segments. *Stamens* 6, unequal, 1 usually larger, with a small tooth or spur on the filament. *Ovules* numerous in each cell of the ovary. *Capsule* free, 3-valved, many-seeded. *Leaves* radical on long petioles. *Scapes* with 1 petiolate leaf, the short raceme in its axil appearing to proceed from the middle of the petiole. *Flowers* few.

- M. (PONTEDERIA) VAGINALIS, Roxb. (M.). Burma. India. S. China.
Lē-pa-douk.

M. (PONTEDERIA) PLANTAGINEA, Roxb. (M.). Burma. India. S. China.
 M. (PONTEDERIA) DILATATA, Buch. (M.). Burma.

Padouk-gyi.

M. (PONTEDERIA) SAGGITATA, Roxb. (M.). Burma.

The young shoots of *P. vaginatis* are edible, and the whole plant is used medicinally, in diseases of the digestive organs, asthma, and toothache.

LILIALES.

Flowers hermaphrodite, rarely unisexual, spiked, racemed, paniced or solitary, rarely capitate. *Perianth* of 6 rarely 4 sub-similar pieces, or monopetalous, and 6-lobed and regular (except *Gillisia*), usually all coloured and petaloid (coriaceous in *Junceæ*). *Embryo* as in *Pontederales*.

Order JUNCEÆ.

Flowers usually hermaphrodite. *Perianth* inferior, 6-phyllous, glumaceous, 2-seriate. *Stamens* 6 or rarely 3, inserted at the base of the perianth-segments. *Ovary* superior, 3- or 1-celled, 1- to many-ovuled. *Orules* erect, anatropous. *Capsule* 1- to 3-celled, loculicidal or septifragal. *Seeds* albuminous. *Embryo* basilar, radicle inferior, stem herbaceous. *Leaves* alternate, sheathing.

Annual or perennial herbs, cæspitose or with a creeping rhizome. *Stem* cylindrical, spongy, or sometimes chambered by medullary septa.

JUNCUS, *Linnaeus*.

J. LESCHENAUILLI, J. Gray. India. S. China.

Order ROXBURGHIIACÆ.

Flowers large, solitary, axillary, fetid. *Perianth* of 4 lanceolate petaloid segments. *Stamens* 4, hypogynous. *Filaments* very short. *Anthers* large, basifixed, 2-celled, longitudinally dehiscent, and produced into a long appendage. *Ovary* 1-celled. *Style* none.

ROXBURGHIA, *Dryander*.

R. sp. (*fide* Dr. Diedrichsen). Nicobars.

Sir J. Hooker says the tuberous root is candied and eaten in India.

Order ASPARAGEÆ.

Flowers usually hermaphrodite, regular, pedicels jointed. *Perianth* inferior, petaloid, sex-partite and biseriate. *Stamens* 6. *Ovary* superior, 3-celled. *Fruit* a berry. *Seeds* with black crustaceous testa. Albumen fleshy.

ASPARAGUS, *Linnaeus*.

A. ACEROSUS, Roxb. Burma (M.).

Shit-ma-tet.

The Orders *Asparagææ*, *Smilacææ* and *Melanthacææ* are by some botanists (Kurz *e.g.*) reduced to tribal rank among the Liliacææ; but Maout and Decaisne separate them as both a more natural and convenient arrangement. *Asparagææ* are intermediate between *Liliacææ* and *Smilacææ*, being differentiated from the former by their berried fruit, and the latter by characters of the testa. *Asparagus* is a favourite vegetable, remarkable for communicating its peculiar smell to the urine, and its roots were once esteemed as purgatives. The roots of *Cordylina*, on the other hand, are used as medicine in dysentery, and the plant is cultivated in Burma, chiefly about Khyoungs or Monasteries. The genus *Phacæna* yields the true "dragon's blood," but the resin of the Padouk (*Pterocarpus*) is not unfrequently substituted for the real article.

DRACENA, *Vaud.*

Perianth tubular, deeply 6-cleft, caducous, valvate in bud. *Stamens* 6, adnate to the perianth-tube, and free from the throat. *Anthers* 2-celled, versatile. *Ovary* free, 3-celled, each cell 1-ovuled. *Style* 3-sulcate, filiform. *Stigma* capitate 3-lobed. *Leaves* petioled, or sessile and half stem-clasping.

† *Flowers in panicles.*

* *Leaves sessile, with a narrowed stem-clasping base. Perianth-lobes more or less recurved from the middle.*

D. ANGUSTIFOLIA, Roxb. *E.T.* Tree forests of South Andaman. Great Nicobar. Trice and Traek.

Panicle erect, shorter than the leaves, stiff; outer bractlets 1-2 lines long, with scarios border, filaments white. Berry-lobes the size of a small pea.

D. ENSIFOLIA, Wall, *E.S.* Upper Tenasserim.

Panicle nodding, longer than the leaves, flexuose. Bracts acute, almost wholly scarios; filaments orange. Pedicels $\frac{1}{2}$ inch long.

D. BRACHYPHYLLA, Kz., *E.S.* Tree forests of the Andamans.

Panicle much shorter than the $\frac{1}{4}$ to $\frac{1}{2}$ inch long leaves, erect, stiff. Bracts linear acuminate, herbaceous, with scarios margin. Pedicels only 2 to 3 lines long.

** *Leaves narrowed in a complicate petiole.*

‡ *Perianth-lobes erect-spreading, conniving in a tube. Small shrubs.*

D. ELLIPTICA, Thbg. var. *a.* Chittagong and all over Burma and the Andamans.

Flowers sparse. Bractlets 1 line or longer. var. *β.* Tenasserim.

var. *a. elliptica.* Flowers by twos or threes, white.

Kwōn len-hpyu.

var. *β. atropurpurea*, Bak. Flowers solitary, purplish outside.

Kwōn-len-hnet.

D. HELPERIANA, Kz. *E.S.* Tree forests of Pegu and Tenasserim.

Flowers 1-sided. Bractlets minute, broad and scarios.

‡‡ *Perianth-lobes removed from the middle. Trees.*

D. TERNIFOLIA, Roxb. Khakyen Hills.

Panicle rather contracted. Corolla twisted. Bracts scarios.

†† *Flowers in simple terminal racemes. Leaves narrowed in a leafy petiole.*

D. SPICATA, Roxb., *E.T.* Tree forests of Chittagong and South Andaman, Kondul and Kar Nicobar.

Peduncle shorter than the leaves, bracted, scaly. Pedicels short. Corolla twisted, tube long, the lobes short, spreading.

D. PACHYPHYLLA, Kz., *E.T.* Tree forests of South Andaman. Malacca.

Peduncle short or almost none; the raceme almost as long as the petiole. Pedicels very short; corolla not twisted, the lobes not recurved.¹

In addition to the above Kurz records

D. LINEARIFOLIA, Miq. Beach forests of Kamorta and Katchall.

D. Finlaysoni, Baker.

D. GRIFFITHII, Reg. Rare in the tree forests of Kamorta.

¹ Kurz remarks; "A *D. spicata*, specie arboreâ quâ cum el Baker conjunxit, staturâ humili et periantho recto, non torto, jam differt."—J.A.S.B. II. 1873. p. 249.

CORDYLINÆ, *Commerson.*

Characters of *Draecna*, but the ovary cells with several ovules.

**C. TERMINALIS*, Kth., *E.S.* Var. *a* cultivated round Monasteries.

Glabrous. Leaves 1 to 3 feet long on a 2 to 4 inch long stem-clasping petiole. Chartaceous green or purplish. Flowers small, solitary, white or purplish.

var. *a. terminalis*. Flowers larger, sessile.

var. *β. ferrea*, Baker. Flowers on pedicels.

Order SMILACEÆ.

Flowers usually hermaphrodite. *Perianth* inferior, petaloid, mostly sex-merous, biseriata, isostemonous. *Stamens* hypogynous or perigynous. *Anthers* introrse. *Ovary* superior, 3-celled, rarely 1, 2 or 4-celled. *Berry* few-seeded. *Seeds* globose. *Testa* membranous. *Albumen* very dense. Herbs or undershrubs, sometimes with tendrils or thorns. *Leaves* all radicle or cauline, alternate or whorled.

This Order is unimportant in Burma. The roots of several American species of *Smilax* constitute the Sarsaparilla of commerce, and a similar article is also procurable from several Asiatic species.

SMILAX, *Linnaeus.*

Flower diœcious. *Perianth* of 6 spreading segments, all equal, or the 3 outer larger, or the 3 outer united, and the 3 inner wanting. *Male Flowers.* Stamens 6, inserted at the base of the segments, or rarely 3, free or monadelphous. *Female Flowers.* Stamens rudimentary. *Ovary* 3 celled, with 1 or 2 erect ovules in each cell. *Stigmas* 3, sessile, distinct or shortly united. *Fruit* a globular berry. *Embryo* minute, remote from the hilum. Climbers.

S. GLABRA, Roxb.

Khasi Hills. S. China.

S. LANCEFOLIA, Roxb.

Khasi Hills. S. China.

S. FEROX, Wall.

Khasi Hills. S. China.

S. OVALIFOLIA, Roxb.

Burma (M.). Ceylon. India. S. China.

S. macrophylla and *prolifera*, Roxb.

S. POLYACANTHA, Roxb.

Kamorta (K.).

Order MELANTHACEÆ.

Flowers hermaphrodite. *Perianth* sub-herbaceous or petaloid, sex-merous, biseriata. *Stamens* usually 6, inserted at the base of the perianth. *Anthers* extrorse in bud. *Ovary* superior or rarely semi-inferior; of 3 many-ovuled cells. *Styles* 3. *Seeds* albuminous. *Embryo* small, included.

METHONICÆÆ.

Perianth tubular or 6-partite. *Stamens* inserted at the base of the perianth-segments, or on its tube. *Ovules* anatropous. *Stigmas* 3. *Fruit* capsular. *Seeds* turgid. *Testa* thick or fleshy, white or red. *Embryo* straight.

METHONICA.

M. SUPERBA, Lam. (M.).

Hsi-mi-touk.

The Hpungyis collect the roots of this for medicine (K.).

VERATRICEÆ.

Stem or *scape* leafy. *Flowers* axillary or solitary, or in spikes or racemes. *Styles* short, usually distinct. *Perianth* leaves free, sessile, or very shortly clawed, sometimes basally united. *Ovary* free or semi-inferior.

ANGUILLARIA.

A. INDICA, Brown (M.).

Burma.

SIEMONA.

S. GRIFFITHIANA, Kz.

Ava. Pegu. Tenasserim.

A perennial erect herb, rhizome thick, hypogæous, leaves ovate, 3-5 inches long, on a petiole of equal length. Flowers greenish-purple. Stamens 4. Filaments broad, purple. Anthers yellow. Ovary 1-celled. Ovules 6, linear-oblong, pendulous capsules bivalved, 3-4 seeded. Seeds sulcately keeled, with a short white basal villus.

This order embraces plants of great medicinal efficacy, and yielding the powerful alkaloids *veratrine*, *colchicine*, *sabadilline*. *Colchicum autumnale*, however, is the only one which may be deemed important in medicine, though many species are used both in powder and infusion as vermifuges and insect destroyers.

Order LILIACEÆ.

Flowers hermaphrodite. *Perianth* inferior, petaloid sex-partite, biseriate. *Stamens* 6. *Ovary* superior, with 3 several- or many-ovuled cells. *Style* simple. *Fruit* capsular. *Albumen* fleshy. *Stem* with a bulbous or fibrous-fascicled root.

HYACINTHINIEÆ.

Perianth tubular or 6-partite. *Stamens* inserted on the receptacle or perianth-tube. *Ovules* anatropous or semi-anatropous. *Fruit* capsular. *Seeds* globose or angular. *Testa* crustaceous, black. *Radicule* facing the hilum. *Herbs* with bulbous or fibrous-fascicled roots.

SCILLA, *Linnaeus*.

Perianth-segments 6, nearly equal, free or nearly so, spreading or forming a bell-shaped or tubular flower. *Stamens* 6, inserted below the middle, or at the base of the segments. *Ovary* with 1, 2 or several ovules in each cell. *Stigma* entire or nearly so. *Seeds* few, black, oblong or globular. *Bulbous* herbs. *Leaves* radical, parallel veined. *Flowers* pink or blue, in a simple raceme on a leafless scape.

S. INDICA, Roxb. (M.).

Burma.

Pa daing-kyet-thwōn.

ALLIUM, *Linnaeus*.

* A. SATIVUM, L. (M.).

Cultivated.

Kyet-thwōn-hypu. Garlic.

* A. CEPA, L. (M.).

Cultivated.

Kyet-thwōn-ni. Onion.

* A. PORRUM, L. (M.).

Cultivated.

Tor-kyet-thwōn. Leek.

* A. ASCALONICUM, L. (M.).

Cultivated.

The Eschalotte, Shallot, or Onion of Askalon.

ORNITHOGALUM.

O. REVOLUTUM, Jacq. (M.).

O. CAUDATUM, Ait. (M.).

ALOINIEÆ.

Perennial herbs, sometimes arborescent, and with fleshy leaves (Aloc), and roots fibrous fascicled, often swollen.

ALOE

* A. SOCOTRINA, L. (M.).

Mōk.

This plant, a native of the Cape of Good Hope, is now thoroughly naturalized in India and Burma, and makes a valuable hedge plant, where gardens require protection near roads from stray cattle. The inspissated juice forms bitter aloes, the best coming from Socotra, and the fibres of the fleshy leaves, yield materials for the manufacture of an excellent and beautiful fabric.

HEMEROCALLIDIÆ.

Perennial herbs with tuberous or fibrous roots.

HEMEROCALLIS.

* *H. DISTICHA*, D. Don (M.).

* *H. FULVA*, L. (M.).

To this tribe belongs the valuable fibre plant, *Phormium tenax*, which would probably thrive well in Burma, and is deserving attention for the sake of the excellent fibre or flax which it yields.

TULIPACIÆ.

This tribe is chiefly remarkable for the beauty of its flowers.

The Order Liliaceæ is an extremely important one to man, as the tribe *Hyacinthinicæ* yields some of the most useful culinary herbs we possess, as the onion, garlic, and leek. *Aloinæ* are also valuable to man for their fibre and other purposes, whilst the tribe *Tulipacæ* yields some of the handsomest and most prized denizens of his pleasure grounds, as tulips, lilies, and the Yucca, which in full bloom forms such a glorious object in an Indian garden. The cultivation of the garlic and onion, especially the former, is probably coeval with history, and their value as a condiment to the somewhat insipid diet of the inhabitants of warm countries can hardly be over-estimated. It is worth remembering that the onion and leek were not formerly eaten by certain classes in Egypt, as we learn from Juvenal—

Porrum et cæpe nefas violare et frangere morsu.
O sanctas gentes quibus hæc nascuntur in hortis
Numina!—*Sat. XI. 9.*¹

At the present day onions are not eaten in India by Brahmins, the assigned reason being their red colour causes them to resemble flesh. There can be little doubt however that the true reason is the same occult one, which caused them to be originally avoided by certain classes in Egypt, though the cause has now died out of the knowledge of the men who nevertheless still observe the prohibition. It has been suggested that the free consumption of onions rendered a man liable to compromise the purity of the air, in the temples wherein he might subsequently worship; but I think a more likely reason for the selection of this plant as a sacred one may be discovered in its globular head of seeds, which, in times when a vivid imagery went hand in hand with the worship of the fecund powers of nature, might have seemed a fit emblem of the great Solar Orb—the fruitful source of life on earth—and have been set apart as holy on that account. It requires perhaps an effort now-a-days to realize the light wherein to us trivial ideas may have then presented themselves; but a very little knowledge of the subject is required to prove how universal and deep-seated was the symbolism connected with religion, when all religion was imbued with nature worship of either Phallic or Solar complexion.

ARALEÆ.

Flowers hermaphrodite, or unisexual, arranged in a spadex or spike, with or without a spathe, or sunk in pits of a minute scale-like frond. *Perianth* of distinct

¹ 'Tis mortal sin an onion to devour;
Each clove of garlic is a heavenly power!
Oh holy nations and O sacred elods,
Where every fruitful garden teems with gods!

pieces, white or green, or of minute scales, or wanting. *Fruit* a drupe or berry with one, few, or many minute albuminous seeds. Herbs, often very large, rarely trees. *Leaves* simple or pinnatifid, very rarely pinnately divided.

Order LEMNACEÆ.

Flowers hermaphrodite. *Perianth* none. *Seeds* most minute. Small, free-floating water plants, comprising the smallest known phanerogams.

LEMNA, *Linnaeus*.

L. PAUCICOSTATA, Hegelm. In a marsh behind Katjui, Katchall (K.).

This order embraces the smallest known phanerogams. *L. minor* is the familiar duck-weed of our English ponds.

Order AROIDEÆ.

Flowers usually monœcious, more rarely diœcious or hermaphrodite, inserted on a simple spadix, furnished with a spathe, with or without a perianth. *Ovary* 1 to several-celled. *Ovules* basilar or parietal. *Fruit* a berry. *Seed* usually albuminous.

The *Aroideæ* are herbaceous perennial plants, with rhizome or tubers and then stemless, or caulescent with straight, branched, and arborescent stems, marked with petiolar scars, sometimes sarmentose, or climbing by means of adventitious roots, sometimes viviparous (*Romusatia vivipara*), very rarely floating (*Pistia*). The leaves of all known species but one (*Anthurium violaceum*) are glabrous, but in other respects very variable, sometimes recalling *Sparganiæ* (*Acorus*), sometimes *Marantaceæ* (*Aglaonema marantæfolium*), sometimes *Smilacææ* (*Goniurus*), sometimes *Tuccaceæ* (*Dracunculus*, *Amorphophallus*), and sometimes even some Dicotyledonous plants, as *Aquilarinææ* (*Heteropsis salicifolia*), or *Cycadææ* (*Zanioleucas*).

ARACIÆÆ.

Flowers dictinuous, achlamydeous, the female on the lower, the male on the upper part of the spadix.

Section PISTIACINÆÆ.

Spadix adnate to the spathe. Female flowers solitary, separate from the male flowers. Aquatic, floating herbs, stoloniferous or terrestrial, with tuberous rhizome.

PISTIA, *Linnaeus*.

P. STRATIOTES, L. (M.).

AMBROSINIA.

A. ? (M.).

Section DRACUNCULINÆÆ.

Spadix free, or rarely adnate to the base of the spathe. *Monœcious* or very rarely *diœcious*. *Flowers* male and female, sometimes separated by rudimentary organs. Herbs with usually a tuberous or thick rhizome. *Spathe* coloured, usually violet, glabrous or hairy within, and fœtid.

ARUM, *Linnaeus*.

Spathe convolute or tubular at the base. *Spadic* androgynous, the ovaries at base, the stamens higher up, with barren organs either between the ovaries and stamens, or above the stamens, or both; the rachis ending in a club-shaped or pointed appendix. *Stamens* distinct. *Anthors* 2-celled, sessile or on short filaments. *Ovaries* 1-celled with 1 or more ovules. *Rhizome* usually tuberous. *Leaves* entire, or 3-lobed, on long radical petioles. *Scapes* radical, without bracts under the spathe.

A. DIVARICATUM, L.

India. Ceylon. S. China.

A. RAPIFORME, Roxb. (M.).

A. TRILOBATUM, L. (M.).

A. orixense, Roxb.

Thwaites considers *A. orizense* as identical with the Linnæan plant. The roots are very acrid, and applied in poultices as a counter-irritant, and also to destroy maggots in the sores of cattle.

AMORPHOPHALTUS, *Blume*.

Spathe of *Arum*. *Spadix* continuously androgynous without barren organs, and ending in an appendix, sometimes very large. *Anthers* sessile, 2-celled. *Ovaries* distinct, 2-, 3- or rarely 4-celled, with 1 erect ovule in each cell. *Leaves* divided into 3 segments, which are again once or twice pinnately divided. *Spadix* often livid purple, and very fetid.

* *A. CAMPANULATUS*, Roxb. (M.). Cultivated.

Weh. Telinga potato.

Cultivated for its roots, which are cooked like yams, and highly esteemed, weighing each from four to eight pounds. In a good soil the yield is as much as 250 maunds (lbs. 20,000) to a Bigah.

Section COLOCASINÆ.

Spadix free, terminated by a naked and sterile appendage (*Colocasia*, etc.) or without appendage (*Caladium*, etc.). *Flowers* male and female, numerous, usually separated by rudimentary organs. Herbs with tuberous rhizomes, stemless or caulescent, sometimes climbing. *Spathe* usually sweet-scented.

COLOCASIA, *Ray*.

Spathe and *spadix* as in *Arum*. *Stamens* united, several together, in short truncate or peltate masses, with the anthers laterally adnate. *Ovaries* 1-celled or partially 3-celled, with several ovules. *Leaves* usually large and glaucous, cordate and sometimes peltate. *Spadix* usually sweet-scented.

* *C. ANTIQVORUM*, Schott. Cultivated in Burma and the Nicolars (K.).

Peing.

C. VIROSA, Kth.

Kamorta (K.).

C. INDICA, Voigt (M.).

Sit-tung.

C. ODORA, Voigt (M.).

Peing-mā-haw-ya.

Of this plant Dr. Mason remarks: "This is a most singular plant. It has a stem 1 or 2 feet high and 6 inches in diameter, resembling a low palm, while its leaves are like gigantic cabbage leaves 3 or 4 feet long, by 2 or 3 wide. The flowers are said to be fragrant. The natives do not cultivate it for food, like the other species of *Arum*, but, as they say, for medicine." In addition to the above species of this family, Dr. Mason gives the names of several others, some of which, it may be presumed, are cultivated varieties of *Colocasia*, which in India has several names in the vernacular. They are as follows:—Koung-gen-peing, Pan-nai-nat, Wet-kyouk-peing, Peing-kyan, Peing-mig, Peing-kyoung-khyac, Peing-shan, and Peing-pan-htwōn. The roots of *Colocasia* are much used as food, but are little esteemed by Europeans. The best way of cooking them is to boil them first, and then bake them, when the superior varieties would probably be found (especially where potatoes are unprocurable) more deserving of notice than they are generally thought.

Section ANAPORINÆ.

Spadix free (*Aglaonema*) or adnate to the spathe (*Spathicarpa*), rarely ending in a sterile appendage (*Pinellia*). *Flowers* female and male contiguous, the female usually mingled with *staminodes*. Herbs with knotted rhizome, stemless, or caulescent.

AGLAONEMA.

A. SIMPLEX, Bl.

Katchall and Kamorta (K.).

CALLACIÆ.

Flowers hermaphrodite, or male and female on the same spadix, aclamyldeous or not.

Section CALLINÆ.

Spathe coloured. Flowers aclamyldeous.

CHAMELOCLADON.

C. OVATUM, Schott.

Great Nicobar (K.).

SCINDAPSUS, Schott.

S. PTEROPODUS, T. et B.

Great Nicobar (K.).

The family of *Aroidæ* is of no great value to man, though many species yield edible roots, which, however, are chiefly in repute among the poorer classes. Some species are cultivated for the beauty and the variety of colour of their smooth cordate leaves (*Caladium*), whilst others are notorious for their repulsive odour. The *Arum maculatum* of our English hedges is a familiar example of this family, and is known by a variety of popular names, many of the older and now obsolete ones being of a highly indelicate character, and referring to the supposed amatory virtues of the plant, or the shape of the spadix. One of them, however, *Aaron*, is a mere vulgar corruption of the word *Arum*.¹ The most curious point, perhaps, about this family is the great amount of heat the flowering spadix of many *Arums* gives off, varying from 7° to 12° above that of the atmosphere, and even 22° according to some observers.

Section ORONTINÆ.

Spathe persistent, herbaceous or sometimes coloured, rarely wanting, covered with hermaphrodite flowers.

POTNOS, *Linnaeus*.

Flowers hermaphrodite, in a globular or cylindrical spike, usually stipitate above the convolute or concave spathe. *Perianth* of 6 small concave scales or segments. *Stamens* 6, opposite the perianth scales. *Filaments* flat. *Anthers* 2-celled. *Ovary* 1-celled with 1 to 3 erect ovules. *Stigma* sessile. *Berries* 1- or 2-seeded. *Albumen* none. *Stem* usually creeping or climbing. *Leaves* entire, coriaceous, usually articulate on the more or less dilated petioles. *Peduncles* axillary, often bracteate below the spathe.

P. SCANDENS, L.

The Nieobars (K.). India. S. China. Ceylon.

P. Seemannii, Schott. *Prod. Aroid.* p. 564, "and probably the whole of the first 19 species enumerated in that work."—Bentham.

P. PINNATIFIDA (P.).

P. GIGANTEA, Roxb. (M.).

Ngā-ya-gye.

P. RECURSIVA, Roxb. (P.).

P. LASIA, Roxb. (P.).

P. HETEROPHYLLA, Roxb. (P.).

Section ACORINÆ.

Spathe leaf-like, adnate to the peduncle. *Flowers* hermaphrodite, covering the spadix. *Leaves* ensiform, equitant, sheathing in vernation.

HOMALONEMA, *Linnaeus*.

H. AROMATICUM, Schott.

Kamorta. Pulu-Milu (K.).

¹ Consult "Popular Names of British Plants," by R. C. A. Prior, under "*Arum maculatum*," "Wake-pintle," and "Lords and Ladies."

ACORUS, *Linnaeus*.

Flowers hermaphrodite, in a cylindrical spike, the spathe linear and continuous with the scape. *Perianth* of 6 concave scales or segments. *Stamens* 6, opposite the segments. *Filaments* linear, flat. *Anthers* terminal. *Ovary* 3-celled, with several ovules in each cell. *Stigma* sessile on the obtuse top. *Seeds* albuminous.

A. CALAMUS, L. (M.).

Len-hai.

This is the sweet cane of the Scriptures, and not sugar-cane, as some have supposed (Mason).

The whole plant is aromatic, but the root alone preserves this quality in drying. It occurs in the bazaars in the shape of wrinkled pieces, and is esteemed by the Hindus as a stimulant in cases of ague and flatulency. The *Calamus aromaticus* of the ancients is considered by Royle to be a grass, *Andropogon calamus-aromaticus* one of the species yielding the fragrant 'grass oil.'

HAPALINE, *Schott*.

II. BENTHAMIANA, *Schott*.

Masonanthus niveus, *Kurz*.

Kurz thus describes this plant:—"A small glabrous herb about $\frac{1}{2}$ a foot high, with a somewhat tuberous root, at base sheathed with a long linear white sheath. *Leaves* 3 inches long, on petioles of equal length, oblong, deeply sinuate-cordate, the basal lobes overlapping each other, and bluntish-prolonged, glabrous, uniformly green, shortly acuminate, the nerves anastomosing. *Flowers* 2 or 3, from the rhizome on long slender 3 to 4 inch long scapes, the *spathe* snow-white, linear-lanceolate to lanceolate, about $\frac{1}{2}$ an inch long, complicate at base, net-veined, reflexed, the male *spadic* exserted, straight, linear-subulate, white, nearly as long as the *spathe*.

"In Eng Forests near Karway (Tsittoung), Martaban. A simple-looking but really attractive plant, growing clandestinely along with other varieties, such as *Hemiochlis Birmanica*, *Kurz*, and *Ariopsis*, on the sterile laterite ground. I have called it 'Dr. Mason's snow-white flower,' in honour of the Rev. Dr. Mason, at Toung-ngoo. Any one who knows this active and modest gentleman personally, and who knows a little about flower-language, will agree with me, that I could have selected no better plant for dedicating to him than the one before me."

It would seem, however, that the plant in question had already received a name, and the above words of *Kurz*, describing his *Masonanthus*, will alone remain as an honourable recognition of Dr. Mason's amiable qualities of heart and mind.

Order PANDANÆÆ.

Flowers dioecious or polygamous, naked, or simple or branched. *Spadices*, protected by many spathes. Male flowers: *Stamens* naked, simple, or variously connate. *Anthers* erect, 2-celled, the cells dehiscing longitudinally, truncate or the connective produced. Female flowers: *Ovaries* naked or rarely surrounded by sterile stamens, solitary or several united into a bundle, 1-celled, the ovules solitary or numerous, and inserted in 2 series along the bi- to septi-parietal placentas; stigmas often sessile. *Drupe*s fibrous-woody or fleshy, free or variously connate, 1- or many-seeded. *Testa* membranous or rarely crustaceous. *Albumen* fleshy. *Embryo* almost basal, small, with an inferior radicle. Trees branched or simple-stemmed, or shrubs often scandent or supported by strong aerial roots. *Leaves* simple, elongate, sessile, parallel-nerved, often spiny along the margin, distichous, or arranged in a triple or rarely simple spiral. *Drupe*s simple or compound, collected in more or less compact heads (*syncarps*).

PANDANUS, *Linnaeus*.

Flowers dioecious. Males: *Spadic* compound fleshy, at the base, and at the branchings furnished with yellow or white spathes. *Stamens* very numerous, single, or more usually united into bundles. *Anthers* erect, 2-celled. Females: *Spadic* often

simple, rarely branched, similarly protected by pale green, rarely whitish leafy spathes. *Drapes* fibrous, woody, with a fleshy epicarp, arranged into compact heads, free or united into bundles, usually angular pyramidal, 1-seeded, or as many (or fewer) seeds as drupes thus united. *Putamen* bony. *Seeds* large, strophiolate.

* *Drapes simple.*

† *Stigmas simple, spiny-acuminate, continuous with the apex of the drupe. Stamens free. Anthers acuminate.*

P. FŒTIDUS, Roxb. *E.S.* Tidal forests of Arakan and Tenasserim.

Tha-kyet or Tau-tha-kyet (Kurz).

Shrubby, soboliferous. *Drapes* quite smooth.

†† *Stigmas spinescent, and often depressed, usually 2-3-forked, horny and deciduous. Stamens palmately connate. Anthers aristate or spiculate.*

P. FURCATUS, Roxb., *E.T.* Tree forests of Chittagong, Pegu, and Tenasserim.

A large robust tree. Leaves 2-4 inches broad, spiny armed. *Stigmas* forkedly 2-3 spinous.

A. GRAMINIFOLIUS, Kz., *E.T.* Tenasserim.

A slender screw pine. Leaves only 3-4 lines broad, minutely spinulose. *Stigmas* very short, blunt.

** *Drapes united into phalanges (rarely the one or two, simple). Stigmas sessile, or nearly so, reniform, or peltate. Stamens racemose-united; the anthers aristate.*

† *Leaves spiny along the margins and midrib.*

P. LERAM, Jones, *E.T.* Marshy spots in coast forests of the Andamans and Nicobars.

¹ Leaves dark-green, 4-5 inches broad, 15-18 feet long, phalanges the size of the fist.

P. ANDAMANENSIS, Kz. *E.T.* Tree forests of the Andamans.

As the last, but drupes only 2 inches long. Leaves gradually acuminate.

P. ODORATISSIMUS, L. f. *E.T.* Coasts of Burma. The Andamans.

Tsat-tha-pu (Kurz). Kamorta and Katchall.

Leaves glaucous or whitish, 3-5 feet long.

†† *Leaves with smooth margins.*

* P. LEVIS, Rumph. Cultivated about villages.

As the last, but all parts without spines.

Kurz makes the following observations on some peculiarities presented by species of this genus (J.A.S.B. 1876, Part 11, p. 152):—"The form which grows along the beaches forms arboreous ascending shrubs, much branched, and sending down quite a labyrinth of straight aerial roots, but the one which grows on the heaths is entirely different, being a small tree from twenty to twenty-five feet in height, with a stout grey simple stem, which sends down short and thick aerial roots, from the lowermost part only, while the crown is small, sparingly and shortly branched, and very dense.

"There are besides, two varieties of these trees on the heaths, the one having the stigmas normal, as in the littoral form, and the drupes connate high up, so as to affect a tessellated appearance, while the other variety has the drupes free for about one fourth of their length from the top, terminating in short erect points, on the inner

¹ There is some discrepancy here I cannot rectify. In the index of species the leaves are described as 15-18 feet long and 4-5 inches broad, whilst in the textual description they are described as 8-15 feet long by 2-3 inches broad (W.T.).

surface of which the linear-lanceolate stigmas are situated. The foliage in the one is darker green, but the male flowers of both varieties are exactly the same. Dr. Hance (in Trim. Jour. Bot. 1875, p. 68) has remarked upon the variability of the stigmas in screw-pines, but overlooked that I had myself pointed out this fact (Jour. Bot. 1867, p. 99) with the qualification, that they vary without therefore giving up their essential value. The stigmas ought to be described from the ovaries, or the young drupes, but it is difficult to collect such. It is usually only after the syncarpus have attained some size that they catch the eye.

“The male organs appear to me to be of much higher value, in grouping the species of *Pandanus*, but the time has not yet arrived, when these organs shall be available for all, or even for most of the species. *Pandanus helicopus* was correctly placed by me in the section *Ryckia*, as I find on re-examination of my material, and I have also since obtained the male spadices of it, which show racemose anthers.”

The *Pandanus* is a useful tree. The basal pulpy part of the drupes can be eaten on emergency, as also can the tender white base of the leaves. The male flowers of the *P. odoratissimus* exhale a delightful perfume. The leaves are used for thatching, and when split up into strips, are made up into soft and durable mats, used either for packing purposes or made into bags to hold different sorts of produce, whilst from the tough strong roots, split up, baskets are made.

FREYCINETIA, Gaudichaud.

Flowers dioecious, or rarely spuriously polygamous, in simple or branched spadices. *Males*: *Stamens* free, naked. *Anthers* 2-celled, opening longitudinally. *Females*: *Ovaries* naked, or surrounded by sterile stamens, united into bundles, 1-celled, with as many parietal placentas, as sessile stigmas. *Ovules* numerous, attached in 2 series to the placentas. *Berries* united in a fleshy syncarp. *Seeds* very numerous, minute.

F. INSIGNIS, Bl., E.S.S.

Tree forests of the Andamans,
Katchall, and Kamorta (K.).

Leaves 3-stichous, 1½-3 feet long, spinulose-serrate in the margins and mid-rib. Stigmas 3-1, horse-shoe shape.

F. SCANDENS, Gaud.

Katchall and Kamorta (K.).

Kurz is in doubt if this is Gaudichaud's plant, or the young state of the last.

PALMALES.

Flowers hermaphrodite, unisexual, or polygamous. *Perianth* double, each of 3 segments in 2 distinct series, imbricate or valvate in bud. *Stamens* 6, or rarely more, or three only. *Anthers* versatile, 2 celled. *Ovary* usually consisting of 3 carpels, free or united, in a 3-celled ovary, with a solitary or rarely 2 erect ovules in each carpel or cell. *Stigmas* 3, usually sessile, undivided. *Fruit* either a 3- or 1-celled drupe or berry, or consisting of 3 distinct drupes or berries, either all developed, or 1 or 2 of them aborted. *Pericarp* smooth, or variously rough, retrorsely scaled. *Seed* erect or laterally attached. *Albumen* first milky, then indurating and horny, or bony-homogeneous, or acuminate, solid, or hollow in the centre, or outside. *Embryo* small, in a cavity near the outside of the albumen. *Simple* or soboliferous trees, erect or decumbent, very rarely branched, or lofty scandent shrubs. Leaves usually very large, usually crowded at the summit of the trunk, or alternate folded in the bud, pinnately or palmately divided, rarely simple, the petioles more or less sheathing. Flowers comparatively small, usually sessile, in simple or panicle spikes, enclosed when young in several, or rarely in single sheathing bracts, called spathes, and usually with 3 small bractlets under each flower.

A large noble group, which yields wine, oil, wax, sago, flour, dragon's-blood, sugar, fibre, utensils, weapons, food, and habitations. The cocoa, date, betel-nut, palmyra, rattan, etc., are well known. Kurz remarks: "The size of the palms is often enough variable and, amongst the many examples, I shall mention only *Phoenix paludosa*, the stem of which varies in height from only 2 to 3 feet up to 15 to 25 feet. Sobolification is a character of little value in my eyes. I look upon it rather as an idiosyncrasy, and, therefore, not even as a sufficient character on which to establish a variety. No doubt in very many species this character has become general and constant, but atavisms are not unfrequent. We know, for example, cases in which the common betel-nut palm has made as many as 7 shoots, and similar examples are not wanting (especially in *Phoenix*, *Cocos*, *Arenga*, *Euterpe*). *Areca triandra* has simple and soboliferous trunks with all intermediate states, and I have, therefore, unhesitatingly connected with it *A. lara*, a species that differs in no structural points. *Caryota sobolifera* is another example wherein simple-stemmed and soboliferous plants may occasionally be found in the Burmese jungles not a dozen yards from one another. Species based upon such distinctions, if not also accompanied by structural differences, are in my opinion untenable, and grouping palm-species after such a character is simply misleading.

"Again, the armature in *Calamus* would appear to me to be also subject to variation within certain limits. It certainly is often very different, according to the age of the rattan itself, or accordingly as the sheaths come from the lower or upper parts of the plant. On the other hand, the *Calami* (including *Dæmonorops*) offer so many valuable characters in their spathes and spathules, nature of seeds, loræ, and flagellæ, and, finally, in the scales and stamens, that we may confidently look forward to a sound and natural classification of the rattans so soon as the numerous book-species, often based upon incomplete pieces only, shall have been got rid of. The difference in the scales of the fruits of *Calamus* in different stages of growth is so far as possible illustrated in the present paper. The indument of the inflorescences and their spathes seems to afford valuable characters, especially to herbarium-botanists. The colour, however, of the same varies greatly in the same species, as for example in *A. gracilis*, in which some individuals have yellowish-white and bright scarlet *spadices*, while others have them greenish-purple.

"Burmese palms are still very incompletely known, especially the rattans. While the distributional area of the *leincarpous* palms is greater than one might have expected, that of the rattans is singularly restricted and limited. Thus I have been unable, in spite of all the pains I have taken, to identify several of my Burmese rattans with any of the 100 species or thereabouts already published. Only the more light-loving species, such as *C. Guruba*, *fasciculatus*, etc., have a wider distribution."

Sub-family CALAMEÆ.

* Fruit covered with retrorsely imbricate scales or bristles. Seeds often arillate. Usually armed climbers, rarely erect or unarmed.

† Flowers spirally arranged, forming a dense cylindrical spike.

ZALACCA, Rumphius.

Erect palms, stemless or nearly so. *Albumen* homogeneous. *Male flowers* solitary or paired, bracteate within the small spathaceous-connate spathules, and enclosed by 2 boat-shaped connate bracts. *Female flowers* solitary within the small spathule and enclosed within 2 ovular bractlets. *Calyx* in both sexes trifid. *Drupe* almost 1-celled, through thinning of the cell-walls, 1 to 3-seeded. *Seeds* with a dense fleshy arillus.

Z. WALLICHIANA, Mart.

Tree forests all over Pegu and Tenasserim.

Z. edulis, Reinw. (apud Mason).

Yen-gan-khyo, or Khyen.

The fruit is eaten by natives according to Dr. Mason, who further remarks: "The Selungs of the Mergui Archipelago shoot over their waters with remarkably light

boats, and they owe their buoyancy to the materials that form their sides, which are the stems of the edible *Zalacca*. These stems are as light and of the consistency of cork, for which they are often substituted, and the Selungs are skilful in uniting them together to serve instead of planks, so as to make an unequalled sea-boat, that floats on the waves like a swan."

KORTHALSIA, *Blume*.

Scandent palms. *Albumen* ruminat. *Flowers* dioecious, solitary, within a scale-like bract, and embraced by 2 bractlets, united in a cup forming a terete catkin or spike. *Corolla* tripartite. *Drupe* 1-seeded, densely covered with rigid, imbricate retrorse scales.

K. SCAPHIGERA, Mart. *E.S.P.* All over the Andamans.

Spines on the petioles almost straight, 3-4 lines long. *Drupe* obovoid, $\frac{1}{2}$ inch long.

K. LACINIOSA, Mart. *E.S.P.* Tenasserim.

Spines on the petioles short, reflexed. *Drupe* turbinate, the size of a small pea.

†† *Flowers distichous* (very rarely spuriously unilateral). *Scandent, often lofty palms, very rarely erect.*

PLECTOCOMIA, *Blume*.

Flowers in small naked racemes or spikes, hidden by the distichously imbricate spathes, and arranged in long tail-shaped paniced catkins; Dioecious. *Male* flowers in pairs. *Stamens* 6. *Females* solitary. *Calyx* and *corolla* 3-parted. *Drupe* densely covered with reflexed imbricate shining scales, 1-seeded. *Leaves* pinnate, the rachis terminating in a whip-like tendril armed with recurved thorns.

P. MACROSTACHYA, Kz. *E.C.* Tenasserim. Bithoko Range at 3000 feet.

All parts glabrous, the petiole and rachis spiny. Spines straight, up to $\frac{1}{2}$ inch long. A lofty climber, distinguished from *P. elongata*, Bl., by its larger flowers and more densely imbricate spathules.

CALAMUS, *Linnaeus*.

Flowers solitary in the spathules, forming panicles, polygamously dioecious. *Calyx* and *corolla* tripartite. *Stamens* 6. *Drupe* covered with retrorsely imbricate scales, 1-seeded. *Arillus* watery, white or rosy, often edible. Evergreens, known as 'rattans.'

* *Flowers usually sessile, spathes persistent, all tubular or flattened, not from a tubular base. Albumen usually homogeneous.*

† *Drupe sessile, i.e. the perianth more or less spreading and adhering to the base of the fruit. Spathules of the spikes much imbricated, the exerted part cymbiform, shorter than broad, truncate.*

‡ *Scales of fruit without a conspicuous appendage.*

Δ *Pinnæ equidistant, no leaf tendrils.*

C. ARBORESCENS, Griff. Tree forests in marshy spots, Pegu. Dun-oung (Kurz).

A stoloniferous, gregarious, erect, tufted cane. *Pinnæ* white beneath. *Leaves* 6-8 feet long, non-flagellate.

C. ERECTUS, Roxb. Tree forests of Chittagong and Pegu. Theing (Kurz).

Low tufted, *Zalacca*-like palm, all parts glabrous. *Leaves* uniformly green, and 8-12 feet long.

Δ Δ *Pinnæ fascicled or interruptedly approximate.*

C. FASCICULATUS, Roxb. All over Burma and the Andamans. Kycing-kha (Kurz).

Young stem whitish, powdery. *Leaves* without tendrils. *Pinnæ* interruptedly fascicled. *Drapes* globular, straw-coloured.

C. LATIFOLIUS, Roxb. Tree forests all over Burma and the Andamans.
Yan-ma-htā.

Glabrous. *Leaves* tendril-bearing. *Pinnæ* broad, alternately approximate. *Drapes* oblong, brown.

†† *Scales of fruits produced into a fringed appendage as long or longer than the crustaceous scale itself.*

C. ANDAMANICUS, Kz. The Andamans and Tree forests of
Kamorta and Car Nicobar.

Leaves tendril-bearing. Inflorescence without tendrils. *Drapes* $\frac{1}{2}$ inch long, straw-coloured.

C. TIGRINUS, Kz. Tree Forests of Pegu. Tenasserim and the Andamans.
Lemay.

Leaves without tendrils. Inflorescence with tendrils. *Drapes* an inch long or more, variegated dark and pale brown.

†† *Drapes seated on the erect, indurated, thick, pedicel-like perianth. Spathules usually long-exserted and tubular, rarely cymbiform and imbricate, rarely truncate.*

Spathules imbricate, broader than long, truncate.

C. TENUIS, Roxb. Chittagong and Pegu.

Leaves without tendrils. *Pinnæ* equidistant. *Drapes* globular, $\frac{1}{3}$ inch thick, straw-coloured.

Spathules exserted and rather elongate.

° *Spathes with a short acute limb only.*

C. GRACILIS, Roxb. Chittagong.

Leaves without tendrils. *Pinnæ* interruptedly-approximate. *Drapes* ellipsoid, straw-coloured, nearly an inch long.

C. HELFERIANUS, Kz. Tenasserim (or the Andamans).

Leaves without tendrils. *Pinnæ* equidistant, narrow. *Spathes* green, very thin, compressed-tubular, almost unarmed.

C. PARADOXUS, Kz. Tree forests of Palawa-zek (Toukyakat) East of Toung-ngoo.

Leaves tendril-bearing. *Pinnæ* distinct, alternately approximate. *Male flowers* in recurved small spikelets, or fascicles exserted from the spathules.

°° *Lower spathes expanded in a flat elongate limb, only at the short base tubular.*

C. GURUBA, Mart. All over Burma.

Kyeing-ni (Kurz).

Leaves without tendrils. *Pinnæ* narrow, equidistant. *Drapes* globular, the size of a pea, the scales straw-coloured with dark borders.

** *Flowers usually pedicelled. Spathes deciduous, the outer one boat-shaped and large. Albumen usually ruminate.*

DEMONOROPS, Blume.

Spathes cleft to the base. *Spathules* incomplete, reduced to bracteoles. *Spadix* erect, stiff, never tendril-bearing. Scandent rattan Palms.

† *Spathes unarmed, or nearly so.*

D. HYPOLEUCUS, Kz. Tenasserim. The Thoungyeen Valley.

Leaves without tendrils. *Pinnæ* interruptedly approximate, white beneath.

†† *Spathes, or at least the outer ones, much armed.*

D. GRANDIS, Griff.

Tree forests of the Andamans.

Leaves uniformly green. Sheaths and spathes outside fearfully armed with flat, glossy, black spines. *Drupe*s globular, the size of a cherry. 'Dragon's-blood' is sparingly produced by this tree (Kurz).

Dr. Mason records the following species, which are, most of them, no doubt, included in the above list of species of *Calamus* by Kurz: *C. platyspathus*, Griff.; *C. palustris*, Griff.; *C. melanacanthus*, Griff.; *C. concinnus*, Griff.; *C. nitidus*, Griff.; *C. laciniatus*, Griff.; *C. longisetus*, Griff., and the following vernacular names of various *Calami*: Kyeing-ta-boung, Kyeing-khã, Kyeing-na-tha, Kyeing-tan, Kyeing-bök, Hpwe-to-mã, 'Ta-nen-tha-ri-kyeing,'¹ Kyeing-lipyu, Thwön-kyeing.

Sub-family PALMÆ GENUINÆ.

Fruits not imbricate-scaly, but smooth or variously rough or tubercled. Seeds without arillus. Usually erect, very rarely armed palms.

FLABELLATÆ.

Leaves fan-shaped. Perianth complete in both sexes. Erect valves.

§ *Coraphinae*. Ovary apocarpous, consisting of 3 free, or apically united carpels, or only the styles united, usually only one of the carpels coming to perfection.

CORYPHA, *Linnaeus*.

Flowers hermaphrodite; clustered. *Stamens* hypogynous. *Drupe* corticate. *Pinne* united into a blade. Erect palms, dying off after flowering.

*Drupe*s the size of a wood-apple or orange.

C. UMBRACULIFERA, L.

Cultivated in Tenasserim.

Pe-peh.

All parts glabrous. Trunk lofty, annulated (not spirally grooved). *Drupe*s $\frac{1}{2}$ inch long, solitary or by 2-3, dirty blue. *Albumen* homogeneous, horny.

A noble Palm, which however dies off after flowering. The pith of the trunk yields a sort of sago, and the leaves are made into huge fans.

*Drupe*s the size of a cherry.

C. GEBANGA, Bl.

Occasionally cultivated.

C. elata, Roxb.

Trunk spirally grooved, as if twisted, 60-70 feet long. *Petioles* 6-12 feet long. The pith yields a sort of sago.

C. MACROPODA, Kz.

Bamboo Jungles on Termoklee and Western side of South Andaman.

Dondar (of the Andamanese).

Trunk 8-12 feet long. *Petioles* 18-25 feet long.

‡ ‡ *Inflorescences* axillary, corolla 3-parted. *Drupe* sappy.

LIVISTONA, *R. Brown*.

Flowers hermaphrodite, clustered. *Stamens* perigynous. *Albumen* with a cavity filled with the intruding integuments. *Pinne* connate in a blade.

L. SPECIOSA, Kz.

Tree forests of the Eastern slopes of the Pegu Range and Upper Tenasserim.

Htan-myook-lu, Tor-ltau (Kurz).

Leaves palmately flabellate, 6-7 feet across, plaited, the petiole at the base, up to an inch broad, and armed with strong sharp falcately-curved flattish, black spines.

CHAMEROPS, *Linnaeus*.

Flowers polygamous, several together. *Stamens* hypogynous. *Albumen* with a longitudinal furrow. *Pinne* united into a blade. Erect palms.

¹ Corrupted by the English into 'Tenasserim'!

C. KHASYANA, Griff. Khakyen Hills and Martaban at 4000 and 6500 feet.

Leaves palmately flabellate, 4-5 feet across. Fruit-bearing spadix decompoundly branched, panicle-like, nodding, glabrous.

LICUALA, *Rumphius*.

Flowers hermaphrodite, solitary, or by twos or threes. *Stamens* perigynous, the filaments inserted at the throat, and united into a ring. *Pinnæ* free or united with flabellate segments by threes or more.

* *Flowers large. Leaves peltately flabellate.*

L. FELTATA, Roxb. Tree forests all over Burma and the Andamans.

Sa-lu (Kurz).

Calyx $\frac{1}{4}$ to $\frac{1}{3}$ of an inch long.

** *Flowers small. Calyx not above 2 lines long. Leaves palmately-flabellate.*

L. PALUDOSA, Griff. Tidal forests and swamps in the Andamans.

Trunk 4-8 feet long. *Petioles* aculeate, bordered along their whole length. *Calyx* about a line long.

L. LONGIPES, Griff. Forest south of Mergui.

Shā-zoung. Pinang lawyer.

Almost stemless. *Petioles* unarmed for the upper third of their length. *Calyx* $1\frac{1}{2}$ line long.

Carpels syncarpous. The ovary 2-4-celled, with as many ovules. Drupes 2-4-celled, with as many seeds.

§ § *Borassina. Ovary syncarpous, 2-4-celled, with as many ovules. Drupes 2-4-celled, with as many seeds.*

BORASSUS, *Linnaeus*.

Spathes incomplete, several. *Corolla* imbricate in bud. *Drupe* large, fleshy, fibrous. *Seeds* soapy, with an apical pore. *Pinnæ* united into a blade. Erect palm.

* B. FLABELLIFORMIS, L. Cultivated in Ava and Prome.

Htan.

The common fan palm.

This is a tree of considerable value. In the Prome district it is largely cultivated for its 'toddy,' which is not only fermented and vended for its exhilarating properties, but is boiled down and a large quantity of coarse sugar thence obtained. The seeds are eaten, their gelatinous flesh being very refreshing, and the young shoots (the seeds being planted in beds to germinate) are eaten as a vegetable, though apt to be stringy to a European palate. The leaves serve a variety of purposes, and the trunk, when split up, yields ratters, pipes or conduits, as may be required. The external fibres are of iron-hardness, and the wood cut transversely has a pretty look, and might be used effectively for inlaid work. It also makes pretty sticks, though not so good as some canes. According to Dr. Balfour (*Forest Trees*), it is one of the strongest woods in tensile strength experimented on by Dr. Wight and Mr. G. Rohde; but its small scantling (the external hard portion being alone used) will always tell against its employment, save in petty or ephemeral combinations. One piece of information embodied by Dr. Balfour is worth preserving as a curiosity. "The timber of the female tree is the hardest and best, and that of the male tree is never used, unless the tree be very old. It is too heavy to make ships of." The *ships* the writer had in his mind's eye, when penning the above passage, must surely have been 'dug-outs'!

PINNATE.

Leaves pinnate or bi-pinnate, or pinnatisect; rarely almost entire. Perianth complete in both sexes.

§§ *Caryotea*. *Spathes* serreal, tubular or sheathing, persistent. *Pinnæ* of the leaves often fasciated, jagged or crose-toothed. *Ovary* syncarpous, 3-celled, with as many ovules.

† *Spathes* serreal, tubular or sheathing, persistent. *Pinnæ* of leaves often fasciated, jagged, or crose-toothed. *Erect Palms*.

Leaves bipinnate.

CARYOTA, *Linnaus*.

Flowers monœcious, on the same spadix. *Stamens* indefinite. *Petals* in females imbricate in bud. *Drupe* sappy. *Albumen* horny, ruminant. *Berries* globular or nearly so.

C. TRENIS, L.

Ava and Pegu.

Min-bō (Kurz).

Simple-stemmed. *Male petals* about $\frac{1}{2}$ inch long by 3-4 lines broad. *Anthers* acuminate.

The pith yields sago, and both species fibre from the leaves.

C. SOBOLIFERA, Wall.

Arakan. Tenasserim and the Andamans, but not yet noticed in the Pegu range.

Soboliferous. *Male petals* about 4 lines long by $1\frac{1}{2}$ line broad. *Anthers* mucronulate to emarginate.

Leaves simply pinnate. Petals in females valvate.

WALLICHA, *Roxburgh*.

Flowers monœcious on different spadices, rarely diœcious. *Ovary* 2-celled. *Stamens* often definite. *Drupe* sappy. *Albumen* homogeneous.

Male spikes almost filiform.

W. CARYOTOIDES, Roxb.

Tree forests of Chittagong. Ava and Tenasserim.

Zanoung (Kurz). Generic.

Stemless, tufted. *Male flowers* yellowish, the calyx tubular, about a line long. *Drupe*s the size of a nutmeg.

Male spikes thick and rigid. Spadix of both sexes very ample. Male flowers purplish or green.

Leaves placed in a $\frac{1}{3}$ spiral.

W. DENSIFLORA, Mart.

Chittagong.

W. oblongifolia, Griff.

Calyx tubular, nearly a line long. A stemless, tufted palm.

W. YOMIE, Kz.

Eastern slopes of the Pegu Range and Kombalu-toung.

W. disticha, Kz.

Calyx minute, cup-shaped, only $\frac{1}{4}$ of a line deep. *Trunk* 3-4 feet high, robust.

ARENGA, *Labill*.

Flowers monœcious on different spadices. *Stamens* indefinite. *Ovary* 3-celled. *Drupe* depressed, triangular, rather dry. *Albumen* homogeneous.

A. SACCHARIFERA, Lab.

Eastern slopes of the Pegu Range and Tenasserim.

Toung-ong.

Trunk 20-40 feet, covered (especially above) with the petioles and netted by the strong black fibrous remnants of the sheaths. *Drupe*s $1\frac{1}{2}$ -2 inches long, yellowish, smooth, pericarp coriaceous, the mesocarp jelly-like and full of raphides. *Pyrenes* 3, dull black, convex on the outer, bifacial on the inner side.

The trunk is easily hollowed, and then forms a good water pipe. The black stringy fibres form a rope peculiarly resistant of decay when wet; the pith of the trunk yields sago; the leaves fibre; and the tree when flowering furnishes toddy

like other palms. Kurz remarks: "Besides its well-known value for toddy, sugar, and fibre, this palm is especially adapted for the support of orchids, ferns, and other epiphytical plants, for which purpose it is highly recommendable to horticulturists in tropical climates."

§§ *Phaniceæ*. *Spathes* 1-2, boat-shaped, persistent. *Ovary* apocarpous, consisting of 3 distinct carpels. *Pinnæ* often fascicled. *Erect* palms.

PUGENIX, *Linnaeus*.

Dioecious trees. *Spathes* 1 or 2, boat-shaped. *Corolla* in males valvate, in females imbricate. *Drupe*s sappy, single. *Albumen* homogeneous. *Lower pinnae* spiny, reduced.

†† *Spathes* glabrous; flowers supported by a small subulate bract.

P. ACAULIS, Roxb.

'Eng' forests of Pegu and Martaban.

Thin-loung (Kurz).

Stemless. *Petioles* rather long and slender. Spiny-armed.

††† *Spathes* covered with a brown scurf. *Flowers* without a bract.

* P. SYLVESTRIS, Roxb.

Cultivated about Chittagong.

Simple stemmed, robust. *Petioles* very short and dilated, spiny-armed. *Drupe*s about an inch long.

P. PALUOSA, Roxb.

Tidal forests of Burma and the Andamans.

Then-boung.

Soboliferous, slender. *Petioles* long and slender, spiny-armed. *Drupe*s about $\frac{1}{2}$ an inch long.

A considerable quantity of date sugar is made from the juice collected from the tree when about to flower. Most trees found near villages bear the scars caused by this process, and many trees are rendered deformed and unsightly thereby.

Mason gives also *P. dactylifera*, which he names Swön pa-lwön, but this species is not included by Kurz.

§§§ *Arecinæ*. *Spathes* 1-2, boat-shaped, caducous. *Putamen* not perforated. *Albumen* solid, homogeneous or ruminant. *Pinnæ* neither fascicled nor coarse-toothed. *Erect* palms.

PINANGA, *Blume*.

Flowers monoecious, immersed in the cavities of the rachis. *Stamens* indefinite. *Stigma* 1. *Albumen* ruminant. *Pinnæ* irregularly united into segments, rarely all united into a bifid blade.

Flowers distichous.

P. COSTATA, Bl.

Tree forests of South Andaman.

Soboliferous, tufted. *Spadix* branched. *Sheaths* slightly scurfy.

Flowers tristichous.

P. (ARECA) GRACILIS, Roxb.

Tree forests all over Burma, especially in marshy spots.

Tan-kwam-thi (Kurz).

Simple-stemmed. *Spadix* slender, ramified or simple. *Sheaths* scurfy.

Flowers 5-6-stichous.

P. (ARECA) HEXASTICHA, Kz.

Marshy spots in Southern Pegu, as near Kyan-zu and Kya-eng.

Simple-stemmed. *Spadix* simple, fleshy, as thick as the finger. *Sheaths* scurfy.

ARECA, *Linnaeus*.

Very like the last, but *stamens* 6 to 3. *Stigmas* 3. *Female flowers* lateral, between the ramifications, rarely axillary.

Stamens 6. Female flowers without a bract.

*A. CATECHU, L. Cultivated, especially in Tenasserim, wild on
Kwam-thi-pen. Betel-nut palm. Kamorta and Katchall.
Glabrous, simple-stemmed. *Drupes* as large as a hen's egg, orange or scarlet.

Stamens 3. Female flowers without a bract.

A. TRIANDRA, Roxb. Tree forests of Chittagong and the Andamans.
Tan-kwam-thi.
Glabrous, simple stemmed or stoloniferous.

ORANIA.

O. NICOBARICA, Kurz. Kamorta.
Spathes spindle-shaped or clavate. Putamen at the base 3-porous, albumen hollow.

Cocos, Linnæus.

Flowers monœcious, on the same spadix. *Petals* in females imbricate-convolute.
Ovary 3-celled, only one of the cells ovule-bearing. *Drupes* large, woolly.

*C. NUCIFERA, L. Cultivated all over Burma, but only thriving near the sea.
Ong. Wild on the Cocos and Nicobars and the North-western
Coast of North Andaman.

The cocoa-nut Palm is one of the most valuable of this order, and thrives best in sandy soils within reach of the sea air, and even sea spray.

NIPINÆ.

Perianth of females reduced to a few scales. Carpels 3, apocarpous. Male flowers in separate spadices, surrounding the central solitary female head. Leaves pinnate.

NIPA, Rumphius.

Spathes many, sheathing, persistent. *Male perianth* sex-partite, valvate in bud.
Stamens united by threes. *Drupes* woody, angular-turbinate, in a large dense head.
Albumen homogeneous, hollow.

N. FRUTICANS, Wurm. Tidal forests of Burma, the Andamans and Nicobars.
Da-ni.

The thatching or 'Dunny' palm.

This palm is often cultivated along river banks and tideways for its leaves, which are used for thatching. Kurz remarks that its seeds would supply vegetable ivory, but I do not know if they are now so used.

Sub-division b. OVARY APOCARPOUS.

(reduced to one carpel in some *Naiadææ*).

POTAMALES.

Flowers hermaphrodite or unisexual. *Perianth* of 3, 4, or 6 segments, or more.
Carpels 1-ovuled. *Style* basal or lateral. *Seed* minute, with very dense albumen and obscure embryo. Minute leafless slender herbs.

Order NAIADÆÆ.

Marine or freshwater, annual, or perennial herbs.

NAJAS.

N. sp. In water-holes behind Katjui, Kamorta (K.).

CYMODOCEA, *Koenig*.

C. sp.

Kurz describes a species of this genus as forming submarine meadows about the coral reefs round Kamorta, at a depth of from 2 to 4 fathoms (J.A.S.B. 1876, Part II p. 153).

Zostera is also included by Diedrichsen in his list of Nicobar plants.

HALOPHILA.

H. OVALIS, H. f.

Submarine banks off Katchall (K.).

EUPALUS ACOROIDES, Steud.

Nicobars (K.).

Kurz (*l.c.*) describes this species as not attaining to more than 6 inches in length, on the reefs off Katchall, whereas in the debouchures of rivers it grows to 4 feet in length, owing, it may be presumed, to the presence of a mixture of freshwater.

Order POTAMELE.

Annual or perennial plants growing in salt, brackish or freshwater. An order of little importance.

POTAMOGETON, *Linnaeus*.

P. INDICUS, Roxb. (M.).

SPATHIUM, *Loureiro*.

S. CHINENSE, Lour. (M.).

Pegu.

The roots are said by Voigt to be nearly as good as potatoes.

Order ALISMACEÆ.

Aquatic or marsh herbs, perennial, and sometimes producing subterranean tuber-like buds. An order of little importance.

ALISMA, *Jussieu*.

A. sp. (M.).

Division B. OVARY INFERIOR.

(Superior in some *Bromeliaceæ* and *Hemodoracæ*).

Perianth usually distinct, bi-seriate and coloured.

Albumen fleshy or horny. *Embryo* distinct.

DIOSCORALES.

Flowers diœcious, regular. *Perianth* herbaceous. Stamens 6, inserted at the base of the perianth segments. Ovary 3-celled. Fruit a berry or capsule. Seeds with copious fleshy dense albumen, and a distinct included embryo. Leaves net-veined. Climbing herbs or under-shrubs.

Order DIOSCOREÆ.

Flowers diœcious. *Perianth* superior, sex-merous, bi-seriate. *Stamens* 6. *Ovary* inferior with 3, 2, or 1-ovuled cells. *Ovules* pendulous, superimposed, anatropous. *Fruit* a capsule or berry.

DIOSCOREA, *Linnaeus*.

Flowers diœcious. *Capsule* 3-angled or 3-lobed, opening loculicidally at the angles, often leaving the nerve-like edge free. *Seeds* winged. Stems twining.

D. OPPOSITIFOLIA, L.

Silhet. Ceylon. S. China.

D. GLABRA, Roxb.

Kamorta and Great Nicobar (K.). Silhet.

D. batatas of China may be a cultivated form of this species (Bentham).

**D. FASCICULATA*, Roxb. (M.).

Ka-dwai-u. Karen Potato, or Tavoy Potato.

This is a small species, not larger than a kidney potato, and excellent in flavour, but procurable only during a few months in the year. In Bengal it yields an arrowroot.

**D. GLOBOSA*, Roxb.

Cultivated (M.).

Myouk-hpyu. Large white yam.

This is one of the best yams, and its flowers are highly fragrant.

D. ALATA, Willd. (M.).

**D. ATROPURPUREA*, Roxb.

Cultivated (M.).

Myouk-ni.

The root is of a dark purple colour and of a good quality, its large and irregular tubers growing so near the surface as to cause it to crack over them. *D. purpurea* is also highly esteemed, and its tubers are said to attain to 3 feet in length.

D. CRISPATA, Roxb. (M.).

Myouk-kyä.

D. RUBELLA, MacClell. (M.).

D. ANGUINA, MacClell. (M.).

D. VERSICOLOR, Bueh. (M.).

D. DILMONTUM, Roxb.

Kywai. Wild Yam.

This is a species with ternate leaves, nearly a foot long and 6 inches wide, and is very acrid and poisonous, but eaten, according to Dr. Mason, by the Karens in times of scarcity. Other wild species, as *D. bulbifera* and *D. pentaphylla*, are very acrid and poisonous, but capable of being rendered edible, by slicing and steeping in a solution of wood ashes, before cooking. Indeed, old Rumphius goes so far as to see a beneficent design in the poisonous juices of this plant, and remarks, "Creator sapienter hanc impregnavit radicem hoc succo, ut ab apris intacta hominibus cibo inserviret!" A still more illustrious authority has suggested if the appearance on the globe of such luscious fishes as the salmon, was not, providentially, deferred to the epoch wherein we know them to have appeared, for the gastronomic delectation of men (and Ahlermen), and in order that their succulent flesh and fine flavour should not be wasted on the inappreciative appetites of Palæozoic Ganoids. We are bound to treat the teleological argument with respect, but nevertheless it sounds but queerly!

In this connexion one is irresistibly impressed with the eugeney of the argument of Pope—

"Has God, thou fool! worked solely for thy good,
 Thy joy, thy pastime, thy attire, thy food?
 Who for the table feeds the wanton fawn
 For him as kindly spreads the flowery lawn.
 Is it for thee the lark ascends and sings?
 Joy tunes his voice, joy elevates his wings.
 Is it for thee the linnet pours his throat?
 Loves of his own and raptures swell the note.
 The bounding steed you pompously bestride,
 Shares with his lord the pleasure and the pride.
 Is thine alone, the seed that strews the plain?
 The birds of heaven shall vindicate their grain.
 Thine the full harvest of the golden year?
 Part pays and justly, the deserving steer.
 The hog that ploughs not, nor obeys thy call,
 Lives on the labours of this lord of all."—*Essay on Man*, III. 27.

The genus *Dioscorea* yields a valuable esculent in its tuberous roots, which are largely cultivated, and form a very passable substitute for the potato of colder regions.

Dr. Mason, in addition to the above, gives the vernacular names as well of several *Dioscoreas*, distinguishing one as the Elephant-foot-yam, from resembling an elephant's foot in size and shape. Myouk-then, Myouk-pwai-tök, Twen-souk-myouk, Hsen-lung-gywöt, Kywai-kyouk-tha, Ka-dat, and in *Pwö karen*, Nai-ka-hsang-khang-long, and in *Sgau karen*, Kwai-taplu and Nwai-so.

NARCISSALES.

Flowers hermaphrodite, regular or irregular. *Perianth* usually petaloid. *Stamens* 3 or 6, inserted on the perianth tube. *Ovary* 3-celled. *Seeds* with copious fleshy or horny albumen, and a distinct embryo. *Leaves* parallel-veined.

AMARYLLIDEÆ.

Flowers hermaphrodite. *Perianth* superior, petaloid, sexfid, biseriate, sometimes with a crown simulating a supplementary perianth. *Stamens* 6, very rarely 12 to 18, inserted in the perianth. *Ovary* inferior, 3 to 1-celled. *Style* simple. *Fruit* a 3-valved capsule.

CURCULIGO, Gartner.

Perianth regular, the tube long, often filiform, the limb of 6 equal deciduous segments. *Ovules* several in each cell of the ovary. *Stigmas* 3. *Fruit* oblong, succulent, crowned by the persistent perianth tube. *Seeds* enveloped in a fleshy pulp, with a lateral beak-shaped hilum. *Flowers* sessile in sheathing bracts, in a sessile or pedunculate head.

C. ORCHIOIDES, Roxb.

Kamorta (a single plant) (K.).

C. ensifolia, R. Br.

Hypoxis minor, Seem. (non Don.).

CRINUM, Linnæus.

Perianth with a long tube and a regular 6-cleft limb, the segments spreading or recurved. *Stamens* inserted at the summit of the tube. *Filaments* free, filiform. *Anthers* linear, versatile. *Ovules* usually 4 in each cell. *Style* filiform. *Stigma* entire or 3-lobed. *Capsule* globular, depressed, bursting irregularly. *Seeds* few, nearly globular, often converted into fleshy bulbs. Large bulbous, glabrous herbs. *Flowers* usually large, white or purplish, in an umbel or head proceeding from a 2- or 3-leaved spathe.

C. ASIATICUM, L.

Kamorta. Katchall. Car Nicobar (K.).

Pa-daing.

C. PROCERUM, Carey.

Burma (M.).

C. RIGIDUM, Herb. (M.).

C. MACROCARPUM, Carey (M.).

C. ENSIFOLIUM, Roxb. (M.).

C. ALENUM, Roxb. (M.).

C. PRATENSE, Herb. (M.).

C. LORIFOLIUM, Roxb. (M.).

C. ELEGANS, Carey (M.).

C. ERYTHROPHYLLUM, Carey (M.).

C. ORNATUM, Herb. (M.).

C. ZEYLANICUM, L. (M.).

C. HERBERTIANUM, Wall. (M.).

PARDANTHUS.

* *P. CHINENSIS*, Ker. (M.).

Thit-sâ.

EURYCLÆ, *Salisbury.*

* E. AMBOINENSIS, Sal. (M.).

La-man. Nac-men.

MOLINERIA.

M. (LEUCOGUM) CAPITULATA, Lour.

Nankowry (K.).

The tuberous rhizomes of this family contain a large amount of starch, and many of them consequently can be used as food. The powdered bulb of *Iris florentina* is known as Orris root. The seeds of *Iris pseudo-acorus* can be substituted for coffee, and *Crocus sativus* is cultivated for its stigmas, which constitute the saffron (true) of commerce, once used extensively as a tonic condiment, and still given as a stimulating medicine to cage birds. Fake saffron, however, contains no saffron, but is a paste manufactured from the florets of *Carthamus tinctorius*. The use of saffron as a medicine, condiment or dye, dates from the remotest antiquity, as we incidentally gather from Homer, who speaks of the Dawn,¹ with 'saffron robe.'

AGAVEÆ.

AGAVE, *Linnaeus.*

* A. AMERICANA.

This plant, though introduced, flourishes well in Burma. It is of great value as a hedge plant, forming, when well and closely planted, an impenetrable barrier to that nuisance of our stations, stray cattle. The fibre of the leaves is strong, and, when dressed and made up, yields an elegant fabric. The fleshy leaves dried and cut up can be used as a substitute for cork. Bitter aloes is the inspissated juice of various species of *Agave*, the best being reported to come from Soetra.

** *Albumen none or cellular. Embryo very obscure. Seeds very minute, except in Taccaceæ.*

TACCALES.

Flowers hermaphrodite, regular. *Perianth* sex-lobate. *Stamens* 3 or 6, inserted on the perianth tube. *Anthers* peculiar. *Fruit* capsular or berried. *Seeds* minute, exalbuminous or larger and albuminous.

Order TACCACEÆ.

Flowers hermaphrodite. *Perianth* superior, petaloid, sex-merous, biseriate. *Stamens* 6. *Filaments* concave. *Anthers* adnate to their concave face. *Ovary* inferior, 1-celled, with 3 parietal placentas. *Ovules* numerous. *Fruit*, a berry. *Seeds* numerous. *Leaves* broad, with a midrib and diverging veins.

TACCA, *Forster.*

* T. PINNATIFIDA, Forst. (M.).

Touk-tā.

This species is cultivated for its tuberous roots, which are rich in starch, and from which in Tahiti an arrowroot is prepared.

T. LEVIS, Roxb. (P.).

Order BURMANNIACEÆ.

Flowers hermaphrodite. *Perianth* superior, sex-partite, biseriate. *Ovary* inferior, 1 to 3-celled. *Stigmas* 3. *Seeds* with cellular testa, exalbuminous. *Embryo* undivided. *Leaves* narrow, with parallel venation, or broader and net-veined.

BURMANNIA, *Linnaeus.*

B. TRIFLORA, Wight (P.).

B. JUNCEA, Brown (P.).

¹ Ἥως μὲν κροκόπεπλος ἐκιδνατο πᾶσαν ἐπ' αἶαν.—Iliad, Θ. l. 1.

GONYANTHES, *Miers.*

Perianth tubular, 3-angled or winged, the 3 inner lobes minute. *Anthers* 3, nearly sessile below the inner lobes. *Ovary* 3-celled. Capsule opening by transverse fissures opposite the cells. *Flowers* terminal, solitary or cymose. Delicate leafless herbs.

G. WALLICHII, *Miers.*

Tavoy. S. China.

Order ORCHIDÆ.

INTRODUCTION.¹

“The Burman books tell us (says Dr. Mason) that the trees round King Wathandria’s hermitage were covered with Orchids, and that after being plucked they would retain their fragrance for seven days.” King Wathandria (whoever that worthy potentate may have been) must either have been in great favour with the Nâts, supposing, as is highly probable, that they placed the Orchids there for his special delectation; or, if he were his own collector, he certainly displayed very good taste, and an early appreciation of ‘the beautiful’ in Nature; for, assuredly, out of all Flora’s choice and bounteous store, nothing could have been drawn more worthy of royal regard. It is with Orchids still that the wealthy and the great love to surround themselves in countries where these lovely plants are strange and exotic; and this at a cost which would probably have astonished good King Wathandria, and which, in the aggregate, is worth a king’s ransom.

The varied and fantastic beauty of this order of plants has attracted so much attention, especially of late, and is so fully appreciated, that it would be superfluous to dilate on this part of the subject; I shall confine myself, therefore, to remarks on their habit of growth and the structure of their flowers for the better information of those to whom they are favourites, and who, knowing but little about them, may desire to know more. For it is to these, and not to the scientific (whom I do not pretend to instruct), that my observations here and my familiar descriptions hereafter are mainly addressed.

“Orchids” are found all over the world, except where the rigour of winter is Arctic, or the aridity of summer heat excessive: but “*Air-plants*” (as they are often called) are not. These last are confined to the warmer or tropical regions of the earth. The strange plants, a peculiarity in the root of which first gave them their name, were originally discovered and studied in Europe, where they are all terrestrial, and have fibrous or tuberous roots, growing like most ordinary plants. Afterwards, as Botanical research was extended to tropical countries, plants of a similar habit of growth and structure, also terrestrial, were discovered; but, besides them, others (and these by far the most beautiful) of a different habit—*epiphytal*—though having the same general peculiarities of floral structure. And, inasmuch as Natural Orders are framed more on similarity of such floral structure than on vegetative growth, the name *Orchidæ* was extended to all those new plants, whether terrestrial or epiphytal, although not strictly appropriate to the latter. But, while *Orchidæ* is the scientific name for both groups, the name of “*Air-plants*” has been used for the latter by the non-scientific. Hence a vulgar error that the words “*Orchids*” and “*Air-plants*” are synonymous expressions and co-extensive. But this is not the case. As not all Orchids are Air-plants, so neither are all Air-plants Orchids. Some of the former (as already remarked) are terrestrial, and many other plants besides Orchids are Air-plants, or (better) Epiphytes; as, for example, many *Vaccinia*, *Aschmanntha*, and some *Rhododendra*.

And now for a word or two on the term “*epiphyte*.” An “*epiphyte*” (I shall presume upon sufficient learning in my readers to tell them the meaning of the word) is a plant which only asks for a lodgment on another and larger plant (a *rock* often answers its purpose), growing on it simply as a support, and deriving no nourishment

¹ This interesting and lucid introduction to the order *Orchidæ* has been most kindly furnished by the Rev. C. Parish.

from it, but from the surrounding air, or, more correctly, from the moisture that is in the air. The expression "Air-plant," therefore, is not so appropriate as is supposed, for though it be true that our Epiphytal Orchids will live a long time when merely suspended in the air, the main condition for their so doing, and for their growth, when so suspended, is that the air be charged with moisture. Their true nourishment is water, not air, as is evident from the fact that they are denizens of damp tropical forests and abound most where the rainfall is the heaviest, or, from whatever circumstances, the atmosphere continues to be heavily laden with moisture; becoming rarer in drier climates, until, in the absolutely dry, they refuse to grow altogether. Their remarkable power of enduring a sustained drought is simply due to the store of moisture which they lay up for themselves during the rainy season in their fleshy stems or pseudo-bulbs. These are always expanded and plump at the close of the rains and become more or less shrunken and angular by the end of the dry season, in consequence of their store of moisture being gradually exhausted in supporting life and in the production of the flowers. The case is the same with other epiphytes. They nearly all have either thick and fleshy drooping stems, corresponding to the lengthened pseudo-bulbs of most *Dendrobia*, or large swollen rhizomes or root-stocks, corresponding to those of *Bulbophylla*, in which moisture is garnered in the rainy season and used in the flowering or dry season. Some *Vaccinia*, for example, have huge swellings, occasionally as large as a child's head, which are the stock from which the short thin branches rise; and the beautiful large white Rhododendron, which is found on the high branches of trees in the mountains east of Maulmain, has lengthened root-stocks of considerable thickness, which enable it to live when the exterior moisture fails, though this may not be for long at the great elevation at which it grows. There are, indeed, exceptions to this fleshy habit in some epiphytes, as in the case of an elegant small scarlet-flowered *Eschynanthus*, which I found on the Shan border, the stems of which were long and slender; but then it grew in the densest and dampest jungles, into which the sun's rays hardly penetrated, and all attempts to make it grow in the drier atmosphere of Maulmain failed. Very different to this is the growth of "parasites," which fasten on and become incorporated with the substance of the tree on which they grow, and drain their life-sap. A common example of such a parasite is furnished by a *Loranthus*,¹ the appearance of which should be familiar to all who have observed the "*Amburcius*" in Rangoon and Maulmain, where hardly a tree attains any size before it is preyed upon by this injurious plant.²

¹ Under the head of "Vanda," further on, it will be found stated that that name is a Sanscrit one, simply adopted by us. But the same name was given also to "*Loranthus*"; therefore, as Sir Wm. Jones suggests, it was probably the Sanscrit for all plants, whether epiphytal or parasitic, which fastened themselves on others. This want of discrimination between two very different kinds of growth, though excusable in pre-scientific and "ignorant" days, is hardly so now. And while on the subject of native names, it will be found, I believe, that they are for the most part names of a class suggested by some superficial similarity, and not the result of any nice distinctions; they are generic, in fact, and not specific, and very broadly so. Specific distinctions are entirely the production of modern science.

² Apropos of epiphytes and parasites, the following fact of vegetable life may be interesting. There grew, when I first went to Maulmain, in 1852, just inside "Tiger's gap" (as the entrance to the Cantonments on the Nyabustee side was then called) in the centre of the three-cross way, "trivium junctæ viæ," a fine *Vitex arborea*, some 40 feet high. There stood in the same place, when I left in 1876, a "*Peepul*" or "*Ficus*" tree of even larger size, the *Vitex* having entirely disappeared. Yet no one removed the one or planted the other: it was a simple natural operation, the silent work of some twenty years.

A ripe fig-seed obtained a lodgment in some crevice of the unhappy *Vitex*, germinated, and became a small and apparently innocent epiphyte. Being there comfortably entertained, it turned parasite (though not in the strict botanical sense), and took an unhandsome advantage of its position, to stretch its roots downwards till they touched the earth, and its branches laterally over those of its supporter.

"In the meek garb of modest worth disguised,
The eye averted, and the smile chastised,
With sly approach it spread its dangerous charms,
And round its victim wound its wiry arms."—*Darwin*.

For some years it did no very evident harm, but in course of time, slowly and insidiously, the roots and

I pass on now to the peculiar structure which distinguishes Orchids from all other plants. "The order owes its chief peculiarities to the following circumstances: 1st, to the consolidation of all the sexual organs (*i.e.* stamens, pistils, etc.) into one common mass, called the column; 2ndly, to the suppression of all the anthers, except *one* in the mass of the order, and *two* in Cypripedeæ; 3rdly, to the peculiar condition of its pollen and the anther which contains it; and 4thly, to the very general development of one of the inner leaves of the perianth in an excessive degree, or in an unusual form."—*Lindley*. Such, shortly and technically stated, is the peculiarity of an Orchid flower; in order, however, to make all the parts of the flower clear to an inexperienced person, perhaps the simplest way will be to suppose that we have such a flower in our hand, and proceed to examine it in detail. Fortunately one of the largest and most suitable for our purpose is also one of the commonest and most easily procurable in Burma: this is the lovely *Dendrobium formosum*. We will take, then, a specimen of this well-known flower in our hand, and examine it part by part. First, we notice that it is seated at right angles on a short round white curved *pedicel*, or stalk, which is thickened slightly upwards, *i.e.* near the flower. This upper or thickened portion is really the germ, or yet unfertilized seed-vessel, which, if duly impregnated, will ultimately be developed into a large oval or pear-shaped pod. Some Orchid flowers have little or no other foot-stalk than this germ. If we next look at and count the segments of the flower, we shall find that they are six, including the lip as one. *Sic*, be it remembered, is the normal number of such parts in all Orchids: there are occasional apparent exceptions, but this is the rule. These six segments go by the general name of *perianth*, which means the flower-envelope ("the flower" of a plant, technically, being its sexual parts, and not the generally coloured parts commonly so called and forming its chief attraction). Of this perianth (a word I have avoided the use of in my specific descriptions) the three outer segments will be seen to be oblong, pointed, and tolerably uniform in shape: these are the *sepals*. Alternating with these are the three much larger and broader inner segments, which are the *petals*. This name, however, in Orchids is mostly confined to the two upper, while the lower one is called "the *lip*"—and is that part of the perianth, which being "generally developed in an excessive degree, or in an unusual form," constitutes one of the main characters of the order. We next observe, in the centre or axis of the flower, a short thick fleshy body—this is "the *column*" ;—and at its extremity, seated in a sort of cleft, a little cap or lid, which is the *anther*; and if we gently lift this lid (it is fastened by a hinge to the back of the column) there will probably fall out (for they are perfectly free) four small, yellow, hard, waxy bodies, either altogether or in two pairs; these are the *pollen-masses*, on the number and position and attachment of which the "diagnosis" of Orchids is made so largely to depend. Farther, if we look just below the anther in front, a small cavity with a viscid surface will be seen: this is the *stigmatic* surface, and the fertilization and development of the germ into a fully ripened capsule or pod depends entirely on

the branches united into a solid mass, till all that could be seen of the miserable victim was an arm here and there, as it were imploringly stretched out and struggling towards the light, vainly trying to escape from the treacherous embrace of its tormentor. At last my poor friend the *Ficus* totally disappeared, enveloped in a winding sheet of inextricable folds, and strangled to death in the embrace of its inexorable foe—a vegetable "Laocoon."

"Round sire and sons the scaly monsters rolled,
Ring above ring, in many a tangled fold,
Close and more close their writhing limbs surround,
And fix with foamy teeth the envenomed wound."

Darwin, Loves of the Plants, Canto iii. 331.

Few who now pass by and see the placid *Ficus* (for I doubt not it stands there yet) would suppose that such a foul deed had been done by it, and that it still holds the murdered body of its victim hidden within that smiling exterior! Many a giant *Ficus* in the forests betrays its former life by its perfectly hollow trunk, from which the very bones of a too confiding friend, similarly treated, have, by the process of inevitable decay, fallen out.

the pollinia, or pollen-masses, coming in contact with it. And it is, doubtless, owing to the fact that the pollinia in *Dendrobium* are wholly free, and so easily fall out and away from the flower, that ripened pods are so rare in this genus as compared with some others, such as *Aerides* and *Saccolabium*, whose pollinia are not free.

But we must not throw away our flower yet, for we have not quite finished its examination. It was said that the outer three segments of the perianth or sepals were tolerably uniform; this, however, has reference to their upper part only, for it will be seen that the two lateral sepals are drawn out backwards (as is also the base of the lip), and have there become *connate*, *i.e.* have grown one with the back part of the column, which is lengthened behind into a *horn* or *spur*. We have now noticed all the principal parts of an Orchid flower, and these are all to be looked for and found in nearly every Orchid, though it is not to be supposed that they will be always discovered as readily as in our typical flower. For Orchids are given to much concealment and to many disguises, in short, to masquerading in the most wanton and bizarre costumes, and they will sometimes hide their features if they can; though it is this very fairy-like wantonness that gives them their chief charm; and, like similar behaviour elsewhere, is doubtless meant rather to attract than to repel. Sometimes you will look in vain for six segments, and must be content with five, as in *Cypripedium*, where the two lower sepals are connate and form but one, and these two together often smaller than the upper one, which stands nobly up, like the standard in a Papilionaceous flower, and is generally the most striking feature. Sometimes you may search in vain for the petals—for they may be so minute as hardly to be seen, as in *Monomeria*—or wholly transformed into something else, as into a fringe in *Epicranthes*. If, again, you should be fortunate enough to obtain that singular little gem, *Drymoda picta*, you will wonder what in the world has become of the two lateral sepals, till, upon more careful inspection, you find them close to the lip, far away at the end of a long and unusual projection. This projection is the "*mentum*." The column, which in our *Dendrobium* was produced backwards into a spur or horn, is, in *Bulbophyllum* and other Orchids, projected forwards, in a greater or less degree, and then it is called a *mentum*. This forward projection is extraordinary (*i.e.* for the size of the flower, which is altogether very small) in *Drymoda*. The column again, which is very short in some Orchids, is very long and prominent in others, as in *Calogyne*. Lastly, the lip is variously attached to the column, sometimes being connate with its base, sometimes articulated or jointed with it, and this in a greater or less degree; so slightly, for instance, in *Bulbophyllum* as to shake tremulously with every movement of the flower. It is the lip also which assumes that endless variety of fantastic form and colouring which is familiar to those who have studied or cultivated this most singular and charming order of plants.

But while all this variety and prodigality of beauty has been the admiration of the cultivator, it has been the difficulty of the botanist who would systematize and arrange. One may easily form an idea of the immense difficulties which so Protean an order, yet, withal, so natural a one, must present. Of this systematic arrangement it is now time to speak. The main divisions of the order were made by Lindley—the acknowledged master of it while he lived—to depend on differences in the pollen-masses. These differences will soon be perceived to be considerable by any one who will take the trouble to examine them. Some, as those of *Dendrobium* and *Bulbophyllum*, are rounded, firm and waxy. Others, as those of most terrestrial genera, are loose in structure and granular. Of the former, besides that they vary in number, some are quite free, without any appendage, or attachment to each other, or to the stigma; others have such appendage or attachment though varying in form and character. Of the latter, the form and position of their anther furnishes distinctive marks. Those who would know more must consult works which treat on the subject. Suffice it to say, here, that Lindley's arrangement, as set forth in his "*Genera and Species of Orchidaceous Plants*" (the only recognized text-book available by me, and my mainstay during all my residence in Burma) is as follows:—

I. Anther one only.

A. Pollen-masses waxy.

- (a) No caudicula or separable stigmatic gland.

Tribe I. *MALAXEÆ* or *MALAXIDÆÆ*.

- (b) A distinct caudicula, but no separate stigmatic gland.

Tribe II. *EPIDENDREÆ*.

- (c) A distinct caudicula, united to a deciduous stigmatic gland.

Tribe III. *VANDEÆ*.

B. Pollen powdery, granular or sectile.

- (a) Anther terminal, erect.

Tribe IV. *OPHREÆ* or *OPHRYDEÆ*.

- (b) Anther terminal, opercular (lid-like).

Tribe V. *ARETHUSEÆ*.

- (c) Anther dorsal.

Tribe VI. *NEOTTEÆ*.

II. Anthers two.

Tribe VII. *CYPRIPEDÆÆ*.

The above arrangement is that followed here.

Quite recently, however, Bentham has propounded a greatly modified arrangement in his "Notes on Orchidææ," read before the Linnean Society, January 20, 1881: and these are available now by all students of the order. If my arrangement had not been already made before I was favoured with a copy of the "Notes," or time had been sufficient, I should have been disposed to adopt their arrangement; but, as things are, the old arrangement must stand. I have, indeed, made one change, but it is only of a word or "term." I have adopted Bentham's term "*stipes*" for the appendage of the pollinia of *Vandææ*; retaining Lindley's term "caudicle" for that of *Epidendrææ*, as the former botanist has pointed out the need of a distinctive term for an organ which is so essentially different "both in origin and substance." I say I have adopted the term here because it comes recommended on such high authority, though I cannot consider the choice of the word a very happy one for so delicate and transparent an organ as is, nearly always, the appendage of Vandæous pollinia. The word "*stipes*" conveys the idea of a *stocky* or *stumpy* support, as opposed to a slender and fragile one. "*Stipitibus davis agitur, sudibusque præstis,*" says Virgil, when he would describe a "certamen agreste"—

"One with a brand yet burning from the flame,

Armed with a *knotty club* another came."—*Dryden*.

Stipitis hic gravidi "nodis."—As applied to a fern-stock it is suitable, for even if that be slender, it is, at least, the stoutest part of the frond; but hardly, I submit, to so delicate an organ as that in question. This is the reason I venture to object to "*stipes*" in this application. It may indeed be difficult to find an appropriate term that has not been already applied elsewhere, but I cannot see why there should be any objection to "*ligula*," though it be used of the prolongation of a grass-sheath, for it is tolerably descriptive of the characters of the little Vandæous tongue or strap. Or, if that word be objected to, I would submit that a simple word like "*ligamentum*" might be considered free from objection.

As these introductory remarks, however, have already reached a length not originally contemplated, it is time to conclude them. This I will do with a few words about books.

Although any one who should take up the study of Orchids in Burma now will find more help to his hand than was accessible twenty years ago, there is, at the same time, no one single work published which describes all known Burmese Orchids. The notices of them are scattered here and there in different publications, as, for instance, in the Botanical Magazine, and in The Gardeners' Chronicle.

Some few of the older plants will be found described in Lindley's "Genera and Species of Orchidaceous Plants;" some few more in his "Contributions to the Orchidology of India," vols. i. ii. and iii. of the *Journal of the Proceedings of the Linnean Society: Botany*. More are to be found in Professor H. G. Reichenbach's "Enumeration of Orchids collected (by me) in the Neighbourhood of Maulmain," *Linn. Soc. Transactions*, vol. xxx.: and yet a few more in the same author's "Orchidæ Parishiæ Burmenses," *Otia Botanica, Fasc. I.* Hamburgh, 1878. Having these, I fear the student must wait until full and complete descriptions of all Indian Orchids appear in the "Flora Indica," now in the course of publication; though it will probably be some time yet before the order "Orchidæ" comes to be handled.

I take this opportunity of acknowledging how much I owe to Prof. Reichenbach for kindly naming my numerous Orchids, and for his collation and recension of them. To quote Mr. Bentham's words: He is "the great Orchidologist of the present day, who took up the pen and pencil as they fell from the hands of Lindley, and who, having since devoted himself almost exclusively to the study of the order, is now the only authority for determination of species."

For my humble part, I have given as complete a Catalogue, as the materials at hand have enabled me to give, of all the Orchids known to grow in Burma, with references. This I trust will prove useful. And from this Catalogue I have selected some of those species which appeared to me to be most remarkable for beauty, or for some peculiarity of structure, and have described or remarked upon them. The descriptions I have tried to make as simple as possible, avoiding scientific terms generally, though, for brevity's sake, I have been drawn into using a few; these, however, I have nearly always explained. I hope that in this a fairly middle course has been struck between language which, by an affected accuracy, might have proved unintelligible to the beginner, and that which, from its laxity, would have been wholly useless from a scientific point of view.

The total number of Orchids here catalogued is considerably over 350. This is a large number for so small an area as that over which the collection has been made. For all but a very few come from the Tenasserim provinces, Upper Burma having been but hastily gleaned. When, therefore, we consider further how little ground has been really covered in the search for Orchids, and how local and limited in their area many plants are, we may be sure that a large number remain to be discovered, and moderately safe in predicting that Burma is yet capable of showing a list of 500 species.

It should be understood that the number of species given as that of each genus means, not that of *all known Orchids*, but of known Burmese Orchids.—C.P.

ORCHIDALES.

Flowers hermaphrodite and very irregular. *Perianth* of 6, rarely 3, segments. *Stamens* 1, 2, or 3, confluent with the style. *Fruit* capsular. *Embryo* very minute.

MICROSTYLIS, Nutt.

Small terrestrial Orchids with plicate wavy leaves, the sheathing bases of which combine to form a kind of false stem. Roots fibrous, attaching themselves to half-decayed leaves and other loose vegetable matter. Flowers small and inconspicuous, seated on a terminal erect stalk or rachis, commonly resupinate (*i.e.* inverted in position). About half a dozen species. Pollen-masses 4, collateral (side by side).

LIPARIS, L. C. Rich.

Also inconspicuous plants, in general appearance resembling those of the preceding genus, but differing in the structure of the flowers. About a dozen species. Pollen-masses 4, collateral.

MALAXIS, Sw.

Sub-genus OBERONIA, Lindl.

All the plants known to me as belonging to this genus come under the head of *Oberonia*, which Lindley constituted a distinct genus; but Reichenbach (whom I generally follow) unites *Oberonia* with *Malaxis*. The following short description is only applicable to *Oberonia*.

Small stemless Epiphytes, pendulous from trees, to which they are attached by fibrous roots. They are readily distinguished by their generally flat (somewhat rounded in *O. myosurus*), fleshy, distichous (two-ranked) equitant leaves (set edge-wise), which are broad and self-clasping at their base, and taper to a point. The flowers are minute and are seated on a rachis, which proceeds from the axis of the leaves, and somewhat resembles a rat's tail. Size, from 3 to 6 inches, or even a foot. About 10 species. Pollen-masses 4, incumbent (back to back).

BULBOPHYLLUM, *Thouar.*

A considerable genus of very uncertain limits, that is to say, it is made by some authorities to include several small groups of plants, which, in the opinion of others, should be separated from it; and, indeed, have been so separated and received distinct generic names. These distinctions cannot here be given. It must suffice to say that *Bulbophyllum*, as here defined, includes *Trias* and *Cirrhopetalum* of Lindley. These all agree in the following characters. They have a creeping rhizome or root-stock emitting rootlets from the under surface, on which rhizome are seated, at longer or shorter intervals, pseudo-bulbs (really leaf-bearing stems), with a solitary leaf at their summit. Occasionally, however, no apparent pseudo-bulb is developed at the base of the leaf, which then sits with a short foot-stalk closely on to the rhizome. In some cases, again, the pseudo-bulbs are so crowded as completely to conceal the rhizome. The inflorescence is various, but always, whether consisting of solitary flowers, or dense or umbellate heads or racemes, supported on a longer or shorter scape or leafless stalk, which arises from the base of the pseudo-bulb and derives its nourishment from it. The flowers have their small labellum or lip versatile, that is, easily moved, in consequence of its very light attachment to the prolonged base of the column, which column has two horns or arms projecting from the top, one on each side of the anther. The flowers of this genus, though for the most part small, are often very beautiful and highly curious, from the varied forms which their different parts assume. The pollen-masses are 4, in pairs, sometimes adhering but separable, sometimes connate, in which case one of each pair is very much smaller than the other. Species about 40.

B. AURICOMUM (Fragrant Bulbophyllum).

This is the ta-zeen-ban of the Burmese, "much prized by the youths and maidens, Burmese and Karen, who are extremely fond of wearing it in their hair."—F.M. Pseudo-bulbs ovate, 1 inch long. Flowers in a long pendulous raceme, small, white or golden yellow, fragrant. When in flower, the plant is leafless.

B. CAREYANUM (Carey's Bulbophyllum).

"This is a common Orchid in the vicinity of Maulmain."—F.M. Pseudo-bulbs rather large, ovate; leaf, long, strap-shaped. Flowers in a dense cylindrical spike, small, greenish purple. A worthless plant.

B. (TRIAS) OBLONGUM.

Dr. Mason remarks that this is the smallest Orchid known to him. There are several smaller, notably, *B. moniliforme*, the pseudo-bulbs of which are only $\frac{1}{8}$ th of an inch in diameter. Of this plant, as being the smallest Orchid known to me (though many others have smaller flowers), I give a short description.

B. MONILIFORME (Necklace Bulbophyllum).

Pseudo-bulbs very small, $\frac{1}{8}$ inch, round, depressed, closely seated on a slender-branched rhizome, which they completely conceal. Leaf one to each bulb, lance-shaped, barely $\frac{1}{4}$ inch long, falling off before the flowers appear. Flowers solitary, at the end of a slender scape which is $\frac{1}{2}$ inch high, themselves about $\frac{1}{8}$ inch in diameter. Sepals yellowish, striped with orange. Petals much smaller, blunt. Lip

red, in shape difficult to describe, as with most *Bulbophylla*, arched behind, bluntly pointed forwards, and fleshy like a tongue. Column surmounted by two awl-shaped projections.

On betel-nut trees, island of Madremacam, Mergui, forming small irregular patches. Flowering in January.

EPICRANTHES, Bl.

One species only known. In habit a *Bulbophyllum*, differing, however, in having a fringed membrane in the place of petals, and only two pollen-masses. For further description see *Otia Botanica*, Reich. fil. Fasc. I. p. 48, No. 25, Hamburg, 1878, *E. Javanica*.

DRYMODA, Lindl.

One species only known, *D. picta*. A very curious little plant, figured and described in *Bot. Mag.* tab. 5904, to which reference can be made.

On trees. Dauna-toung, about 4-5000 ft. Flowers in Nov., Dec.

DENDROBIUM, Sw.

A very large genus, which, as at present constituted, includes plants of widely different habit and general appearance. Their point of agreement lies in their flowers. Some (sub-genus *Aporum*) have flat stems with fleshy equitant leaves and small and unattractive flowers. Some have pseudo-bulbs approximating them in appearance to *Bulbophylla*, as *D. amplum*. Others have terete (or quill-shaped) stems and leaves. Others, again (and these are the true and typical *Dendrobia*), have more or less elongated cylindrical leafy pseudo-bulbs or stems (as they may be fairly called here), the leaves being generally bifarious (in two ranks) alternate and flat, *i.e.* in the same plane. They differ, as in habit, so in size, some being less than an inch high, others 5 or 6 feet long. The flowers are lateral, and either solitary, in fascicles, or in racemes. The sepals and petals, in other words, all the segments of the flower except the lip, are nearly uniform in shape and colouring,¹ the general difference being that of the three outer segments or sepals the two lateral ones are somewhat larger than the other and adhere commonly to the side of the column, which is semiterete (or half-round) and is usually prolonged into a sort of blunt spur. The lip is always sessile, and articulated with the base of the column or adnate to it, generally large, undivided or three-lobed. It is of the same thin texture generally as the rest of the flower, whereas, in *Bulbophyllum* the lip is thick and fleshy. Pollen-masses 4, in pairs, side by side, nearly uniform and quite free, in a two-celled anther. Species 70 or 80.

This genus includes a predominating proportion of the beauty of the Orchid Tribe, at least of that part of it which is found in the Eastern Hemisphere. It stretches from India through the Eastern Archipelago to N. Australia, and Burma may fairly lay claim to be its Head-centre. Out of so much that is beautiful, it is difficult to make a selection, which must necessarily be limited.

D. CRUMENATUM.

Pseudo-bulbs tufted, swollen at the base, and there deeply grooved and sometimes constricted at intervals; swollen portion, 3 or 4 inches long and varying in diameter from $\frac{1}{2}$ to $1\frac{1}{2}$ inch; suddenly tapering off into a very long slender stem, 1 foot or more, marked with the scars of the fallen leaves. Leaves fleshy, linear oblong, often opposite on lateral offshoots 2 or 3 inches by $\frac{1}{2}$ an inch, blunt and emarginate. Flowers single or in pairs, in a raceme at the end of the long stem; large—2 inches—pure white, with a yellow quadrate spot on the lip; sweet-scented.

I select this species for special mention, not because of its beauty (though it is pretty enough), but on account of a peculiarity which I have noticed in it, and think

¹ This is the case with the typical *Dendrobia*, but in others, such as *Aporum* of Lindley, now included in *Dendrobium*, the petals are very small and narrow.

worth recording. The flowers last but one day, and it flowers (as far as I have observed) but once a year. I had several (3 or 4) plants on trees in different parts of my garden in Maulmain, and I noticed for one or two years that they all came into flower on the very same day! On one such day, when they happened to be in flower, Colonel Benson, who was then residing in Maulmain, came into my garden, and I mentioned this curious circumstance to him, pointing in proof of my statement to the several plants all at that moment in flower. He was naturally surprised and not a little incredulous. He said, however, that he had one plant nailed to a tree in the compound which he then temporarily lived in. We walked up, accordingly, to his house, and there, sure enough, his one plant was in flower! All the flowers, his and mine, were withered before the next day. This singular circumstance is worth further verification. The plant is rather frequent about Tavoy, with its very nearly (a smaller plant of the same character), *D. angulatum*.

D. FORMOSUM.

This is the "Silver-flower" of the Burmese. It grows profusely in the neighbourhood of Maulmain, and may be found in blossom almost at any season of the year. It is brought into the town in basket-loads during the rains, as it is a great favourite with the Burmese, and is commonly seen in their houses and among their offerings at the Pagodas. It is so well known as hardly to require description. The flowers are very large—the largest of the genus,—being 5 inches in diameter, of the purest white, save for a blotch of yellow in the centre of the lip; and of a delicate fragrance. The stems vary much in size—from 6 inches to 18.

D. INFUNDIBULUM.

A nearly allied species to the preceding—very similar in form and general appearance, but with smaller flowers and more slender stems. It is abundant on the mountains near Toung-ngoo, on Dauna-toung, near Maulmain, and elsewhere, at an elevation of 4–5000 feet. Although so near to *D. formosum*, as to appear to be only a mountain variety, I could never succeed in making it grow in the plains. These two species, together with *D. Jamesianum*, *D. eburneum*, *D. xanthophlebium*, and one or two more, all white-flowered, form a group distinguished by Lindley as "nigro-hirsute," as they are all marked by the presence of black hairs on the stems when in a young state.

D. PIERARDII.

Stems long (3–4 feet), pendulous, slender. Flowers in alternate pairs along nearly their whole length, diaphanous, pale lilac, lip of a somewhat dingy yellow, with purplish veins, the lower part rolled into a tube round the column. Common about Maulmain and probably elsewhere. Very pretty when full of flower, but wanting in colour.

D. TRANSPARENS.

As Lindley says, "Very like *D. Pierardii*," but generally brighter in colour, with stems very much shorter and stiffer, about 1 foot. I have only met with it once or twice on the mountains near Toung-ngoo.

D. CHRYSOTOXON.

A fine yellow-flowered species. Pseudo-bulbs clustered, thick, club-shaped from a slender base, ribbed and jointed, with 3 or 4 oblong leathery leaves at the end. Flower-stalks just below the leaves, bearing a drooping raceme of golden yellow flowers, with a beautifully fringed lip. Abundant in the Tenasserim Provinces. This is surely *D. clavatum* of Roxburgh.

D. AGGREGATUM.

Also a yellow-flowered species, but readily distinguished by the more crowded pseudo-bulbs, which are ribbed or grooved, but not jointed, and have a habit of lying almost flat, appressed against the branch on which they grow, also by the single leaves and the much thinner and more delicate texture of the flowers. Abundant, and widely distributed.

D. DALHOUSIANUM.

A noble species. Stems often 5-6 feet long when found in damp shady forests which it affects, drooping. Flowers in loose racemes, near the end of the stems, of 6-7 flowers, 4 inches across, cream-coloured; lip large, saccate, but hardly slipper-shaped, with two large deep blood-red blotches on the inside, the middle and front part projecting forwards and covered with a soft velvety pile. Abundant in the Tenasserim forests. The stems, however long, are but of one rainy season's growth, at the close of which they flower for the first time, while the leaves remain on, but the same stems will flower also the second and third year, after the leaves have fallen off, new racemes proceeding from the leaf-axes next below those of the preceding year. As there has been some confusion in respect of this and two nearly allied species, I subjoin below characters which, I hope, may suffice to distinguish them. They have all three been under my eye in a growing state at the same time.

D. DALHOUSIANUM.

Stems terete, 5-6 feet, pendulous, *marked with red-purple lines*. Leaves lanceolate, obtuse. Racemes lateral, but towards the end of the stem, 6-8 flowered. Sepals oblong-obtuse. Petals oblong-ovate obtuse, broader than the sepals. Lip bagged, or boat-shaped, villous, with the *central margin turned outwards*. The flowers are very large, 4 inches across; cream-yellow, but delicately tinged with rose; the lip is of the same general colour, with two deep, rich, blood-red blotches on the inside. Column and anther dark purple.

D. CALCEOLARIA.

Stems terete, 4-5 feet, pendulous, *not marked with purple lines, but stippled towards the base with green and purple dots*. Racemes 5-8 flowered. Sepals oblong-obtuse, very widespreading. Petals oblongo-ovate obtuse, much broader. *Lip slipper-shaped*, not at all pointed, but with the *central margin turned in*, very villous, or soft with pile. The flowers are of the same general colour as those of *D. Dalhousianum*, though more deeply tinged with rose, and smaller, about 3 inches across. Lip yellowish, with two deep red-purple blotches, and crested or fimbriated veins. Column and anther dark purple.

D. MOSCHATUM.

Stems terete, pendulous, 4-5 feet, stippled. Leaves lanceolate obtuse. Racemes 5-8 feet. Sepals lanceolate acute. Petals rhomboido-ovate obtuse, broader. Lip slipper-shaped, very obtuse, villous *outside*. Flowers orange-yellow, 2½-3 inches across. Lip of the same colour, with two deep crimson blotches on the inside, and five crested fimbriated veins. Column and anther greenish-yellow.

D. FIMBRIATUM.

In general character like the three foregoing species, but the flowers, which are golden yellow, are much smaller—2 inches across. The lip is not slipper-shaped, and the edge all round is beautifully fringed. The stems have no special markings.

Of the four species here described, *D. Dalhousianum* and *D. calceolaria* have *creamy white flowers* tinged with rose. *D. moschatum* and *D. fimbriatum* have *yellow flowers*. *D. Dalhousianum* may always be *infallibly* distinguished by the purple lines on the first season's stems, whereas those of *D. calceolaria* are stippled and not striped. As the stems of *D. moschatum*, however, are also stippled, I know no mark whereby to distinguish this species from *D. calceolaria* when out of flower. When in flower, the colour alone (yellow) is sufficient mark. *D. fimbriatum* may at all times be distinguished from the other three, both by the absence of all special marking, and by the circumstance that its stems (according to my experience) invariably *taper* at both ends, being stoutest in the middle. All four are beautiful Orchids—but *D. Dalhousianum* bears the palm. I may add, that *D. moschatum* and *D. calceolaria* smell strongly of rhubarb and magnesia, the other two do not. They are all abundant in the Tenasserim Provinces, except *D. calceolaria*, which I never found but once.—

N.B. *D. calceolaria* (our plant) of Hooker is not *D. calceolus* of Roxburgh—which latter I believe to be *D. moschatum*. Hence, it is probable, much of the confusion.¹

D. FARMERI.

Pseudo-bulbs 4-sided, club-shaped, tapering finely downwards, but again expanding into a small swollen base. Leaves 2 to 4, near the top. Flowers in a loose raceme. Sepals ovate obtuse, petals broader. Lip rounded, with a sinus near the base on either side. General colour pale rose; lip yellow, deepening towards the centre. A most lovely Orchid. Frequent throughout the Tenasserim Provinces. The true *D. Farmeri* lasts in bloom a full month. There is an inferior variety with weaker stems and smaller flowers, which fade in 3 or 4 days.² The figure in Bot. Mag. 4659 resembles (as far as the flowers are concerned) this inferior variety.

D. FARMERI, VAR. AUREO-FLAVUM.

This may be shortly described as the preceding, with golden yellow flowers. It appears to be rare. I have only found it once, on Dauna-toung, having in vain sought for it after its first discovery.

D. TORTILE.

To enable this species to be recognized, it may suffice to say that it has also swollen pseudo bulbs tapering downwards; but instead of being square, they are rather flattened. The flowers also are borne on the plant differently—not in a single raceme, but in twos or threes on distinct foot-stalks. General colour lilac. Sepals and petals much contorted. Frequent. Also a lovely Orchid.

D. ALBOSANGUINEUM.

Stems elongated, terete, about 1 foot long. Leaves 5 or 6 near the top. Flower stalk from between the topmost leaves, erect, 6-7 flowered. Flowers 2½ inches across, creamy white. Lip same, but with some deep blood-red streaks near the base. When out of flower, this species may be readily distinguished by the black margins of the leaf-sheaths. Abundant in some places, but local.

D. SENILE.

A small species—about 6 inches high—with erect rigid stems, which are covered with white hairs. Flowers yellow. Apparently rather rare. Shway-gyeen district.

D. BOXALLII.

Stems drooping, 1 foot or more, nodes moderately swollen at the top, tapering downwards, dark brown when old, but pale white still clothed in their young leaf-

¹ It is often a difficult task to unravel a tangled web which a moment's carelessness has caused. Such a tangle has gathered round *Dendrobium pumilum*.

I. Roxburgh, Vol. III. p. 479, under the head of this plant, gives a correct description of it in the first two paragraphs, or for some four lines, but thereupon follows to the end a long description of another and totally different plant.

II. Some years ago I found two small *Dendrobia*, one of which had short swollen (turbinate?) pseudo-bulbs (my No. 98), and agreed otherwise with Roxburgh's description. This accordingly was considered to be *D. pumilum*. The other (my No. 120), though almost exactly alike in the inflorescence, had elongated quadrangular bulbs, and being clearly a distinct plant, I named it *D. quadrangulare*, a name already appropriated, which I was not aware of at the time! These (with drawings) were sent home to Kew, where my second plant (*D. quadrangulare*) was designated *D. pumilum*. Happening to be at Kew not long ago, I was shown an authentic specimen of *D. pumilum*, and surely enough, it was identical with my *D. quadrangulare*, and not with the other or *turbinate* species.

III. In a recent description of some of my Orchids by Prof. Reichenbach published by the Linnean Society (to which some figures are appended) the artist has actually combined in *one* my *two* drawings. The bulbs will be seen, on careful inspection, to be of two forms, which are those of two distinct plants! To this moment I do not know which of the two is really Roxburgh's plant, but I incline to think it is that with swollen or "turbinate" bulbs, and not the quadrangular plant, though this last is called *D. pumilum* in the Kew Herbarium. Occasionally (it is probable) among the numbers of bundles of dried plants sent to Kew from all parts of the world, a specimen or a label may become displaced.

² This is *D. palpebræ*, Lindley.

sheaths. Flowers in alternate pairs all down the stem, large, 3 inches across. Petals and sepals lanceolate, pink-lilac. Lip full, round, but slightly pointed, golden yellow, with a white margin and lilac tip. A very handsome plant. Bhamo and the North generally.

D. NODATUM.

Stems branched, with swollen joints, which are more apparent in the older stems, rooting at the joints. Leaves at the end of the young shoots, oblong lanceolate. Flowers single. Sepals lanceolate. Petals ovate, broader. Lips obscurely 3-lobed, lateral lobes turned inwards, middle lobe rhomboid, with a blunt point. General colour creamy yellow, that of the lip yellow, deepening to orange in the centre, with two very dark purple streaks at the base. Column green and purple. Anther purple. A very free-growing plant.

D. FINDLAYANUM.

Another Orchid with jointed stems, joints larger upwards and tapering rather suddenly downwards, pear-shaped, with a large brown sheath at each internode. Leaves oblong-lanceolate, acute, unequally toothed at the point. Peduncles 2-flowered. Sepals linear lanceolate, acute, revolute. Petals ovate, broad. Lip nearly round and undivided, slightly crenate at the margin. Sepals and petals lilac, deepening towards the tips. Lip pale lilac at the edge, yellow in the centre, with a deep purple stain at the claw. Column striped with the same. Anther white. An elegant plant, first found by Mr. James Findlay on the route to Zimmay, and given by him to me; hence named after him.

D. CRASSINODE.

Stems swollen at the joints to an exaggerated degree, so as to look like a number of flattened spheres with short intervening constrictions. About 1 foot long. A strikingly beautiful Orchid, first discovered by me in the year 1859, on the Shan border, S.E. of Maulmain, in February, when it was in full flower. The whole of a very fine collection, made on that occasion, not of Orchids only, but of other plants, was lost in the *Persia*, which foundered in the Calcutta River. One plant, which I reserved and attached to a tree in my garden, lingered for 2 or 3 years and then died. It was fortunately rediscovered later by Col. Benson, in the hills between Thayet-myo and Arakan. It will be seen, by looking at the figure in *Bot. Mag.* 5766, that the flowers are there represented as having red-lilac tips to the sepals, petals and lip, while the centre and base of the latter are yellow. A rough drawing of my plant made at the time of discovery shows *these colours exactly reversed*—tips yellow and lip red-lilac! It may be observed here that several Orchids which are found in the jungles S. and E. of Maulmain, reappear in the N. and W., while they seem to be wanting in the intervening districts, notably the plant now under discussion, with *D. Parishii*, *D. eburneus*, and others. Colour, again, varies oftener than is generally supposed, so as to make it doubtful wisdom to give a distinct name to an Orchid because of such difference merely. While on the subject of variation, I may take the opportunity of saying that a long acquaintance with this Order has satisfied me, that even the labellum or lip, which is generally esteemed a sure characteristic mark of a species, is liable to considerable difference of form. I will specify two Orchids in which this is the case, *D. erumentum* and *D. bambusifolium*. I possess drawings, most carefully made, of the labellum of these two plants, and, being made at different times from different individuals, they display most marked differences both in form and colour. My opportunities of observation were almost unrivalled. Fixed at one station for upwards of 20 years, and having some 150 species growing in my garden, fresh supplies being continually brought in, it was my daily delight to watch their growth; and hardly a day passed on which I did not either draw or examine microscopically some one Orchid or another, and often the same species at widely different times, and brought from widely distant localities. I trust, therefore, that my remarks, here and elsewhere, may be made without presumption, even though they should chance to differ from the opinion of acknowledged masters in Orchidology.

D. BENSONLE.

This is one of the very few Orchids I have never gathered. I must therefore borrow my description from the *Bot. Magazine*. Stems terete, 1 to 3 ft. long, nodes not swollen, internodes concealed by the membranous sheaths (this is the case with many other Orchids when the stems are in a young state). Flowers 2 or 3 on a foot-stalk, 2 inches across, pure white, except the lip, which is golden yellow in the centre, and has two dark purple spots near the base. Lip nearly round, convolute into a sort of neck at the base, a feature common to other *Dendrobium*. A handsome species. Arakan hills.

D. PARISHII.

A very handsome plant when large and covered with blossom. Stems pendulous, generally more or less curved (a pretty constant habit) a foot or more long. Flowers wholly red-purple, with a deeper-coloured lip. It smells offensively of rhubarb and magnesia. It is, I believe, too well known to require further description.

D. FYTCHIANUM.

This is described in *Bot. Mag.* as *D. barbatulum* by Mr. Bateman, from which, however, I always considered it markedly distinct. My name has been since accepted, and its distinct character admitted. Stems erect, terete, slender, of the size of a goose quill, and 1 foot long. Flowers in a terminal raceme, 1 inch to 1½ across. Sepals narrow, lanceolate. Petals very broadly ovate, pointed. Lip distinctly 3-lobed—middle lobe broadly obovate, with a small mucro or point in the slightly sunken centre—lateral lobes small, erect, between which and at the base of the middle lobe is a tuft of purple hairs. Colour of the flower pure white, except the purple eye. A very elegant little *Dendrobium*, which first attracted my attention as ornamenting the hair of the Burmese girls in Maulmain. It was some time before I could find it. At last, when ascending the Salween River in company with the then Col. Fytche, he spied an Orchid on the overhanging branch of a tree. It proved to be the desired plant. The name records the circumstance.

Space will not admit of further notice of this genus, profuse as it is in number of species and in beautiful forms. The object here proposed is not a scientific description of all Burmese Orchids (this would require a work of some considerable length), but only just sufficient brief notice of some of the most striking species as may enable an amateur collector to distinguish them, and incite him to their study. I pass on, therefore, to other genera.

CRYPTOCHILUS.

A small genus of obscure plants, of which Burma has but one representative, as far as is at present known, *C. meirax*. It is a dwarf species, stemless, consisting wholly of a flattened pseudo-bulb ½ an inch in diameter, attached to the tree on which it grows by minute fibrous roots. Each bulb produces 1 sessile flower, large for the size of the bulb. Its peculiar feature is that the exterior segments of the flower cohere at their edges, and thus form a sort of tube concealing the lip. It has a 2-celled anther with 4 pollen-masses in each.

ERIA (including ANIA).

A genus which includes plants of widely different size and appearance—some being small stemless plants with flattened pseudo-bulbs, not more than ¼ inch high, bearing a pair of small leaves and 1 or 2 obscure flowers in their axis; others being a foot or more high, with short or lengthened pseudo-bulbs, and leaves leathery and smooth, or thin and plicate, and variously disposed. The inflorescence also is various, being either in lateral or axillary racemes, or in dense heads, or consisting of solitary flowers on a thin peduncle. It is distinguished from *Dendrobium* by having 8 pollen-masses instead of 4, which are round or pear-shaped, and united in 1 or 2 bundles at their base by an elastic cobwebby material, not free as they are in that genus. The lip, articulated with the much prolonged and projecting base of the column, is commonly 3-lobed, and has crested or raised lines on its disk. Species about 35.

E. OBESA.

Pseudo-bulbs short, ovate, plump, about 2 to 3 inches high, 3 or 4 together, their rather flattened sides touching each other. Leaves 4 or 5, beginning from near the base, and terminating (each) a broad sheath, which clasps the bulb all round. These sheaths slope alternately to right and left, and are striated, or marked with lines, as are also the bulbs, which are somewhat constricted at the internodes. Flowers small, $\frac{1}{2}$ inch, almost colourless, forming a raceme of 3 or 4, with large ovate reflexed bracts at the junction of the stalks.

E. EXSTINCTORIA.

Pseudo-bulbs round, flattened and even depressed on the top, growing in small crowded patches, about $\frac{1}{4}$ inch across and the same in height, bearing, when fully matured in the rainy season, one small ovate pointed leaf in the centre. Before the dry season has well set in, and the plant flowers (the only time when it is likely to attract attention), these have fallen off and, in its place, exactly in the axis of the bulb, stands a slender erect peduncle or flower-stalk about 2 inches high, which, gradually swelling into the germ, terminates in a solitary flower, about $\frac{1}{2}$ inch long. Upper sepal ovate, acute, lateral sepals of the same general shape, but produced downwards and adnate to the prolonged column which ends in a blunt, rounded, or slightly notched spur. Petals smaller, lanceolate. Lip 3-lobed, middle lobe large, and itself 2-lobed, the segments rounded, lateral lobes smaller, rounded and crenate. The lip tapers into a claw, which is attached to the foot of the column, and has 3 raised lines or ridges along its length. Colour white, tinged with pink; the 3 papillose ridges of the lip and the intermediate space are orange-yellow, with just a tinge of pink. Base of the column inside, yellow. Spur greenish. Anther blotched with deep red on each side. I have here given the colour, as seen and carefully drawn by myself. I consider the figure in Bot. Mag. much too highly coloured, and the pollen-masses to be incorrectly drawn by the artist. I find them 8, but in 2 bundles of 4 nearly round united by their suddenly tapering caudicles in the normal manner of the genus, by an elastic cobwebby substance. On the subject of leafless Orchids I have a word or two to offer. Several small species have been described as leafless which are not really so. This plant, with *Drymoda picta*, *Bulbophyllum moniliforme*, and others, has leaves. But they must be looked for at the right season, viz. in the rains. In the dry or flowering season, when they are generally sought for and gathered, no trace of leaf is to be seen. Wight (Lcones, No. 1741) figures and describes *Cheilochista usneoides* as a leafless epiphyte. Whether this plant be really so or not I cannot say, as I am not acquainted with it; but we have a small Orchid (*Thriaspium luniferum*), which, for the greater part of the year, consists simply of a bundle of roots, growing from a common centre, which centre hardly presents a trace of stem. In this state it resembles Wight's plant. In the dry season a long raceme of small flowers grows forth from this axis, and in this state it is generally found; but if it be watched throughout the rains, two small leaves (about 1 inch long), lanceolate and pointed, will be seen to be produced at the same axis. I think it very probable that if *Cheilochista* were watched with equal care, leaves would be found. The only really leafless Orchid with which I am acquainted is *Galeola*, which will be described in its proper place.

E. VESTILA, sp. aff.

A very different-looking plant from either of the preceding ones. Stems tufted, a foot or more long, pendulous, about the diameter of a lead-pencil, very dry and hard near their base, where they are generally leafless, being leafy only for about $\frac{1}{4}$ of their length; leaves lanceolate, acute, 3-4 inches long and 1, or a little more, broad, fleshy, profusely covered with soft rufous hairs on both sides, making them velvety to the touch. Racemes axillary, very short, consisting of 3 or 4 flowers only. The short hairy flower-stalk is rather zigzag and bears 5 or 6 ovate pointed bracts, the 2 or 3 lower of which are without flowers. Flowers sessile in the superior ones, $\frac{3}{4}$ inch long. Dorsal sepal linear, lateral sepals broad, connate below and forming a blunt spur. Petals narrow, linear, about the same length as the sepals, showing

their recurved tips between them. Lip attached to the base of the curved spur, and curved conformably to it, undivided, wedge-shaped, rounded at the point, about the length of the sepals. Column cylindrical, contained in the same line as the short ovary. Anther deep purple. Petals white, lip pale yellow. Sepals, bracts, flower-stem, and margin of lip red with hairs. Tavoy. I have been minute in my description of this plant in the hope that it may be sent home and satisfactorily determined. My dried specimens appear to have been lost, and, by a strange omission, the pollen-masses are wanting from my drawing of the flowers. In the absence of flowers, the plant exactly resembles *Eria vestita* of the *Bot. Magazine*, No. 5807. In consequence of the dry and wiry character of the roots I could never succeed in making it attach itself to a tree, and it always refused to grow with me.

DENDROCHILUM.

A small genus consisting of a few obscure plants. Pollen-masses 4, incumbent. For further information reference must be had to books. Limited space allows only brief notice here. Species 1.

D. PALLIDE-FLAVENS.

A small plant, in general aspect like a *Bulbophyllum*, bearing a slender raceme about 3 inches long, of minute straw-coloured flowers from the base of the pseudo-bulbs.

PHOLIDOTA.

The plants of this genus have either pseudo-bulbs, or jointed swollen stems, with plicate leaves, and terminal, two-ranked, drooping racemes. Pollen-masses (in the only two species known to me) 4, ovate, joined in pairs to a slender caudicle. Species 2.

P. IMBRICATA.

Pseudo-bulbs ovate, oblong, terminated by a large lanceolate leaf, from the central axis of which hangs a long flexible spike of closely imbricated greenish-yellow flowers, each almost concealed by a concave bract. Common.

P. ARTICULATA.

Stem articulated; joints fleshy, cylindrical, 3-4 inches long, terminated by a pair of ovate leaves, from the axis of which droops a lax raceme of some dozen greenish-yellow flowers. It forms loose, irregular masses, rooting freely at the joints.

OTOCHILUS.

In general appearance like *P. imbricata*, but the flowers are slenderer, and have a long, arched, half-rounded column resembling that of *Calogyne*. Pollen-masses 4, incumbent, concavo-convex, united in pairs by an elastic cobwebby material. Species two, forming large tangled masses on the branches of trees in mountainous districts. Flowers colourless and inconspicuous.

PLEIONE.

A small group of very distinct form and habit, by some united with *Calogyne*, and indeed in the general structure of their flowers having no essential difference; passing, moreover, by easy gradations, through *C. Schilleriana* and *C. uniflora* into that genus. The few plants belonging to this group are dwarf epiphytes growing in dense patches on rocks and trees on the higher mountains, among moss. They consist of rounded, more or less depressed, pseudo-bulbs, $\frac{3}{4}$ or 1 inch in diameter and height, from the base of which spring 1 or 2 strikingly beautiful flowers of extraordinary size for that of the bulb. Leafless when in flower. Although apparently lateral, the flowers here (as in *Calogyne*s) are really terminal. They grow at the end of a new and as yet undeveloped pseudo-bulb, which, in its early stage, forms the foot-stalk of the flower. This, after the flower has perished, swells and eventually becomes the recognized pseudo-bulb, often bearing at its end the now matured fruit. Thus the leaves are formed later than the flowers, the reverse of what is ordinarily the case in Orchids.

The discovered species are two, *P. præcox*, which I have gathered abundantly on the mountains near Toung-ngoo, at an elevation of 7 or 8000 feet; and *P. Reichenbachiana*, on the mountains E. of Maulmain at a somewhat lower elevation. The latter plant shared the fate of my *Dendrobium crassinode* and many other fine things, all sunk in the "Persia," and thus Col. Benson became the fortunate first introducer of the plant into England. Both species are figured in the *Bot. Magazine*.

CELOGYNE.

The Orchids of this genus have for the most part handsome flowers, though not of the first order of beauty. They are to be distinguished by the following characters. The flowers are terminal (as explained under *Pleione*) on a pseudo-bulb formed or unformed. Pseudo-bulbs crowded so as to form tufts, or distant on a creeping root-stock, generally short, but sometimes much elongated. Leaves 2, at the end of the pseudo-bulb. Sepals separate and distinct, generally, but not always, wide spread. Petals similar, but narrower. Lip large, articulated with the base of the column, and parallel with it, usually 3-lobed, the side-lobes very large and erect, with longitudinal raised lines or crests on the disk. One of the most marked characters is the column, which is long, curved and winged, often hooded and toothed at the top. Pollen-masses 4, incumbent (back to back), united in pairs by a granular substance. This is the rule, but there are exceptions. Species 25.

C. SCHILLERIANA.

This may be fairly called a small *Pleione*. Pseudo-bulbs small ($\frac{2}{3}$ inch). Leaves 2, at the end of the undeveloped pseudo-bulb, which, at this stage, looks like a narrow flower-stalk only, with imbricated bracts at the base. Flowers solitary from between the leaves, about $1\frac{1}{2}$ inch across. Sepals and petals tawny-yellow, the latter very narrow. Lip 3-lobed, lateral lobes oblong, rounded, parallel with the column; middle lobe very broad, wavy, crisped and notched at the point, colour yellow, with dark reddish-brown blotches. The old bulbs are leafless at the flowering season. Maulmain and elsewhere.

C. UNIFLORA.

Pseudo-bulbs about 1 inch long, flask-shaped, seated closely on a creeping root-stock, terminated by 2 long linear leaves. Flower 1 (sometimes 2) from the base of the *fully-matured* bulbs, and not from the axils of the leaves, as in *C. Schilleriana* (herein apparently forming an exception to the rule of the genus already mentioned), about 1 inch long, orange-yellow. Lip 3-lobed; side-lobes small, acute; middle-lobe boat-shaped, with 3 orange-coloured streaks at the base, and three similar spots in the middle.

C. RIGIDA.

Pseudo-bulbs distant, 3 inches or so, on a coarse, hard, branched root-stock, which is $\frac{1}{2}$ inch in diameter, ring-marked where the scales have fallen off, and sending out wiry roots from its under surface. The bulbs from 3 to 5 inches long, smooth when young, but much grooved when old and shrunk. Leaves two, ovate-lanceolate, pointed. Flowers 8 or 10 in a pendulous raceme from between the leaves. Raceme 8 inches long, flowers $\frac{3}{4}$ inch, rufous. Sepals oblong. Petals very narrow and standing back from between the sepals. Lip 3-lobed, middle lobe broad and itself 2-lobed, with two dark brown wavy crests. The unexpanded flowers have each a large ovate, pointed bract, embracing and nearly concealing them. These bracts are of a rich brown colour towards the point. The flowers occupy about half the length of the peduncle, and at the base of the lowest flower are a number of imbricated scales, extending back for about two inches. The old bulbs are generally surmounted by the hardened rigid remnant of the peduncle, which is almost hard enough to run into the hand. Hence the name.

C. FUSCESCENS, VAR. BRUNNEA.

A plant of much the same character as the preceding, but generally smaller and less robust. The flowers are 5 or 6, in a drooping raceme at the end of the young

undeveloped pseudo-bulb, each about 2 inches long, of a general tawny-yellow colour. The lip dark chocolate brown. A handsome Orchid.

C. PARISIII.

Pseudo-bulbs on a creeping root-stock, 5-7 inches long, cylindrical, smooth, surmounted by two oblong-lanceolate plicate leaves. Peduncle of about 5 flowers in their axil, 6-7 inches high. Flowers large, green, lip crested and marked with black streaks and spots. More curious than beautiful. In this species the flowers terminate the fully-matured pseudo-bulbs.

SUNIPIA, Buch.

A genus of two species only (as far as is at present known), one of which is found in Burma, *Sunipia scariosa*. Its description may suffice here for that of the genus. A plant in habit like a *Bulbophyllum*, with a creeping rhizome of the thickness of a goose quill, bearing upon it, at regular distances of 2 or 3 inches, ovoid pseudo-bulbs about 1 inch long, tapering upwards, each terminating in a single linear leaf, 6 inches by $\frac{3}{4}$, leathery. Inflorescence a spike on a long slender peduncle, erect for about 10 inches, with stem-clasping scales at intervals, thence drooping for another 6 or 7 inches. Flowers very small, sessile, alternating on a zigzag rachis, each concealed by a glumaceous bract. Sepals ovate obtuse, the two lower uniting to form a keel. Petals much smaller and nearly round. Lip articulated with the column, 3-lobed, side lobes rounded, middle lobe elongated, blunt, solid, hollowed out at the base. Pollen-masses 4, collateral, nearly round, attached by pairs to two short blunt fleshy caudicles. The colour of the flower is white, tinged with rose at the base. Lip pale yellow. Lindley places it among *Vandea*, and speaks of a gland, but I can find no trace of one. 4-5000 feet among the mountains.

AGROSTOPHYLLUM, Bl.

Like the last, this is a small genus consisting of 2 or 3 species. Our Burmese representative is *A. planicaule*, a plant with fleshy flattened stem about 5 inches long, $\frac{3}{4}$ inch broad by $\frac{1}{2}$, bearing a leaf (possibly 2 leaves) at the top. Leaf oblong, 6 inches by 1. Flowers in a small dense head at the base of the leaf, interspersed with brown bracts. The pollen-masses are 8—those of an *Evia*, though Lindley places the plant among *Vandea*. The plant grows in a tufted manner—several stems near together. This is the meanest Orchid and the most *weedy*-looking that I know. Species 1.

SPATHOGLOTTIS, Bl.

“Terrestrial plants with subterranean corms” (rhizomes underground, Bentham in *Flora of Hong-Kong*, p. 355), “and sword-shaped plicate leaves. Sepals spreading, free, equal. Petals rather broader. Lip articulate at the base of the column, not spurred but concave or saccate, 3-lobed, middle lobe contracted into a claw, and crested or tuberculated. Column winged or petal-like. Pollen-masses 8, waxy. Scapes radical, leafless.” Species 3.

The foregoing generic description is simply copied from Lindley and Bentham. This is done because the first of the three species mentioned below (placed in this genus by Reicheubach) will be found to differ in some respects from it.

S. HARDINGIANA.

Pseudo-bulbs about the size and shape of a cob-nut, terminated by two lanceolate pointed leaves much attenuated below, 6-7 inches long by $\frac{3}{4}$ broad. The flowers are borne in a loose raceme of some 8 or 10, on one, or occasionally two, slender peduncles 9-10 inches high, with 2 or 3 sheathing scales nearly an inch long at regular distances upon them, springing from the base of the pseudo-bulb. The stem (peduncle) is covered with soft hairs and is red. Each flower, which is nearly an inch across when fully expanded, has a slender stalk 1 inch long and a pointed bract at its base. Sepals ovato-lanceolate pointed. Petals of the same length and appearance, but *much narrower*, all thrown backwards when in full flower. Lip long and narrow, awl-shaped, very acute, from a broad rounded base with a central

longitudinal line. About the middle of the lip are two prominent lumps or callosities (one on each side of the line), of considerable size for that of the lip. The column is long, slender, arched (almost hooked at the end) and winged on the upper half. Anther 2-celled. Pollen-masses 8, long and tapering into caudicles, and cohering in two bundles of 4 by their glutinous extremities. The colour of the unopened buds is greenish, that of the expanded flower clear white with just a blush of rose at the tips; column rose; anthers deep red purple, and the callosities marked with red and yellow. An extremely elegant little Orchid sent me by Mr. Harding of Rangoon in 1873. I named it accordingly after him. I believe he received it from Blamo. I grew it for 2 years with the greatest ease at Maulmain in a pot, where my one plant increased to two or three. I should have liked to send it to England in a growing state, but fearing that, if it were lost or died, there would remain no proof of its existence beyond a verbal record and a drawing, I sacrificed it in its full beauty, forwarding one dried specimen to Kew and reserving one for myself. The fortunate possession of this perfect specimen has enabled me, now as I write, to re-examine the pollen-masses. In my original drawing, made in 1874 I represented them as attached to a sort of gland, but I appended a note to the effect that I was not sure I was right, that the apparent gland was torn, and I could not clearly make it out. This observation Prof. Reichenbach quotes in his description of the plant (*Otia Botanica*, Hamburg, Fasc. I. p. 46), and suggests that the apparent gland had some irregular source. I now find that the pollen-masses are without any gland, as is to be expected in *Epidendrea*, but I perceive that the rostellum at the end of the column is very thin and membranous, and I think it likely that in removing the pollen-masses from the anther, an irregular fragment of this membrane may have been carried away with them, in consequence of the very glutinous nature of the caudicles.

The differences observable between this species and the description of the genus are, that, though terrestrial, the pseudo-bulbs are above ground, the petals are smaller than the sepals, and the lip is undivided.

S. PUBESCENS.

S. LOBBII.

These two plants must be passed by with a brief notice. They both have underground bulbs of an irregular shape, two long linear-lanceolate leaves and long slender flower-stalks, which bear from 3 to 5 yellow flowers, about 1½ inch across. Sepals and petals broad, nearly the same size. The lip is 3-lobed or tripartite, and in both is of a remarkable shape. They are about a foot high, resemble each other very much, differing in points of small detail. The first I find on Zing-gyik, near Martaban, the last on the hills East of Amherst. It was also sent to me by the late Capt. Gower, from Akyab. They are both easy of cultivation, and deserving of it.

Spathoglottis is nearly allied to *Bletia*, from which (says Lindley) it is distinguished by the middle segment of the 3-parted lip being unguiculate with two tubercles or lamellæ at its base, and by its two-celled anther." There is a handsome purple *Bletia* grown now frequently in Rangoon gardens which I take to be an introduction.

CALANTHE, *R. Br.*

Terrestrial or epiphytal plants, consisting of pseudo-bulbs which are nourished by fibrous roots from their base. Flowers numerous in racemes on erect stems, which spring from the base of the pseudo-bulb. Sepals and petals spreading, nearly equal, free. Lip connate with the column, entire or lobed, variously spurred. Pollen-masses 8, in pairs, tapering into caudicles, which adhere to each other by a cobwebby substance, and are occasionally united by a spurious gland. Leaves terminal on the pseudo-bulbs, broad, plicate. Species 3.

C. VESITA.

Pseudo-bulbs large, 4-5 inches, ovate, somewhat squared, partly clothed with membranous scales, of an ashy-grey colour. Leaves 2 or more from the end, a foot or more long, 4 inches or more broad, lanceolate, ribbed, tapering downwards into

a foot-stalk, and upwards into a point, falling off before the flowers appear. Flower-stem, or scape, springing from the base of the matured pseudo-bulb, 1 foot or more, erect, bearing at intervals sheathing scales, clothed with hairs which stand out at right angles with the stem. Flowers large, several, 7-8, in a loose drooping raceme. Sepals and petals widely spreading, broad, lanceolate, pointed, nearly of the same size. Lip widely spreading, the base of it attached to the sides of the column along its whole length, laterally compressed; the remaining or projecting portion rounded in outline, deeply 3 lobed; the middle lobe again subdivided, but not so deeply. Spur long, slender, curved forward under the lip. Anther sunk in the column, 2-celled. Pollen-masses 8, tapering into caudicles, adhering to each other, but without any gland. The colour of the flowers is pure white, with the exception of a yellow or Roman-red stain in the eye of the lip. An extremely beautiful plant, widely distributed; always found on trees.

The pollen-masses of *C. veratrifolia*, a Straits plant, are united to a distinct gland, but one of a different character from the gland of *Vandea*. *C. obtusata* has a distinct gland, very Vandeous-like.

LIMATODES, Bl.

Terrestrial plants, bearing pseudo-bulbs nourished by fibrous roots which penetrate the vegetable soil. In character very near to *Calanthe*. Sepals and petals spreading, nearly equal. Lip free, undivided, spurred. Column very short. Pollen-masses 8, as in *Calanthe*, without a gland. Leaves terminal, broad, plicate. Flowers in a raceme on a stalk which springs from the base of the pseudo-bulbs. Species 1.

L. ROSEA.

Pseudo-bulbs elongated, jointed or constricted, angular, tapering upwards, 5-6 inches long. Stems villous, erect, with scales at intervals, many-flowered. Flowers rose-coloured. Lip oblong, undivided, rolled into a tube at the base, and enveloping the column; pale yellow in the eye, which is surrounded by a deep crimson ring. Spur long, stouter than in *Calanthe*, and bent backwards. Stem and flowers hairy. A lovely plant, profusely abundant in the crevices and on the ledges of the limestone rocks about Maulmain, growing in loose rich vegetable mould.

The Messrs. Veitch have produced a hybrid plant by crossing *Limatodes rosea* and *Calanthe vestita*. The conclusion to be drawn from this is, not that plants of distinct genera can be intercrossed, but that the so-called genera are not really distinct. It points to the extremely close relationship of the plants, and to the purely artificial nature of the distinction which has been made.

It may be remarked here that *Calanthe* and *Limatodes* have been placed by Lindley and other botanists among *Vandea*, on account of the occasional appearance of a gland to the pollen-masses. The character of this gland, however, as well as that of the pollen-masses themselves, is very different from that which prevails among *Vandea*.¹ These two genera, accordingly, with some others, are now referred to the Epidendrous division of Orchids, as showing more general affinity with it.

ARUNDINA, Bl.

Terrestrial plants with tall erect leafy stems and 2-ranked leaves, and no pseudo-bulbs. Sepals lanceolate, equal, petals broader. Lip 3-lobed or entire, rolled round the column, without a spur. Column half-rounded, clavate (club-shaped) at the end. Pollen-masses 8, in fours. Flowers large, handsome. Species 1, *Arundina bambusifolia*, for description of which see Roxburgh's Flora Indica, vol. iii. p. 460, under *Cymbidium*. Damp shady places among moist rocks. Akyab.

PHAIUS, Lour.

Terrestrial or epiphytal plants, generally tall and caulescent, though sometimes stemless and pseudo-bulbous. Scapes radical. Flowers showy. Sepals and petals free, spreading, nearly equal. Lip rolled at its base round the column, 3-lobed or

¹ *C. obtusata* perhaps excepted.

entire, spurred. The middle lobe with ridges or raised crests. Column continuous with the ovary, half round. Pollen-masses 8, nearly equal.

P. BLUMI.

I regret being unable to speak positively of this plant, and to say if it have pseudo-bulbs or not, as, unfortunately, I have kept no record of the fact, nor any drawing, and my dried specimens consist of flower-stems and flowers only. Nor does the drawing of *Limodorum Tankervilleæ*, *Bot. Mag.*, tab. 1921 (now *Phaius*), which, being closely related to it, probably grows in the same way, afford any material for deciding; nor does the meagre description of the plant there given. As far as my recollection serves me, the leaves, which are broad lanceolate, pointed and plicate, arise from a mass of underground fibrous roots, and form a sort of false stem made by their combined bases, which is slightly swollen at the point where it touches the ground. The scape, or flower-stalk, springs from the side of the leaves at their base, is longer than the leaves, being about 10 inches or 2 feet long. It has several sheathing scales along its length at regular distances of 2 inches, and bears towards the end a loose raceme of several (6-8) large handsome flowers, full 4 inches across. The form of the flowers is as described above in the genus. The lip has a short curled spur at its base. Sepals and petals white outside, brownish inside. Lip whitish, streaked with crimson. From Bhamo.

THUNIA, *Rehb. fl.*

Epiphytal plants, with leafy fasciated stems, slightly swollen at the base, clothed with alternate leafy sheaths from the bottom, enlarging upwards with normal leaves. Flowers few, 2-6, terminal, each with a spathaceous bract at the base. Sepals and petals lax, thin, wide-spreading, lanceolate, pointed, nearly equal. Lip parallel with the column, 3-lobed, bluntly spurred, the lateral lobes enveloping the column; middle lobe broad, wavy, crested on the disc. Column winged, somewhat hooded at the top, 3-lobed, middle lobe rounded, side lobes toothed. The stigmatic aperture is covered by a membrane which falls over and conceals it, very much as in *Vanilla*. Pollen-masses 4, or, by division, 8, united by a thick fleshy stipes. Anther 2-celled, each cell subdivided again into two. Species 2 or 3.

T. ALBA.

The generic description given above may serve also generally for the specific description. The stems of this species are 6 or 10 inches long tapering to a point. The leaves are alternate and two-ranked, glaucous, long-lanceolate, pointed, and the flowers are white.

T. BENSONIÆ.

Same as above, except that the flowers are larger, 3 inches long, and purple. The lip is of a much deeper colour than the rest of the flower, and has its disc ornamented with yellow raised and crested lines. Certainly a handsome plant, but disappointing, owing to the flaccid texture and drooping habit of the flowers, which hardly show their beauty unless raised and opened by the hand. Both this species and the foregoing are epiphytal on the perpendicular surface of trees and rocks at an elevation of 4-5000 feet. Although known to me for some time previously, Colonel Benson was fortunate in being the first to send it to England.

T. XANTHOPHLEBIA (PULCHRA).¹

¹ THUNIA PULCHRA, *Rehb. f.*, "Gard. Chron." 1881.—"A glorious specimen of this is at hand from Mr. W. Bull. It has a rather nodding, rich inflorescence of 10 fine flowers, and these make one think of *Celoglyne cristata* in their pure whiteness. The lip has yellow and brown crests, but very little of those is to be seen as long as you do not expand the flowers artificially. The genus *Thunia* was established by the writer of these lines, in Dr. Lindley's lifetime, in Von Schlechtendal and Von Mohl's *Botanische Zeitung*, 1852, p. 764, having been regarded as *Phaius* till then; it has been universally admitted. Let us now imagine somebody had refused its acceptance, and declared it once more a *Phaius* and not a *Sobralioid Arctosee*, then it should have waxy and not amyaceous pollen. What is a waxy pollinium? The one that, by being covered with a layer of exina, is fit to resist the entrance of water a good while, and is hard and stringy, usually bright yellow, seldom green, hyacinth-red, or

In general character like the two preceding species, but a very much larger plant. Whereas in *Thunia alba* and *Bensonia*, only two stems, one old and one new, go to form the plant, the species under consideration has several stems growing in a fascicled manner, and these are 18 inches or 2 feet long, as thick as the little finger, and leafy throughout. The flowers also are more numerous, 6 to 8 in a raceme. They are white, hardly so large as those of *Thunia Bensonia*, and the lip is marked with ochraceous lines in the disk and yellow veins, whence the specific name. On trees in the plains, about Maulmain.

Thunia pulchra is the same as *Thunia xanthophlebia*. Both are Prof. R.'s names. Why he changed the latter name first given into *T. pulchra*, I do not know. *T. xanthophlebia* is descriptive; *T. pulchra* is not. I had it growing for 20 years in my garden, and considered it an indifferent thing.—C.P.

Before leaving this genus, I would draw attention to the pollen-masses. These are described by Sir J. Hooker in *Bot. Mag.* under tab. 5694 as 4, clavate (club-shaped) furrowed, and finely granular. It was always my custom, whenever time permitted it, and the opportunity offered itself, to examine the pollen-masses of all Orchids with the greatest care, and to draw them with scrupulous fidelity. In the great majority of cases this was done at leisure, the plants examined being fresh-gathered in my garden. This was the case with *Thunia Bensonia* and *xanthophlebia*, and the drawings as made some 15 years ago are now before me as I write these lines. Now the pollen-masses of the two plants are very different. They differ in number and in shape. In *T. xanthophlebia* I find 4, and in *T. Bensonia* I find 8. The difference in shape is not easy to describe; a drawing is required to make it plain. However, in *T. xanthophlebia*, they are distinctly 4 only, all 4 equal, elongated, lying in pairs, one pair in each cell of the anther, concavo-convex, and accumbent, *i.e.* appressed side by side, their concave surfaces one against the other; all four united by two constricted necks (which gives them a somewhat club-shaped appearance) to a common thick granular base, or stipes.¹ In *T. Bensonia* they are 8, 2 pairs in each anther-cell, and these pairs are incumbent, *i.e.* one pair behind another. The pairs in each cell, moreover, are unequal, a larger pair and a smaller pair, the smaller pair being raised by a slenderer stipes of their own on to the broader stipes of the larger pair, and all united by a grumous (or thick clotted) mass, forming a spurious gland. It may, indeed, be allowable still to say they are 4 only, but these 4 are distinctly cloven to their base, so as to form 8 plano-convex masses, very much as, in *T. xanthophlebia*, the two greater may be said to be partible into four smaller masses. I have no record of the pollen-masses of *T. alba*, but they are probably like those of *T. Bensonia*, from which it is doubtfully distinct as a species. Indeed, under its old name of *Phaius albus*, it comes under that genus in Lindley's "Genera and Species of Orchidaceous Plants," and one of the distinctive characters of *Phaius* is that it has 8 pollen-masses.

MONOMERIA, Lindl.

Founded by Lindley on one species discovered by Wallich in Nipal, to which Lindley gave the name of *M. barbata*. The following is his description of the genus.

whitish. This one has no cover of exina, though I admit that the pollinia are not quite as soft as in *Bletilla hyacinthina*, called *Sobralia bletroides* by excellent botanists of Paris for its mealy pollinaria, yet they are nearly as in some *Galeola*, which I had the pleasure of seeing fresh. Blume, indeed, has, in 1856 (*Muscum*, p. 181), quoted *Phaius albus*, Lindl., as *Phaius*, yet in his last Orchid book he omitted the plant, no doubt having been informed of its separation—at least I cannot find it in his last book. After all Blume did not know the marks of distinction between *Phaius* and *Bletia*. Morphologically our plant teaches us once more not to rely too much on the presence of the spurs. Our plant has no spur, and *T. alba* enjoys a spur. *Thunias* have a terminal inflorescence on the leafy shoots, when *Phaiuses* have their inflorescences and their fascicles of leaves apart. *Thunias* have fleshy membranaceous leaves, *Phaiuses* have plaited ones; *Thunias* have persistent, *Phaiuses* deciduous bracts; *Thunias* have 4, *Phaiuses* 8 pollen-masses; *Phaius* flowers get blue when dried, *Thunias* keep white, or get brownish flowers in this state. If you look to the propagation, you can make cuttings of *Thunias* as of a *Dracena*. Try it with *Phaiuses*? A representation of *Thunia pulchra* will be given in *Xenia*, and it is intended to add for mere comparison a representation of *Phaius*!—H. G. Rehb. f.

¹ I use the word stipes here, as, from its meaning, it is more appropriate than caudicle, though it is not of a Vandaceous character.

"Sepals ringent (gaping wide), unequal, the lateral ones far removed from the top one (the interval being toothed), united to each other and to the base of the column, bearded. Petals none. Lip jointed with the foot of the column, incumbent, 3-lobed, with 4 parallel lamellæ (thin plates) on the disk, the lateral lobes falcate forwards and bidentate at the apex. Column much lengthened out below, half round, with 2 small horns at the point. Anther crested, 1-celled. Pollen-masses 4, cohering in one." A plant with a creeping rhizome (root-stock), which bears pseudo-bulbs. Leaves single, leathery, without veins. Raceme from the root, many-flowered. Note (by Lindley): "This is the only known genus of Orchids in which the petals are abortive. Nothing is found in their room, but there is a wide toothletted interval between the upper and lower sepals." Here follows his further description of the species.

"Pseudo-bulbs ovate. Leaves with very long petioles (stalks) 1 foot long, erect. Raceme shorter than the leaves. Scape (flower-stalk) light-coloured, bearing a few scales, spotted. Flowers light-coloured, spotted with purple. Lip yellowish. The foot of the column thickly dotted with purple."

As a special interest is attached to this plant, I have been careful to give here everything that Lindley says of it. There appear to be only 2 or 3 specimens remaining of this singular plant in European Herbaria, and these, as it may well be supposed, owing to their age, not in a very good state for examination. Lindley himself could only have seen and examined a dried specimen; hence, possibly, he may have been mistaken in some particulars.

It was my good fortune in February, 1871, to find on *Ta-ok*, at about 3000 feet of elevation, a solitary plant, looking exceedingly like a *Bulbophyllum*. Knowing, by experience, how deceptive these *Bulbophyllum*-like Orchids are, I brought it down to Maulmain, where it flowered, and proved to be a *Monomeria*. I thought I had Lindley's *M. barbata*, so very similar did it prove to his description and to his figure of that plant in his *Sortum Orchidaceum*. Eventually, however (to be short), Prof. Reichenbach pronounced it to be a distinct species, and gave it the name of *Monomeria crabro*, from a fancied resemblance of the flower to a hornet.

Into the distinctions between the two species (which are, after all, very slight) I will not enter, but proceed to give a familiar description of my plant, in the hope that it may be found again some day, and sent home once more. As I have remarked above, the plant might be passed over as a very ordinary looking *Bulbophyllum*. The rhizome, which is about as thick as a cedar-pencil, and covered with scales, creeps extensively, emitting tough wiry roots from its under part. It has pseudo-bulbs seated upon it, several inches apart. These are pear-shaped, about 2 inches long, and terminated by a solitary, leathery, strap-shaped leaf, which is some 10 inches by 1½. The flowers are about 20, individually 1 inch long, forming a sparse raceme extending over about 9 inches of a curved drooping scape, which in total length is 15 or 16 inches. This scape springs from the base of the pseudo-bulb, and has several scales on its lower portion. The flowers, of a remarkable shape, terminate a germ of 1 inch in length, which, in fact, forms their peduncle, and at the base of the germ is a lanceolate bract. Of the 3 sepals the upper one is ovate triangular, sharp-pointed, and stands erect, arched over the column which it in part conceals. The two lateral, or in this case more markedly, *lower* sepals are oblong, oblique, pointed, parallel to each other, and cohering along their whole length so as, apparently, to form but one oblong-pointed segment. Petals minute, triangular, fringed. Lip elevated on the up-turned end of the column, much shorter than the lower sepals, 3 lobed; lateral lobes small, triangular, acute; middle lobe, oblong with a mucro, or point, at the end. The colour of the upper sepal is yellow, that of the lip dark purple, and the two lower sepals are blotched with the same colour on a dark yellow ground. It remains to speak of the most important part of the flower, the pollen masses. Lindley describes those of his *M. barbata*, as simply 4, "cohering in one mass." This is very much as was to be expected, judging from the general character of the plant, which is that of a *Bulbophyllum*, and it is what I was prepared to find also in my plant. To my great surprise, however, on dissection, I found indeed the 4 pollen-masses, cohering in one round mass, exactly as described by Lindley, but also,

proceeding from between them, a rigid curved stipes (I thankfully avail myself of this word, suggested as more appropriate by Bentham than caudicle), and at the end of it a gland, not a membranous gland as in *Vandea*, but a firm grumous mass; the whole as figured (from my drawing) in the Linnean Transactions. Reichenbach (though whether confirmed by actual observation or not I cannot say) has accepted my representation. But Mr. Bentham, in his recent "*Notes on Orchidæ*," Linn. Soc. Trans. vol. xviii. p. 301 (a copy of which he kindly presented to me), makes the following observation in reference to this plant: "I cannot help thinking that the pollen figured by Parish had become accidentally attached to some extraneous body mistaken for the stipes, a conjecture somewhat confirmed by the very exceptional manner in which the pollen appears attached to the supposed stipes, which, moreover, does not correspond in shape with that of the rostellum, from which it would have been detached." Now, all I can say to this is, that I do not think it possible for me to have made so serious a mistake; I must, therefore, with such modest assurance as I fairly may, state my firm conviction, that it is as I have drawn it, and that there was attached to the pollen-masses a veritable stipes and gland. My original drawing now lies before me (and on none have I bestowed greater pains), and, in corroboration of my statement, I perceive that, in a highly magnified representation of a front view of the column, with all the parts still "*in situ*," as yet untouched, the gland is distinctly drawn as projecting forwards in front, from under the anther. I admit the improbability of such a structure being found, and I feel the full weight of the authority against me, but I must adhere to the correctness of my representation, until, by the fortunate rediscovery of the plant, I shall be proved to be wrong. It is a mountain plant, and the special locality where I found it is Ta-ok in the Daunrange, east of Maulmain, at an elevation of 3-4000 feet, as nearly as I can guess.

EULOPHIA, *R. Br.*

Terrestrial plants, pseudo-bulbous. Roots fibrous, from their base. Flowering stems sometimes terminal on the yet undeveloped leafy bulbs, which grow out from the base of the old leafless bulbs, sometimes also several from various parts of the old bulb, simple or branched. Leaves long, membranous, plicate or smooth. Sepals and petals spreading, nearly equal, free, or adhering more or less to the column, which is lengthened into a blunt spur. Lip 3-lobed, middle lobe wrinkled, much veined or crested with hairs. Anther 2-celled. Pollen-masses (Vandeous) 2, each with a mark as of a second and smaller lobe behind, attached by a short stipes (caudicle of Lindley) to a rather large gland. Flowers in racemes, numerous, single, of no great beauty, about 1 inch in diameter, generally greenish, with more or less of purple on the lip. Species 4.

CYRTOPERA, *Lindl.*

Terrestrial pseudo-bulbous plants, so near in their several characters to the preceding, as by some to be united with that genus. Lindley distinguishes the genus by the absence of a spur, whereas it is present in *Eulophia*, but in the two only species known to me, pronounced to be *Cyrtopera* by Prof. Reichenbach, there is a distinct spur, and it is simply in deference to his acknowledged authority that I have separated them from *Eulophia*.

The flowers of *C. squalida* grow in a loose sparse raceme, are 1½ or 2 inches in diameter. Sepals creamy-white, striped with purple, petals pink; lip undivided, oblong, faint pink, with a broad yellow line down the middle. The anther has two horn-like appendages. The flowers of *C. macrobulbus* grow in a dense raceme of many individuals, of a uniform dull brown or burnt sienna colour. They (as do also the *Eulophias*) affect damp, shady jungles, in places where vegetable mould abounds. Species 2.

GEODORUM, *Jacks.*

Terrestrial, pseudo-bulbous. Petals and sepals free, nearly equal. Lip ventricose, obscurely 3-lobed or entire, slightly spurred or pouched at the base, parallel with the column. Column short, very broad, not produced below. Anther 2-celled, but the partition not prominent, with two little lappets inside, which serve to keep the

pollen-masses in their place. These are two, with deep indentations, attached by a broad stipes to a transverse somewhat triangular gland. Old bulbs leafless, new undeveloped bulbs leafy. Leaves broad, plicate, sheathing at the base. Scape from the base of the young leafy bulb, shorter than the leaves. Flowers in curved, drooping, rather dense racemes. Species 3 or 4.

CYMBIDIUM, *Sw.*

(*Eu-Cymbidium*, of Lindley).

Epiphytes with or without bulbous bases. Stems tufted. Roots few, fleshy. Leaves long, narrow, expanded at the base, and these alternately and closely overlapping one another, so as to form a sort of false stem. Flower-stalk of varying length, proceeding from the axils of the lower leaves, few- or many-flowered. Sepals and petals nearly equal, spreading. Lip 3-lobed or undivided, free, articulated with the column, concave, without a spur. Column prominent, erect, half-round. Anther 2-celled. Pollen-masses 2, bilobed behind, sessile on a large triangular gland. Flowers generally handsome, in short few-flowered erect, or in many-flowered pendulous racemes. Species 4.

C. ALIOPOLIUM.

A common plant, at least in the Tenasserim Provinces, with long, narrow, hard, rigid, fleshy or leathery leaves, and a long drooping raceme of dull-coloured flowers. It forms large masses on trees.

C. TIGRINUM.

A small mountain species, about 8 inches high, tufted. Leaves 3 or 4, from the top of the young pseudo-bulbs, which are enveloped in their sheathing bases. Scape radical, scaly below, bearing from 3-6, rather large flowers, two inches across. Sepals and petals oblong, of a uniform yellowish-green colour, stippled with red at their base, wide-spreading. The upper sepal and the petals nearly erect; the lateral sepals distant, spreading. Lip 3-lobed, broad but tapering below. Side lobes rounded, streaked with red on the inside; middle lobe oblong, pointed, creamy-white, with transverse bars and blotches of red. There are two raised ridges at the back of the lip. Column curved forwards, green. Pollen-masses 2, lengthened transversely, 2-lobed, sessile on a triangular gland.

An interesting peculiarity of this species is the dimorphism of its flowers, observed by me on a large number of plants, on the top of Moollee-it, where it is abundant at about 6000 feet. There are two kinds of flower on the same stem. Out of about 6 flowers, the terminal ones are normal, as described, and perfect in structure. But the lower flowers are different. They are of a rich red colour throughout, and rather blotched than striped, and their structure is imperfect. The column is quite abnormal, being unusually thickened, and less curved. There is no anther at all, and there are no pollen-masses; but the edges of the column at the top are turned inwards so as to form a sort of hood, and underneath these edges is a small quantity of a yellow waxy substance (pollen) in an amorphous state. And, occasionally, the intermediate flowers are intermediate also in condition, having no anther, but perfect pollen-masses, though without any triangular gland.

C. LOWIANUM.

A very handsome species. Stems tufted, pseudo-bulbs; or rather the swollen bases, covered with the sheathing leaves, which are very long and narrow, 2-3 feet, and only about an inch broad. Scape 2-3 feet long, drooping. Flowers 12 or more, 3-4 inches across. Sepals and petals green, striped with red. Lip 3-lobed; lateral lobes large, green; middle lobe with 2 ridges at the back, white in the centre, with a lovely maroon-coloured tip. Column green, with red markings. Presumably collected in Upper Burma, by Boxall, and sent to Mr. Low. I had a plant from the same quarter, which I at first took for *C. giganteum* till I saw the flowers.

C. PARISIII.

Stems tufted, not bulbous. Leaves 2-ranked, long, linear, 18 inches by 1,

striated, overlapping alternately at the base. Scape short, erect, about 3-flowered. Flowers large, handsome, ivory white. Sepals and petals ovate, pointed, nearly equal. Lip 3-lobed, very broad; side lobes erect, rather square; middle lobe broad, square retuse, wavy at the edge; all three beautifully streaked with Roman-red, bright golden in the centre. Deliciously fragrant. A lovely plant, but too near to *C. eburneum*. Shan border, 1859. On trees.

THECOSTELE, *Rehb. fl.*

Sepals and petals spreading, free, the former ovate, the latter narrow linear. Lip continuous with the base of the column, 3-lobed. Column long, terete, incurved two-horned at the top. Anther 2-celled. Pollen-masses 2, deeply notched behind, attached by 2 thin elastic stipites to a broad rounded gland. Pseudo-bulbous. Leaf single, terminating the bulb. Scape many-flowered, radical. Species 1.

T. ALATA.

This is *Cymbidium alatum* of Roxburgh. Bulbs aggregate, ovate, somewhat flattened, ribbed, each one terminated by a broadly ovate solitary leaf, which is 5 inches by 2. The bulbs are yellowish, the leaves dark green. Scape drooping, 6-7 inches long, scaly towards the base. Flowers numerous, $\frac{3}{4}$ inch across, spotted with red on a yellowish ground. Lip with 2 small rounded lateral lobes, and an elongated obovate middle lobe, which is hairy in the middle and retuse, *i.e.* it has the centre of a rounded end depressed, colour red, with pale yellow margin. The column is of a remarkable shape, retreating at the base, then arched forwards like a swan's neck, and has 2 horn-like appendages at the end. On trees in the neighbourhood of Maulmain. Flowering in the rainy season.

BROMHEADIA, *Lindl.*

I have no description of this genus, founded, it would seem, originally on one single species, *B. palustris*, a Straits plant, which I only know from Wight's figure. I must, therefore, confine myself to a short description of the second species which it was my good fortune to discover.

B. APOROIDES.

A small plant, 2-3 inches high, with distichous (2-ranked), rigid, hard, sharp-pointed, scimitar-shaped leaves, having very much the appearance of an *Aporum*, for which, in the absence of flowers, it might be taken. Flower, in my plant, terminal on a short scaly stalk, large for the size of the plant, 1 inch long. Sepals and petals linear-lanceolate, nearly equal, connivent. Lip parallel with the column, which is that of a *Calogyne*, long, curved, winged and projected beyond the anther. Pollen-masses two, like those of *Cymbidium*, sessile, on a large triangular gland. The colour of the flower is white, the lip excepted, which is 3-lobed; side lobes streaked with pink, pointed, almost as long as the small triangular middle lobe, which has a yellow crest. Flowering time April. No two plants can be more unlike in vegetative character than this and *B. palustris*.

LUSIA, *Gaudich.*

Plants with elongated woolly stems, long aerial roots, terete (rounded, quill-shaped) leaves, and small and, mostly, inconspicuous flowers. Pollen-masses 2, notched behind, united by a broad stipes to a triangular gland. Species 5.

COTTONIA, *R. W.*

Caulescent. Leaves distichous. Flowers in axillary or leaf-opposed racemes. Pollen-masses 2. Vandeous.

C. CHAMPIONI.

A small plant, with fleshy, ovate, pointed leaves, and a few flowers, 5 or 6, on a rigid leaf-opposed stalk, 4 or 5 inches long. Sepals and petals ovate, broad, nearly equal, spreading. Column short. Lip 3-lobed, connate with the base of the column, lateral lobes quadrate, rounded, middle lobe projecting at right angles with them and

tapering to a finely forked extremity. At the back of the lip, between the lateral lobes, is a large cushion-like oval callus, and there is also a *hump* on the middle lobe. A strikingly different plant from *C. macrostachya*, for which see Wight's *Icones*, tab. 1755. The only other known habitat for this plant is Hong-Kong. The flowers are $\frac{3}{4}$ of an inch across, dingy yellow, with a white and purple lip.

TRICHOGLOTTIS, *Bl.*

A small genus of Vanda-like habit. Leaves long, distichous. Flower-stalks axillary or leaf opposed, few-flowered. Pollen masses 2, stipes narrow, gland broad, peltate. Species 1.

PHALÆNOPSIS, *Bl.*

Sepals and petals spreading, free; petals much the largest. Lip connate with the slightly produced base of the column, free, 3-lobed, with variously-shaped callosities at the base. Column half round. Pollen-masses 2, bi-lobed, attached by a strap-shaped stipes to a heart-shaped gland. Stemless epiphytes, generally with 2 or 3, sometimes 4 leaves, which are large, broad and fleshy. Flower-stem from the short axis of the plant, 1 or more. Flowers large and showy. Species 4.

P. LOWII.

Stemless. Leaves 2, 3 or 4, very variable in size, from 3 inches \times 1 to 6-7 inches \times 2, ovate-lanceolate, fleshy, pointed. Roots fleshy, flat, extending to a great length. Scape long, 8 to 12 inches, slender, 1 or more, 4 or 8 flowered. Flowers distant, large, $1\frac{1}{2} \times 2\frac{1}{2}$ inches across, white, suffused with rose. The upper sepal is larger than the two lateral ones. The petals are very broad and rounded, tapering inwards into a wedge-shaped claw. The lip, which is violet, is 3-lobed, and equals the lateral sepals in length. The side lobes are erect, somewhat square, with a reflexed point; middle lobe oblong, pointed and ridged lengthwise. The rostellum or beak (the prolonged point of the column) is very much lengthened, and when the anther, which is also lengthened, lies in its place upon it, the whole has the appearance of an elephant's trunk, as one often sees it nearly touching the ground with the end up. A very lovely plant, discovered by me on limestone rocks near Maulmain about 1860. It grows on the rocks and on the small bushes that clothe the rocks. It varies exceedingly in size, and in the number of flowers which one plant will bear. Ordinarily, a plant has 1 flower-stem with 4 or 5 flowers on it, but I once found a plant which had 3 flower-stems and 8 flowers on each, 24 in all, and the individual flowers were $2\frac{1}{2}$ inches across. The roots spread for a long distance, 2 or 3 feet, and adhere so firmly along their whole length to the shrub or rock on which the plant grows, that it is quite impossible to detach without lacerating them. The consequence is that removal irremediably damages the plants. They live, indeed, if attached to a tree again, but they take years to recover their original size and beauty, as they are of exceedingly slow growth.

P. Parishii is a much smaller plant, but very pretty, and has a highly curious lip; indeed, the appendages of the labellum of the genus *Phalænopsis* are so various and strangely elaborate in form as to baffle description. *Phalænopsis cornu-cervi* (called *Polychilos* in *Bot. Mag.*) has flowers barred with red. *P. Wightii* is smaller again than *P. Parishii*. Perhaps yet other species of this beautiful genus may reward a diligent search.

VANDA,¹ *R. Br.*

This genus contains some of the most magnificent Orchids of which the Eastern Hemisphere can boast. Not a few are of very large size. They are all epiphytal, and have distichous leaves, which are often thick and leathery, and more or less strap-shaped. The flowers are borne in lateral, erect or pendulous, racemes. The sepals and petals are wide-spreading and resemble each other. The lip is saccate or spurred, and fleshy, entire or 3-lobed, continuous with the base of the column. Column

¹ "Vanda," according to Sir Wm. Jones, is the Hindoo name for *V. Roxburghii*, the original species.

short and thick. Pollen-masses 2, bi-lobed, attached by a more or less wedge-shaped stipes to a large roundish or sub-triangular gland. Species about 12.

V. GIGANTEA.

A very large species, with broad, fleshy, strap-shaped leaves, 18 inches or more long by 3 or 4 broad, blunt and emarginate at the end. Raceme drooping, 1 foot or more long, consisting of large yellow flowers 3 inches across, marked irregularly with round spots of a reddish-brown colour. This is undoubtedly a very handsome Orchid, but the flowers, though really large, are dwarfed and rendered comparatively inconspicuous by the still larger and abundant foliage. It sometimes forms masses of extraordinary size. In my early days of botanizing in Burma, and while yet but indifferently acquainted with its Orchids, by good fortune I fell in with this plant on the Shan border. The yellow flowers caught my eye from amidst a considerable mass of foliage, high up on the branch of a forest tree. A Burman was sent up, who after some little difficulty, by the free use of his *dha*, succeeded in detaching the mass, which struck me with astonishment as it came crashing down. As it lay upon the ground, it was as much as one man could drag along by his greatest effort. All I could do was to cut off some comparatively small portions (each in itself a goodly plant) to carry away with me, and leave the bulk behind, as the whole was a great deal more than I could have packed on an elephant, of which we had several in the party. It is, apparently, a very local plant, but abundant in some places, viz. in the shady jungles about Tavoy, and in the Yunzalin district.¹

V. PARISHII.

A coarse-looking plant with a rather flattened stem and broad leathery but flabby leaves, about 8 × 3 inches. The flowers are borne in an erect raceme of 6 to 8 flowers, which are nearly as large as those of *V. gigantea*, and resemble them much in their markings. They are uniformly dotted with round spots of a red-brown colour on an orange ground. The column and base of the lip are white, and the somewhat triangular middle lobe is purplish-lilac. It has a delicious fragrance, resembling honey. It is, I think, the freest and most rapid grower known to me, and very easy of cultivation.

I come now to a very puzzling group of Orchids. I have lying on the table before me as I write, figures and drawings of *Vanda Roxburghii* (true), of *V. Roxburghii*, var. *unicolor*, *V. Bensoni*, *V. Denisoniana*, and of a *Vanda* of my own finding, which I have marked doubtfully as *V. Bensoni*. Size and colour apart, I look in vain for anything among all these which, in any other order of plants, would be reckoned sufficient for a specific distinction. One description will serve fairly well for all. Accordingly I give that of

V. BENSONI.

As it is in *Bot. Mag.* No. 5611:—"Leaves distichous, obliquely and unequally-toothed at the end. Flower-spikes erect, many-flowered, longer than the leaves. Flowers distant, about 2 inches across. Sepals and petals unguiculate (clawed) obovate, obtuse. Lip about the same length as the sepals, with two small, triangular, rather blunt side-lobes or auricles at its base, from in front of which it is ovate, convex, traversed by 3 lamellæ, and terminated by a kidney-shaped, broad, bifid apex."

I repeat, this description (for I have omitted observations on the colour) will serve for all the so-called species above mentioned. There may be trifling differences in outline, as, for instance, in the posterior lobes of the lip, which, according to my drawing of *V. Denisoniana*, are rather rounded than triangular, but they are of no consequence as serving to distinguish species. The general aspect of all the plants is much the same, and the form of the flowers, including the crucial part, the lip, with

¹ Since writing what is above, my eye has chanced to light on the following paragraph in the *Gardener's Chronicle*, of July 16, 1881:—"Sir J. Hooker says in the *Botanical Magazine* that he has been credibly informed of a single plant of *Vanda teres* in Burma being a sufficient load for an elephant." There is, I fancy, some mistake here. I have indeed said this of *V. gigantea*; but the growth of *V. teres* is of so light a character that it could not possibly be true of it.

its saccate base, blunt posterior lobes, which are more or less rounded, its lamelle and its remarkable terminal lobe, exactly like a Blackcock's tail, is the same. Leaving, however, the form and coming to the colour, the extremes are indeed widely different, but there are intermediate varieties. The flowers of *V. Roxburghii*, the first discovered species, are "tesselated, having longitudinal as well as short transverse markings of yellow and dusky ferruginous purple" (Roxb.), the lip being violet at the lobed apex, while the back of the flower is white. The flowers of *V. Denisoniana* are wholly white, except a little yellow in the very centre. *V. Bensoni* is dotted inside with reddish-brown on a yellowish-green ground, the apex of the lip being also violet, and the outside white.

V. Roxburghii, var. *unicolor*, is of a uniform dull greenish-brown colour on the inside, lip included, without any markings, and white on the outside. Finally, my fifth plant, which I too hastily took for *V. Bensoni* (not having at the time seen the figure of this plant in the *Bot. Magazine*), is coloured as follows. The inside of the flower (lip excepted) is marked with longitudinal lines of reddish-brown, darkest towards the end of the segments, with short intermediate lines of the same colour running transversely, leaving square interspaces (*areolæ*) of a light colour, so that the marking may be *correctly* called "tesselated," a word inapplicable to the markings in Wight's *Icon*. No. 925, though he describes them as such. The usual bi-lobed lip is of the deepest ruby-red, with lines of the same on the lamina, the spur being colourless. The back of the flower is white, but the coloured markings on the inside show faintly through. The pedicels (being in fact the germs) are also white, as in *V. Bensoni*. This I consider the handsomest of all the varieties (as I cannot but call them) of this *polychromous* plant, for *polymorphous* it cannot be called. The slight differences in the length of the flower-stems, or in the indentations or crosions at the end of the leaves, or in the forms of the posterior lobes of the lip, or in the number of ridges, are not sufficiently constant (even if important enough in themselves) to found specific distinctions upon. I hope I may not be thought presumptuous if I remark that descriptions of new species are not seldom made at home from a single individual plant, which some Orchid-grower has been fortunate enough to flower and bring into notice first, and that small points of structure or form are consequently sometimes relied on as distinguishing marks, which those who have seen many individuals in their native habitats know to be variable. When it happens that colour is the main point of difference, then any other little variation is eagerly looked for and made the most of. This appears to hold good in the case of Orchids only, in which order colour has a value accorded to it which is not accorded to it in any other as far as I know. To revert shortly to our nearly-related group: I may say that *V. Roxburghii* (true) is a Bengal plant, found also in Malabar, and elsewhere in the Madras Presidency, but not yet found, as far as I know, in Burma. *V. Roxburghii*, var. *unicolor*, I have found. *V. Denisoniana* I found on Ta-ok, but I do not know where Col. Benson found it. The highly-coloured variety, described above, I cannot fix a locality for, and *V. Bensoni* is one of the very few Orchids described as Burmese, which I have never myself gathered.

I cannot conclude my remarks on the Vandas without pointing to another small group which affords difficulties of a similar kind to those just discussed, in consequence of the great resemblance in the forms of the flowers of its species, and the wide difference in their size and colour. I allude to *Vanda parviflora*, *V. carulescens* and *V. carulea*. It should be first stated that *V. parviflora*, *Aerides testaceum* and *Aerides Wightianum* are all one and the same plant. Having stated this, I go on to say that I find, about Mayawaddee, East of Maulmain, a plant of which the following will serve as a general description. Stem 1-2 feet long, as thick as the little finger, woody, with long stout flexuous roots just below the leaves. Leaves numerous, straight, rigidly distichous, with an obliquely-toothed apex, 6 to 8 inches long by $\frac{3}{4}$ broad, strongly keeled. Raceme erect, many-flowered, from the axis of the lower leaves. Pedicels and germ about 1½ inch long, with a small lanceolate bract at its base. Flowers about 1 inch across. Sepals and petals nearly equal, but the latter the smallest, obovate, obtuse. Lip shorter than the sepals, with two thick longitudinal ridges on the middle lobe, which has a dilated extremity with a bilobed convexity.

This is an accurate description of my plant, which was pronounced many years ago to be *Aerides Wightianum*. It answers also admirably for that of *Vanda carulescens* var. *Bozallii*, *Bot. Mag.* 6328, from which, indeed, it is almost wholly taken. The differences, such as they are, are the following:—The leaves of the latter plant are shorter, but to this I attach no importance whatever; (my drawing happened to be that of an individual with longer leaves, that is all,) and the ridges of the labellum, described as “smooth” in *V. carulescens*, are in my plant *pimply*. Beyond this trifling discrepancy, what remains is entirely a difference of colour and size. My flowers are rather smaller and, the lip excepted, pure white. The ridges of the lip are rose-pink, and there is a faint tinge of yellow at the base of the column inside, whereas the flowers of *V. carulescens* (*Bot. Mag.* 6328) are faintly tinged with violet, and the lip is a deep blue. The general habit of the two plants, a matter more for the eye and the pencil than the pen, is identical. Indeed, my plant more nearly resembles *V. carulescens*, var. *Bozallii*, than it does *Aerides Wightianum*, *Bot. Mag.* 5138, the leaves of which are more curved and less rigid. The verbal description will suit this plant also, but the colour is very different, yellow, with purple ridges to the lip. Leaving, then, this last or yellow variety, out of the question (as it is a Madras plant), it seems to me that in *V. carulescens*, var. *Bozallii* (which might with almost greater propriety be called *V. parviflora*), we have the first step in advance from my simple white variety, upwards towards “The blue Vanda,” *V. carulea*. The next step is made by *V. carulescens* as figured in *Bot. Mag.* 5834, called “The pale blue Vanda.” Here, the form of the flowers remaining very nearly the same, their size is again enlarged, and the general colour more nearly approaches to blue. (I follow the description, and not the plate, which is certainly pink and not blue.) The two ridges of the lip are here, and the form of the lip is like that of var. *Bozallii*, except that the terminal lobes are rather more pronounced and the intermediate notch more distinct. The other differences are, that the leaves are rather broader, the spur is slightly incurved, and the raceme is drooping instead of erect. A farther advance in size and colour is made in another variety of *V. carulescens*, figured in the new series of “The Floral Magazine.” Here the flowers are once more considerably larger, and the general colour of a deep violet. The very same two ridges remain on the lip, but the bilobed apex with the intervening notch is yet farther developed. The breadth of the leaves has slightly increased, the spur is slightly more incurved, and the raceme, as in the preceding variety, is pendulous. But one step more, and that not a great one, and we arrive at “The blue Vanda.” In all the stages, colour and size have been the distinguishing characteristics rather than structure. Possibly, yet other and intermediate varieties remain to be discovered. There is a gradual development upwards, and it is difficult to draw the line for species; but if I were asked to draw it between the varieties described, I would do so above *V. carulescens* var. *Bozallii* and below *V. carulescens*, *Bot. Mag.* 5834, calling the former *Vanda parviflora*, var. *Bozallii*; for it certainly has more affinity of habit with my *Aerides Wightianum* (which we have said is a synonym for *V. parviflora*) than with the other vars. of *V. carulescens*. There is (and this is the point to which I would specially advert) a greater difference in habit and in form, to say nothing of colour, between *Vanda carulescens*, var. *Bozallii*, and the extreme blue variety figured in the *Floral Magazine*, than there is between the several *Vandas* of the *Rozburghii* group; yet these last have received distinct specific names, while the first is counted but a variety.

V. TERES.

This species differs widely from all the foregoing. Its leaves are terete, or quill-shaped, distant, few, alternate, 6–8 inches long. The racemes, which are few-flowered, are opposite to a leaf, 6–12 inches long. The flowers are very large and handsome, of a prevailing rose colour, quite 4 inches across, with a large conical spur. Lip 3-lobed, lateral lobes forming a tube round the column, middle lobe broad and fan-shaped, bifid. The stem, which is single or branched, and of a dry woody nature, though only about $\frac{1}{2}$ of an inch in diameter, often attains a great length, ascending to the tops of trees, from among the highest branches of which it loves to thrust its handsome blossoms into the full blaze of the sun. The roots

are sparse, long and tough like cords, and take a firm hold of the tree on which it grows. Found sparingly all over the provinces.

GRAMMATOPHYLLUM, *Bl.*

As but one species of this genus is known to me, and I have never had the good fortune to see it in flower, I will describe its appearance as far as I know it, borrowing the rest from another source.

It is a very large ("gigantic," Hooker calls it) epiphytal, caulescent Orchid. The stems (it is straining a term to call them pseudo-bulbs) are numerous, and take their rise from a huge dense tangled mass of short, branched, fine wiry roots, 3, 4, or 5 feet in circumference according to the size of the plant, they (the stems) are 4 or 5 feet long, 2 or 2½ inches in diameter, rather flattened, clothed for nearly their whole length with long, membranous, strap-shaped distichous leaves, which are close-set and sheathing at their base. Roughly speaking, they may be compared to large-sized sugar canes. This is all I can say of the plant from personal knowledge. The rest of the description is from the *Bot. Mag.*, No. 5157, under the head of *G. speciosum*, which species I feel nearly sure that it must be. After stating that the plant sometimes attains the height of 8 or 10 feet, and the leaves a length of 2, the description proceeds as follows: "Scape nearly the size of one's finger, from 4 to 6 feet long, radical, erect, terete, quite smooth, many-flowered. Flowers distant, expanding from the base upwards, each with a large, broad, concave bract, an inch long. Flower-bud 2½ inches long. Expanded flower nearly 6 inches across. Sepals and petals much spreading and slightly reflexed, broad oblong or subovate, yellow, richly spotted and blotched with deep red purple. Lip small for the size of the flower, 3-lobed, 1½ inch long; the lobes obtuse, the side lobes convolute over the column; the disk furrowed with three plates more elevated in the centre, marked with red streaks, and where the red streaks are the lines are ciliated; middle lobe entire. Column curved a little downwards, semiterete (half-rounded), and partially spotted with red."

This "Queen of Orchidaceous Plants," to which for grandeur nothing in East or West can compare (unless my plant should prove a new and distinct species), is a native of the Mergui Archipelago, where it grows on Betel-nut trees. For years I had gone to and fro between Maulmain and Mergui without seeing or hearing anything of it. As soon as discovered, I procured two or three plants and brought them to Maulmain. The climate, however, proved unfavourable to them, and they yearly became smaller, and never gave the slightest indication of flowering. The plant seems to require a continually moist atmosphere throughout the year, which it can obtain in and around the Straits (where it was first discovered), and may in some fair measure have also in the islands of the Mergui Archipelago, which, probably, is its northern limit. It is to be hoped some resident at Mergui may yet have the flowers brought in to him, and the plant be verified.

RENANTHERA, *Lour.*

A genus nearly allied to *Vanda*, but distinguished from it by having the lip jointed with the column instead of being continuous with it; and saccate in the middle instead of at the base. The flowers are widely expanded; sepals and petals generally narrow and linear, nearly equal, or, if there be a difference, the two lower or lateral sepals are the larger. Column short, erect. Pollinia of the usual Vandaceous character.

R. COCCINEA.

Stem many feet long, climbing up trees to a considerable height, simple or branched, sending out long wiry roots here and there, leafy at the termination of the branches. Leaves two ranked, thick and fleshy, varying in length and breadth, 6 or 8 inches × 1 or 2. Flowers red, very handsome, 2½ or 3 inches across, in a large lateral panicle. Lip small, striped with yellow, bagged in the middle, 3-lobed; side lobes rounded, erect; middle lobe ovate, pointed. Discovered many years ago in Cochin-China. Found by me only on the Moscos Islands.

AERIDES, Lour.

Caulcescent epiphytes with two ranked leaves. Flowers in racemes or spikes. Perianth spreading or more or less closed. Sepals and petals nearly equal, the lateral sepals being often oblique at the base, and connate with the prolonged base of the column. Column short. Lip jointed with the claw of the column, spurred or bagged, 3-lobed; side lobes small, centre variously shaped. Pollen-masses 2, normal.

A. VIRENS.

One of our most lovely Orchids, one, too, which must be well known to all collectors in Burma. It is very near to the old *A. odoratum*, but far finer. Leaves broad, blunt and depressed; flowers in long elegant drooping racemes, individually about an inch long, waxy, white, spotted with violet, deliciously fragrant. Sepals and petals obovate, obtuse. The lip terminates in a pointed, curved, and up-turned spur or horn, its 3 lobes are connivent, the side lobes being erect and toothed, and the middle incurved between them and serrated. All three close over the column and anther, completely hiding them, and when the lip is forcibly opened, it flies back to its closed position much as the flower of the Snapdragon does. I have often been amused by watching the humble bees and the difficulties they meet with in their efforts to get at the honey which lies inside the horn. A bee settles on a flower, and, after a laborious effort, succeeds in pulling back the lip, and thrusting his hairy body inside. Now, while he is in this position, his hinder legs only remaining outside, the force of the spring of the lip presses his thorax against the anther, and when he backs out, he rubs the anther hard and lifts it, detaching the whole pollen-apparatus, and he presently reappears with it sticking to his back by its glutinous gland. This irritates him, and he sets to work with all his might to rid himself of it, but, his labour is vain, the pollen-masses stick as fast as the old man of the sea on Sinbad's back; so he gives it up, and attacks a second flower, with a similar result. He has now two lumps on his back, and he becomes infuriated, and his frantic struggles to rub them off are very amusing. He must be a bold bee who ventures upon a third flower. I never saw one succeed in rubbing his burden off, so glutinous is the gland. The scene ends by the bee flying away with his load, going home, I suppose, to invoke the aid of his brother bees in unburdening himself. This has always been the result of the visit of bees to this flower when I have witnessed it: they have carried off the pollen-masses. If such is the case, they can hardly aid in the impregnation of the germ, rather the reverse, and yet *A. virens* is one of the Orchids which ripens its pods most freely. Perhaps the flowers become self-impregnated when unmolested (as many must be, humble-bees notwithstanding) by the falling forward of the pollinia on to the stigmatic surface at a later period.

A. LOBBII.

Another lovely species, smaller than the last. The leaves are narrower and curved, and the flowers more numerous and dense, on a single or sometimes branched, drooping raceme, which gradually tapers to a point. The flowers are more generally purple than the last. The "Fox-brush *Aerides*," *A. Fieldingii* of gardeners, must be a variety of this species.

A. AFFINE.

Somewhat resembling the last, but known from it at a glance by its habit of growth. The leaves are more fleshy, scimitar-shaped, and generally folded inwards, and the raceme, which is shorter and has fewer flowers, is much more rigid, and instead of drooping gracefully, hangs down perpendicularly without any curve. The flowers are of a deeper rose colour than those of *A. Lobbiai*. All the three species here last mentioned are widely distributed throughout the Tenasserim Provinces.

A. DIFFORME.

A small almost stemless plant, with broad, smooth leaves and a panicle of small yellow flowers, of no remarkable beauty as a whole, but of most singular and interesting form individually, and very difficult to describe. The sepals and petals are thrown back, the column is thrust prominently forward horizontally and has two

curved horns or hooks at its extremity. The lip hangs down perpendicularly from the base of the column to which it is but slenderly attached by a sort of short claw. It consists of two distinct parts, a *hypochilium* and *epichilium*, or back and front lip; the former has a rigid curved spur and 2 oblong side lobes above. The latter, which may be called the middle lobe of an ordinary labellum, is also but slenderly attached to the former just above the spur. Looked at sideways, it is square in outline; viewed in front, it is semicircular and has a fringed edge, while a tuft of very fine hairs ornaments the back part. I find the following note in pencil attached to my drawing made in 1863: "That this is *A. difforme* there can be no reasonable doubt, but it is a much smaller plant than the figure in the frontispiece of Lindley's *Sertum Orchidaceum*, and possesses none of its fine colouring. Experience, however, shows that Orchids are much given to vary in size and colour according to locality, though tolerably true to form and habit."

SACCOLABIUM, Bl.

A genus so closely allied to *Aerides* that it is difficult to lay hold of a really satisfactory distinction. I look in vain for anything tangible, or that will hold good in every instance. Lindley, in his analytical table of genera, where he naturally seizes upon that point which most readily admits of distinct contrast, makes the difference to consist in the attachment of the lip, which in *Aerides* is affixed to the *lengthened*-base of the column, whereas in *Saccolabium* it has "very little connexion with the column." This, I presume, means much the same thing as to say (as Bentham has it in his recently published "Notes on Orchidæ") that *Aerides* has a "*mentum*" and *Saccolabium* has *no mentum*;¹ but this distinction is very slight, and in a variety of species not so easily determinable practically. Lindley does, indeed, in his after definition of the two genera, make another distinction in the *form* of the lip, which he makes *3-lobed* in *Aerides*, and *undivided* in *Saccolabium*. But, unfortunately, this will not hold good, for some species of (so-called) *Saccolabium* have as distinctly two side lobes to their lip as some species of *Aerides*. Neither does the form of the "sac" or spur (call it which you will) furnish any reliable distinction (though one plainly aimed at in the name): for, though the bag-lipped form is well illustrated in some species, e.g. in *Saccolabium calcicolare*, and a small group closely allied to it, there are other species (so named) in which the appendage takes the ordinary *spur*-shape of *Aerides*. Nor (as far as my experience goes) is it distinctive of *Aerides* to have the spur "turned upward on the back of the labellum" (Bentham, p. 333), for there is a tendency in that of some *Saccolabia* to take the same direction, e.g. *Saccolabium ramosum* and others.² When, to all that has been said, it is further added, that there is hardly a *Saccolabium* which has not been called *Aerides* (while some have even received the name of *Vanda* and *Sarcanthus*), and that some of the species have probably not yet found their final resting-places, it will, I think, be admitted, that the task of satisfactorily defining genera is by no means an easy one. Species 14.

S. GIGANTEUM.

A species not to be confounded with any other, when once seen. Leaves very broad, 2-3 inches, fleshy, streaked, short comparatively, a foot or more, unequally two-lobed at the end. Stem simple or branched, short and stout, sending out thick fleshy roots. Flowers in a dense drooping raceme, very numerous, moderately sized, white, with a purple lip, and a few lilac spots on the petals. The lip is flat, turned upwards, and has 3 lobe-like divisions at the end. A noble species when seen in perfection in its native wilds, but ill suited for cultivation in hot-houses at home, owing to the room it requires and its extremely slow growth. Abundant about Toung-ngoo and elsewhere in the North; but, not found, I believe, in the Tenasserim Provinces.

¹ The "*mentum*" of an Orchid is the prolongation and bending forward of the column, in the way of a "*chin*," a feature specially noticeable in the genus *Bulbophyllum*.

² *Saccolabium Huttoni*, Bot. Mag. 5681, which is surely a typical *Aerides*.

S. BLUMEL.

Too well known in Burma to require an elaborate description here. The leaves are strap-shaped, a foot or more long and 1 inch or so wide, terminating abruptly, truncate and crose (*i.e.* with several irregular points). Flowers numerous, small, crowded in a long beautiful pendulous raceme, covered all over with lilac dots. Lip flat, turned upwards, parallel with the column. Spur blunt, flattened laterally, and slightly curved backwards. Widely distributed and abundant. This plant bears the same sort of relation to the old *S. guttatum* which *Aerides virens* does to *A. odoratum*, being, in fact, little, if anything, more than a fine variety of the same.

S. CURVIFOLIUM.

Stem short. Leaves long, narrow, curved, channelled, through being folded inwards, obliquely bidentate on the point. Racemes from the axils of the higher leaves, erect or slightly drooping, 4 or 5 inches long. Flowers numerous, $\frac{3}{4}$ inch across, of an orange-red colour, with an orange-yellow lip. Sepals and petals ovate, equal, spreading. Lip small, oblong, with two small erect lobes on the base. Spur drooping, linear, swollen at the base. A showy Orchid, very abundant in the Tenasserim Provinces. This is *S. miniatum* of the *Botanical Magazine*. Every intermediate form of leaf between *S. miniatum* and *S. curvifolium* may be found.

S. AMPULLACEUM.

In general character very much like the last, but of shorter and denser growth; in shape of flower also similar, but the flowers are of a beautiful rose colour. In our Tenasserim plant the leaves are short, straight, and rigid, commonly stained with purple, not long and curved as they are in *S. curvifolium*, but they probably vary according to locality. The colour in *Bot. Mag.*, tab. 5595, is represented as lilac, though said in the text to be "*rose*," which they are. Local, but sometimes abundant where found, appearing to affect open arid jungle and small trees.

S. CALCEOLAKE.

This species answers truly to its generic name of bag-lipped. It is a small plant, with a very short stem, the whole not more than about 6 inches in length, bearing a few leaves which are sheathed at the base, linear-oblong, bifid at the end, the two points being unequal and very acute. The flowers, which are few in number, are borne in a sort of umbellate raceme and form a roundish head on a short thick foot-stalk. The sepals and petals are oblong and blunt, being, indeed, rather broader at the end than at the base (or spatulate), spreading, but slightly curved forwards, yellow. The lip is simply a large inflated pouch with a semicircular lamina or plate in front, beautifully fringed. The colour of the pouch, is white at top and orange-yellow at bottom, the lamina and fringe white, but there are some bright red or purple spots on it, as there are also on the edge of the pouch and base of the very short column. From the top of the column and just below the anther a large two-lobed rostellum projects, in which the gland of the pollinia lies. *Saccolabium denticulatum* answers to the same general description, but is totally different in colour, somewhat also in form. I observe that the pollen-masses in this latter plant are hairy, a circumstance I have never noticed in any other orchid. They are so represented in my drawing. The former plant I found at Mergui, the habitat of the latter I forget.

SARCANTHUS.

A genus of Vandeous epiphytes varying much in appearance. Some have the ordinary flat leaf and short stem, and others a long slender stem, and terete or quill-shaped leaves. The flowers are small, but highly coloured, on leaf-opposed racemes. The sepals and petals are of a uniform shape and size, spreading; they have a fleshy 3-lobed lip, jointed with the column and spurred, the spur being partially divided internally. The Pollen-masses are of the usual Vandeous type, but (if the species are all rightly placed) the stipes and gland vary much in form and size. I find, in *every* species, situated at the back but upper part of the spur, below the column, a bilobed fleshy appendage or callus. This varies in shape in different species, but is constant

in being 2-lobed, and, I think, may be relied upon as a sure and distinguishing character of this genus. Other genera, hereafter to be mentioned, have a callus in or near the same part of the spur, but in no case, as far as I have seen, is it 2-lobed. Species about 12.

S. ERINACEUM.

A pretty fleshy-leaved species, with stems only a few inches long. The leaves are lanceolate and pointed. The flowers are white, suffused with pink, and have a fleshy incurved pointed lip of a deep rose colour. They hang down in elegant racemes, varying from 3 to 6 inches. The rostellum, or beak of the column, is prominent. The pods are covered with short rigid hairs, hence I gave the plant the name of *S. dasycarpon* (shaggy-fruited), not "*dasygon*" (shaggy-bearded), as erroneously stated in the *Botanical Magazine*, but it pleased Professor Reichenbach to change the name to its present one, derived from Pliny's word for hedgehog, a name of which I admit the equal fitness with my own, though not a greater. The flower-stem or rachis, and the exterior parts of the flower, are similarly clothed with hairs.

S. LAXUM.

Similar in general character to the last, so much so that one description might almost answer for both. The leaves, however, are more fleshy still, being, indeed, of a very remarkable thickness, about $\frac{1}{2}$ inch thick and linear, with an unequally oblique termination. They are generally stippled on the under-side with greenish-purple. The flowers, which much resemble those of *S. erinaceus*, have the lip of a deep ruby-red, and a very prominent column and beak, which, together with the outspread sepals and petals, give them the appearance of tiny birds poised in mid flight. The pollen-gland of these two, as of the other flat-leaved species, is very small, and the stipes very long and slender. It seems to be rather rare, and when found by me it has always been on the boughs of small trees overhanging mountain streams, which I happened to be crossing. It is nicely figured in "*Saunders regium Botanicum*," tab. 109.

S. TERETIFOLIUM.

This is a long slender pendulous plant, sometimes as much as 4 feet long. Leaves few, distant, all inclining to one side, terete, about the thickness of a crow-quill, and 6 to 8 inches long. Flowers small— $\frac{1}{2}$ inch across—distant, numerous, on a pendent raceme 8 or 9 inches long. Sepals and petals reddish-brown. Lip and interior of flower lilac, spur slightly 2-lobed.

S. WILLIAMSONI.

Another terete-leaved species, but of erect growth, with shorter and stouter stem and leaves, about the thickness of a goose-quill. The racemes, however, are slenderer, simple or branched, and the flowers rather more numerous and smaller. Sepals and petals pale salmon colour, lip lilac with deep ruby-red side-lobes.

S. APPENDICULATUM.

This is *Arides appendiculatum* of Wallich (*Lindl. Gen. and Sp.* p. 242). It is also a species with terete leaves, stem erect, simple or branched, leaves about 4 inches long. Raceme curved and drooping, 15 or 16 inches long, flowers on the last third only, $\frac{3}{4}$ inch across. Sepals and petals spreading and reflexed, nearly equal, linear-oblong. Lip 3-lobed with a pointed middle lobe and a conical spur. Colour, red-brown stripes on a yellowish ground, lip yellow and purple, also striped behind on the spur.

This plant received its name in consequence of a peculiar appendage, "*callo magno tabulari a dorso calcaris projiciente*," Lindley, inside the lip. It was the discovery of this plant in 1856, at "The Three Pagodas," and the observation of this singular appendage, together with the fact that notice of it was taken by Lindley (and so I was enabled unmistakably to identify the species, that led me to pay special attention to similar appendages, and to note their presence or absence, and accurately to draw their varying forms.

The result of my observations is much as follows. In all flat-leaved *Sarcantha* I find them, and always 2-lobed, or in some forms bipartite throughout, generally divaricating upwards. I find them also in the three terete-leaved species last described, but here they differ in shape from those in the flat-leaved species, though similar in the three; in all of which (though again not *identical* in outline) they are of one common type. The upper part is flat, semicircular, and undivided, resting on a narrow slightly bilobed base. I find a similar appendage again in *Cleisostoma*, but here it is simply a flat lamina, rounded in outline or more or less quadrate. This, I presume, is the "tooth" to which Lindley alludes in his definition of the genus where he says "calcare *dente* clauso." I further find an appendage agreeing with that of *Cleisostoma* in a small and obscure plant which Prof. Reichenbach has named "*Saccolabium bipunctatum*," but which I had ventured to name *Ceratochilus*; and, indeed, whether this genus of Blume be a good one or not, I cannot but think still that it is a *Ceratochilus* according to his definition, and that it may even be his *C. biglandulosus*, so remarkably does it agree with his characters at all points. Lastly, the genera *Thrixspermum* and *Appendicula* are also furnished with appendages, but they are either of a different character or in a different position.

CLEISOSTOMA, *Bl.*

Plants with distichous leaves, caulescent. The flowers are small and of little beauty. The distinguishing mark is that the baggy spur or pouch is closed by a large projecting tooth, described above, and has no partition. Species 2.

Bentham, in his "Notes," says, "*Aerides* (*Sarcanthus*) *appendiculatum* is a *Cleisostoma*." This may be; for the group of genera *hereabouts* is in great confusion, and it needs a master-hand to re-arrange them at once naturally and intelligibly, though, I fear, not a few will steadily refuse all artificial classification; I say, '*this may be*'; but, if so, then I think *Sarcanthus filiforme* and *S. Williamsoni* should go along with it, for in both, the callus or appendage which projects into the cavity of the spur, is met by a projecting lump on the opposite side, and thus the entrance is closed. My drawings distinctly show this, for they include longitudinal sections, though I unhappily omitted to make a similar section of *S. appendiculatum*. And this closing of the spur by the "tooth" or appendage is of the essence of the genus. Against this, however, is to be set the fact that in both these species the spur is partially divided by a membrane, which, again, is said to be the special mark of *Sarcanthus*, although, once more, in some instances I have not been able to detect this. In all my remarks, I must be understood to speak of Burmese Orchids only, known to myself.

CAMAROTIS, *Lindl.*

A small genus of slender climbing epiphytes, with long narrow linear leaves, and small flowers on leaf-opposed racemes. They have a long rostellum, and a fleshy incurved lip, and have much the appearance of *Sarcanthus*. *C. purpurea* is a very pretty species with purplish-lilac flowers. It must be rare, as I was twenty years in Burma before I found it, and then only one plant. It was discovered in Silhet many years ago. *C. obtusa* may be described as a pale pink variety of the same, which is distinguished by having the rostellum or beak turned at right angles to the column. Species 3.

THRIXSPERMUM, *Lour.*

This genus consists of a small number of caulescent epiphytes with distichous leaves, short woody stems, which emit a great number of wiry roots. The flowers are small and few on a rachis, which assumes various shapes, sometimes round, sometimes flat, but always more or less swollen and fleshy. The flowers are marked by a 3-lobed lip with a thick and solid middle lobe, articulated with the prolonged mentum or base of the column. The pods are long and cylindrical, open longitudinally by one valve, and are full of silky hair in which the seeds are enveloped. Species 5.

ACRIOPSIS, *Bl.*

Pseudo-bulbous epiphytes. Bulbs aggregate, about the size of a hazel-nut, terminated by two long slender, linear, pointed leaves. Flowers numerous, very small, in racemes or panicles on a long slender curved radical stem. They are remarkable for being *tetramerous*, i.e. the perianth has only four segments—two sepals and two petals. Pollen-masses 2, fusiform. Species 2. *A. Indica* has almost colourless pale-green flowers, and is more striking when in fruit. It *pods* freely, and the pods are of the size of a currant and golden-yellow. Flowers in a panicle. Those of *A. picta* are rather larger, coloured, and in a raceme.

THELASIS, *Bl.*

Pseudo-bulbous epiphytes. Bulbs terminated by a single leaf. Flowers very small on a radical scape. Pollen-masses 8, on a long slender stipes with a narrow elongated gland. Worthless obscure plants, from the ordinary point of view, but highly interesting from the botanical standpoint. Species 2.

APPENDICULA, *Bl.*

Small caulescent epiphytes, with hard woody stems a few inches long and remarkably flat bifarious leaves, the sheathing bases of which overlap each other alternately on the stem. Flowers *minute*, either in elongated spikes or crowded in small heads at the end of the stem. The pollen-masses are 8, and they have this peculiarity, that they have no *caudicle* in the sense in which Lindley uses the word, no *stipes* in Bentham's sense, but they taper gradually after the manner of *Calanthe* and *Limnolobos*, and are attached by their slender ends (which Bentham calls *caudicles*) to the gland, which I find is round or ovate and pointed. A similar remark to that made on the last genus may be made also on this. Species 2.

PODACHILUS, *Bl.*

Another genus of inconspicuous Orchids. Stems caulescent, a few inches long, leaves close-set and bifarious. Flowers most minute, sometimes no bigger than a large pin's head, solitary or spiked, generally terminal. The pollen-masses are 4, attached, in pairs, by 2 stipites (*caudicles* of Lindley), to a common gland, which is ovate and pointed. This is true of *P. cultratus*. But in *P. luwesensis* I find 2 stipites with 4 pollen-masses seated on their *united connivent summit*, but *no gland*, and the stipites are divergent at the base! Altogether the structure of the *Pollinarium* in this genus is remarkable to a degree, and can only be shown properly by elaborate and highly magnified drawings, such as I have made from living plants. Species 3. The flowers of this and the two preceding genera have spurred or pouched bases, and are closed instead of spreading.

Tribe IV. OPHRYDEÆ.

ACERAS, *R. Br.*

Terrestrial herbaceous plants with short leafy stems and fleshy fasciated roots with 1 swollen tuber. The flowers are small and of a dull colour in terminal spikes. Anther erect, 2-celled. Pollen-masses 2, with separate caudicles, but only 1 common gland. Species 1.

The Orchids of this and following genera, included in the tribe Ophrydeæ, are all terrestrial, and resemble in general appearance the Orchids of our home woods and pastures. The structure of the anther and pollen-masses differs much from any hitherto described. The former is no longer an easily detached lid or cap, but a firm and fixed part of the column, with two very distinct cells opening vertically by long slits or sutures. The pollen-masses, again, instead of being hard and waxy, consist of a number of small grains which cohere by means of an elastic cobwebby substance, and taper into a point below, and end in a gland. This extended or tapering portion is the true *caudicle*, so called by Bentham and by Lindley also, and it is a part of the

pollen-mass itself. It differs entirely from the so-called caudicle of Vandææ, which is no part of the pollen-mass, and to which Bentham prefers to give the name *stipes*. The Ophrydeæ are mostly Orchids of temperate or sub-tropical regions; evidently, however, not confined to them, as our ever-widening knowledge of this Order serves to prove. *Accras anthropophora* is common in our English woods. Our solitary Burmese species, *Accras angustifolia*, was first (I believe) found in Simla and elsewhere in Northern India. Wight, who figures it among his "leones," says, "This genus has not yet been found so far South," meaning, I suppose, as Madras. We have now brought it nearly as far South. It is a mean plant, but interesting in this fact, that it is so far separated from its congeners.

GYMNADENIA, *R. Br.*

As the object proposed in these "Notes on the Orchids of Burma" (as they may be called) is rather to make the subject popularly intelligible than to affect scientific accuracy, and as the distinctions between the different genera in this Section turn on minute and purely technical points, I shall omit them, and confine myself to a short and familiar description of a few of the most notable species.

G. SESAMOIDES.

A common terrestrial Orchid about Maulmain and Martaban. It is about a foot high and has a leafy stem, the leaves of which are little more than scales below, growing larger upwards. The flowers are solitary in the axils of the leaves, and of a large size, $1\frac{1}{2}$ inch long. The sepals and petals are connivent, *i.e.* adhere together on the upper side of the flower, pointed, with upturned ends. The lip is very large, pure white, very broad when expanded, but in its undisturbed state convolute, undivided, and furnished with a spur behind. The roots are fleshy with 1 round bulb. Another species is equally or even more abundant, and is distinguished by a narrower lip and its varying colour, which is green, or lilac, or deep purple. This is *G. Helferii*.

PERISTYLUS *Bl.*

P. CONSTRICTUS.

A tall stout terrestrial Orchid, often 2 feet or more high, with large, broad, stem-clasping leaves and a dense spike of numerous pure white flowers, intermingled with long lanceolate bracts. The lip is trifid, and has a small, round, almost detached, serotiform pouch at its base. Also common during the rains in the neighbourhood of Maulmain. Roots fleshy and fibrous, with a large bulb. There are 3 species of this genus.

PLATANThERA, *Richard.*

P. SUSANNÆ.

A very handsome and apparently a very rare terrestrial Orchid. Stem, a foot or more high, leafy, terminated by 4 or 5 pure white flowers of very large size, with an immensely long spur. The flowers of the plant found by me (I never found but one) were 3 inches across, and the spur 4 inches long only, but Wight, who figures it in his *Icous* (for it is also found in the Pulney Hills) represents it as $4\frac{1}{2}$ inches across with a spur "twice its length." He calls it a magnificent species, and adds: "I have never met with it except once." The sepals are very large and broad, the petals very narrow and acute. The lip is 3-parted, the middle lobe being straight and linear, and the side lobes broad and lacinated, or deeply jagged. I may note here once for all that these terrestrial Orchids must be sought for in the rains, when only they flower. They die down at the approach of the dry season, when they are kept alive, as our European species are in the winter, by their underground bulbous root. *P. Susannæ* is also a native of Java, China, and Nipal, and is a plant that has been long known to botanists, having been called *Orchis Susannæ* by Linnæus himself.

HEMIPILLA, *Lindl.*

H. CALOPHYLLUM.

A small terrestrial Orchid with a single broad ovate pointed leaf, which is most beautifully marbled. Root, a single ovate bulb, with several fleshy rootlets above it. Stem solitary, 6 or 8 inches high. Flowers 5 or 6, about an inch apart and an inch long, supported on pedicels (the germ) of the same length, each subtended by a small bract. The upper sepal and the two petals are erect and connivent, being arched over the column and anther, forming a sort of hood to them, as in some *Habenarias*. The lateral sepals are expanded and reflexed. They vary in colour from white to pink. The lip, which is $\frac{3}{4}$ inch long and deep violet, is broad, ovate, slightly truncate, wavy at the margin, and produced into a spur behind. A very beautiful little plant. It is found on the limestone rocks which abound in the Tenasserim Provinces.

HABENARIA, *Willd.*

An extensive and widespread genus of terrestrial Orchids. They are found in Europe, Asia, and Africa. *Habenaria bifolia*, or "The butterfly Orchis," as it is called, is sufficiently common in our English woods to be familiarly known to very young botanists. Their general aspect is very similar, wherever found. They are commonly about a foot or 18 inches high, and have a leafy stem terminating in a spike of sessile white or yellow flowers, and a large bract under each. The sepals and petals are nearly equal, but the petals, if anything, the smallest. Lip almost always 3-lobed, often with its segments much elongated, or cut into fringes. The root is tuberous; sometimes one, sometimes two may be found, according as the last year's tuber has decayed sufficiently to fall off or not. There are 16 species enumerated in my list, and, no doubt, there remain many more yet to be discovered.

Tribe V. ARETHUSEÆ.

GALEOLA.

G. HYDRA.

A very remarkable Orchid indeed, found once by me, and once only, in the year 1859, far away in the jungles near *Ko-tsay-ko-gown* or "99 islands." It is entirely leafless, of the thickness of a small rattan, or, say, the little finger, and scrambles up and over trees to an indefinite length. My specimen was about 30 feet long, but Lindley speaks of it (or a similar species) as being "50 to 120 feet long." The colour of the stem is reddish-brown and the place of leaves is supplied by stiff leathery scales, at long intervals. It supports itself by aerial roots, and its flowers are in racemes, of a yellow colour, and, as far as I can recollect, about 1 inch across. It was in my early days of botanising in Burma that I found it; I had no drawing materials with me, and I was so loaded with new and strange things, that there was no time to do more than roll it up just as it was, in a coil as one would a rope, take it home, and finally send it to Kew. The structure of the flowers, therefore, is unknown to me, except as I read it in Prof. Reichenbach's printed notes. I took the plant at the time to be *Erythrorchis scandens*, Bl. and I do not even now know wherein *Galeola* differs from *Erythrorchis*.

VANILLA, *Plumier.*

V. PARISHII.

I had the good fortune to find, in the same jungles, though not on the same occasion, a species of *Vanilla* which Prof. Reichenbach named after me. *Vanilla*, like *Galeola*, has a thick cord-like stem which climbs up and over trees and hangs down in festoons from them. It is leafy, however (one species excepted), the leaves being ovate, oblong, pointed and very green and fleshy. It attaches itself firmly to its support by short thick, fleshy roots. I had three species growing for many years in a shady part of my garden in Maulmain. I erected a large trellis for them which they soon covered with a tangled mass of vegetation. Nothing could be more rampant than their growth. Although I could not distinguish one from another when out of

flower, the flowers of all three were very different from each other. I received cuttings from Calcutta, being determined to experiment on Vanilla-pod growing. There was no difficulty in getting pods, for all my three species flowered profusely; the difficulty was to ripen and dry them, in which I signally failed. The pods, after growing to their full size, invariably fell off while yet green, and my attempts to dry them never got beyond producing black, leathery, soft, *slug-like* things with a smell of prunes, and the faintest possible taste of "Vanille." I am speaking here of the true species, or what was sent to me as the true species, which is supposed to produce the "Vanille" of commerce, *Vanilla planifolia*. The pods of this species succeeded with me no better than the others. I do not know why they so persistently fell off, as my plants were in the most robust health; but, so it was, that the ground was strewed with them every morning, which so disgusted me that at last I gave up paying any attention to them; when, of course, they flowered no more. To explain the reason of this, I may here say that, in the Vanilla flower, there is found between the anther and the stigmatic surface a projecting membranous flap which effectually prevents the pollen-masses from reaching that surface unless they are assisted thither by external aid. It was, therefore, necessary for me to go round every morning and impregnate all my flowers mechanically—*every* morning, for they only last one day—and the process was this: with a small pair of suitable pincers, thin but blunt and broad at the points, I seized the intervening flap described above, and tore it away, taking care not to disturb the pollen-masses. This done, I pressed the anther with the point of the pincers, so as to force the pollen-masses down upon the stigmatic surface. I soon got quite expert at this operation, so as to do several flowers in a minute, and I do not think that I ever failed in my object, *viz.* successfully impregnating the flowers. In nature, this result is said, or supposed, to be brought about by the agency of some insect. I am not aware if the insect be known to scientific men. Certainly, no insect was ever obliging enough to perform the operation for me, and indeed, I am at a loss to understand how any but a very strong insect, and the same acting of deliberate purpose, can perform it, so tough is the flap that has to be removed, and so closely does it cover the stigmatic surface.

POGONIA, *Juss.*

A small genus of terrestrial Orchids with round tubers, 1 to 1½ inch in diameter, which have short rigid papillæ (roots?) projecting from their surface at all points. The flowers are borne either singly or in loose drooping racemes on a leafless scape, which springs from the centre of the bulb, and is a few inches high, and has several sheathing scales. After this flowering scape, and when the flowers are faded, a solitary leaf appears, which takes its rise either at the base of the flowering scape and close to it, or a little way up, and also has sheathing scales at its base. The flowers, which vary from 1 to 2 inches in length, and are generally drooping, have long lanceolar, nearly equal, sepals and petals, which are free, but connivent (rarely expanded). The lip is long, undivided, or slightly 3-lobed, parallel with the column, and convolute round it, occasionally with a very short blunt spur. The column is also rather long and somewhat club-shaped, and terminated by a lid-like anther. The pollen-masses are 4, granular, long and tapering, without a gland. The leaves are large, rounded and heart-shaped, many-nerved and plicate, or fan-like. In one species they are smooth and green; in a second clothed with tawny hairs; in a third copper coloured; and in a fourth dark green, with a purple-black spot between every nerve. The flowers also vary much in colour, being green, or of different shades of white, pink, or purple. The germ is very short: I have never seen the fruit. They are propagated (as Roxburgh correctly says) by suckers from the petiole (leaf-stalk) just below the ground. The flowers come up in the rainy season, the leaves *after* the rains; consequently it is not easy to secure them. The best way is to dig up the roots and plant them in the garden. I have found 5 species, one very pretty, with a 2-flowered scape and flowers which have a rose-coloured lip, green at the base. Sepals and petals also pink and expanded. I have not seen the leaves, and have only a drawing of it. I have named it provisionally *P. pulchella*; it is my No. 322.

Tribe VI. *NEOTTEÆ*.

Of this section, although we have several genera in Burma, I must restrict myself to the mention of two—*Monochilus* and *Anæctochilus*.

MONOCHILUS, Wall.

These two genera, although terrestrial, may be almost said to be also epiphytal, for they rest but lightly upon decayed leaves and sticks, together with which they may be lifted, having no real attachment to the soil. They are small plants, but a few inches high, with a thick nodose succulent rhizome, or root-stock, of 1 or 2 inches in length, one end of which turns up and becomes the flower-stem, and from the under-side of which issue small rootlets attaching them to the decayed vegetation. Their flowers, though botanically interesting, are of no beauty—their attraction lies in their leaves, some of which are extremely lovely, both for their colouring and the exquisite veining on their upper surface. They are much prized in England, and are carefully grown in hot-houses under bell-glasses, as they require an atmosphere abundantly charged with moisture to keep them alive. This is the reason that they cannot endure the plains in Burma, but affect the mountains, where the air is cooler and the atmosphere much more moist all the year round. I must have seen several species, but they nearly all slipped through my fingers, on account of the difficulty of preserving them alive in my hurried mountain journeys. Hundreds of beautiful things of the frail, succulent sort, not Orchids only, but other flowering plants, await discovery by the happy man who shall only have the opportunity and the resolution to pass a rainy season in the mountains. Among the most beautiful species known are *Monochilus regius*, a Ceylon plant, possibly to be found in Burma; and *Anæctochilus selaceus* and *Dawsonianus*, which are found in its forests. Species ascertained of the two genera about 6 or 7. "*Monochilus* differs from *Anæctochilus* in the absence of a spur, and in the adhesion of the lip to the column."—Lindley.

B. Anthers two.

Tribe VII. *CYPRIPEDÆÆ*.*CYPRIPEDIUM*, L.

The plants of this last tribe differ remarkably in their fertilising apparatus from the rest of the order. I shall confine my remarks, however, to one genus, viz. *Cypripedium*, as I am wholly unacquainted with the other two or three genera which go to complete the tribe. We have no longer a lid-like or operculate anther here, as in our old familiar acquaintances *Dendrobium* and *Vanda*, nor an erect rigid anther opening by two slits as in *Habenaria*, no more pollen-masses of the ordinary type, waxy or granular, free or attached to stipes or gland, and always easily detached from the column; but something wholly different. As you look into the flower, all you will probably see is a large flat fleshy appendage to which you cannot give a name. If you want to examine the mysteries of the interior, you must open the flower and look behind this same appendage. Then all that is to be seen will be revealed. The structure is as follows: Theoretically there are 3 anthers, though practically, or apparently, only 2. "The column is short, bearing 2 perfect anthers" (the 2 rounded bodies visible beneath), "one on each side of the rostellum or style; the dorsal anther (the only one in other Orchideæ) is here usually reduced to a variously shaped barren *staminodium*" (the aforementioned strange appendage); "the rostellum or style is more or less prominent or elongated between the lateral anthers, and dilated at the end into a more or less oblique stigma."—*Bentham*. The genus is not confined to tropical regions, but extends into the colder temperate parts of the world, being found in Europe and N. America. The species found in the latter are terrestrial, those in the former mostly epiphytal. Species 3.

C. CONCOLOR.

A dwarf terrestrial species. Leaves 5 or 6, or more, ovate, oblong, blunt, beautifully mottled above, with two shades of green, purple underneath, 4-5 inches long. Flower-stalk short, purple, 2-flowered; with a large bract at the base of the germ.

Flowers large, yellow, speckled with small red dots, 2 inches or more across. Upper sepal very broad, nearly round. Lower sepal very similar, but not quite so broad. (It should be mentioned here that it is a feature of *Cypripedium* to have the two lower or lateral sepals connate or united into one.) Petals broad, oblong, blunt. Lip, as in the genus generally, saccate, with the edges turned in.

Of the two excellent figures of this plant, one in *Bot. Mag.* t. 5513, and the other in *L'illustration Horticole*, 1865, t. 444, I give the preference to the latter, as, in it, the markings on the leaves are more carefully drawn and are truer to nature. It grows abundantly in large patches in the hollows of the limestone rocks which form so striking a feature in the scenery round about Maulmain. These hollows are commonly filled with light, black and well-drained vegetable mould. *C. concolor* affects such soil as does *Limatodes rosea*, and as do also many other beautiful plants, besides Orchids, which I could name. I discovered it in such a place at "The three Pagodas" in the year 1858. There is a similar species from the Straits with pure white flowers, *C. niveum*, which, although the flowers are not so large, is, in my opinion, a more elegant plant.

C. villosum.

An epiphyte, and a larger plant than the preceding. Leaves numerous, about 1 foot long by 2 inches broad, linear, flaccid, pointed, dark green, the lower ones stained with purple underneath. Scape 6-8 inches high, villous, as is the germ and all the exterior part of the flower. The flowers are 3 or 4 inches across, green outside, dark chocolate inside. Upper or dorsal sepal spatulate, *i.e.* expanding upwards from a narrower base, arched, concave. The lateral sepals obovate with a tapering base. The lip, which is of the usual form, is the same colour as the other parts of the flower, but of a much lighter shade. A very handsome species, growing in large tufts on trees. Found on Dauna-toung, East of Maulmain, but scarce. Abundant on the mountains of Toung-ngoo, about 4000-5000 of elevation.

C. Parishii.

Also an epiphyte. Stem and leaves together a foot or even 18 inches high, the latter 2 inches broad, dark green above, lighter underneath, linear and cleft at the end. Scape, 18 inches to 2 feet high, villous, 4-5 flowered. Bracts large, green. Sepals pale green, striped, broad, ovate, pointed, 2 inches long. Petals long, narrow, 4-5 inches, and twisted, pendulous, much expanded, upper portion green, lower dark purple with a green margin. The edges are waved and crisped, with, here and there, warty protuberances with a pencil of hairs. Lip sometimes green, but oftener, when of robust growth, of a dark purple tinge. First found in 1858 on the Shan border S.E. of Maulmain, but not there abundant, more so, apparently, northwards.

P.S.—The following supplementary list has been kindly furnished me by Mr. Low, of Clapton, since I wrote what goes before.

1. *BULBOPHYLLUM ALOPECURUM*, R. fil.
2. *ERIA TRILOPHOTA*, Lindl., a variety of *E. obesa*. "Flowers larger and the lower part of the lip very gradually passing into the upper. Flowers pure white with a lemon-coloured lip, marked by three longitudinal purple elevated lines."—Lindl. Journal of the Proceedings Linn. Soc. vol. iii. p. 34.
3. *DENDROBIUM LUBBERSIANUM*, R. fil. Gard. Chron. 1882, Ap. 8, p. 460, "in growth like a smaller *D. FORMOSUM*."
4. *DENDROBIUM CRASSINODE*, var. *BARBERIANUM*, R. fil.
5. *D. CRASSINODE*, var. *ALBIFLORUM* or *CANDIDUM*, R. fil.
6. *D. SUAVISSIMUM*, R. fil.
7. *D. MARMORATUM*, R. fil.
8. *D. WARDIANUM*, var. *WATSONI*, R. fil.?
9. *D. WARDIANUM*, var. *ALBUM*, R. fil.?
10. *D. BENSONLE*, var. *XANTHINA*, R. fil.
11. *CELOGYNE BRACHYPTERA*, R. fil. (near *C. lentiginosa*) in Gard. Chron. 1881, July 2, p. 6.
12. *LIMATODES LABROSA*, R. fil.

13. THUNIA MARSHALLI, R. fil.

14. SPATHOGLOTTIS PlicATA, Blume. Lindl. Gen. and Sp. Orch. Pl. p. 119.

Lindley gives *Java* and *Penang* for this plant. Nothing is more likely than it should be found in Burma also, though Mr. Low may possibly have received it from the Straits, ascribing it through error to Burma.

15. SPATHOGLOTTIS ALBA, R. fil.?

16. LUISIA, sp. (EMARGINATA?).

17. AERIDES LARPELLE (?).

18. SACCOLABIUM INTERMEDIUM, R. fil. "near *S. bigibbum*." Another variety of the *S. calceolare* group, which seems to be only "constans in levitate." It appears to be almost impossible to find two plants alike in this group, and that, if only two could be fixed upon as the extremes at either end, the name *intermedium* might be applied to all the rest. Since writing my observations under the head of *S. calceolare* I received a living specimen from Mr. H. Veitch of *S. bigibbum*, said by him to be the plant so named by Prof. Reichenbach himself. On comparing the flowers with the figure of that species in the Bot. Magazine, I found that they did not agree with it either in form or in colour, but rather with the figure of *S. denticulatum*. On drawing his attention to this, Mr. Veitch writes me, "The flowers vary very much, and next year, if all is well, I will send you flowers as light as those figured in Bot. Mag. and darker than those I sent you last week."

19. SARCANTHUS HINCKSIANUM, R. fil.

20. CYMBIDIUM COCHLEARE, Lindl. Journal Linn. Soc. vol. iii. pp. 28, 178.

21. VANDA CERULESCENS, var. LOWII, R. fil. See my remarks under head of *V. cerulescens*.

22. VANDA VIPANI, R. fil. Gard. Chron. 1882, July 29, p. 134.

23. CYPRIPEDIUM BOXALLII, R. fil.

ORCHIDS.¹

"Where Java's Isle, horizoned with the floods,
Lifts to the skies her canopy of woods;
Pleased *Epidendra* climbs the waving pines,
And high in heaven the intrepid beauty shines,
Gives to the tropic breeze her radiant hair,
Drinks the bright shower, and feeds upon the air.
Her brood delighted stretch their callow wings,
As poised aloft their pendant cradle swings,
Eye the warm sun, the spicy zephyr breathe,
And gaze uncenvious on the world beneath."

Erasmus Darwin's *Loves of the Plants*, Canto iii. 391.

AN ENUMERATION OF BURMESE ORCHIDS SYSTEMATICALLY ARRANGED.

A. Anther one only.

I. Pollen-masses waxy.

I. Tribe I. Malaxideæ. Pollen-masses free, *i.e.* without any caudicula or gland, or other connecting substance.

Microstylis, Lindley, Genera and Species of Orchidaceous Plants, xiii.

1. *M. RHEEDI*, Lindl. Gen. and Sp. p. 21. Wight's Icones. t. 992 (bad). C.P. No. 215.

¹ The whole of this account of the Orchids of Burma is from the pen of the Rev. C. Parish, formerly Chaplain of Maulmain, a zealous admirer and a successful cultivator of this charming class of plants.

2. M. WALLICHI, Lindl. Gen. and Sp. p. 20. C.P. 115.
3. M. BILOBA, Lindl. Gen. and Sp. p. 20. C.P. 191.
4. M. FLAVESCENS, Lindl. Gen. and Sp. p. 20. C.P. 364.
5. M. PURPUREA, Lindl. and Sp. p. 20. C.P. 356.

Liparis, Rich. Lindl. Gen. and Sp. Orch. xix. p. 26.

1. L. SPATULATA, Lindl. Bot. Register 1840. Miscellany, 189. Griffith, 772. C.P. 101.
2. L. BIS-STRIATA, Par. and Reichb. fil. Trans. Linn. Soc. xxx. p. 155. C.P. 80.
3. L. STENOGLOSSA, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 154. C.P. 154.
4. L. PACHYPUS, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 155. C.P. 233.
5. L. PARADOXA, R. fil. in Walpers' Annal. vi. p. 248. (EMPUSA of Lindl. Gen. and Sp. Orch. xi. p. 17.) C.P. 316.
6. L. PARADOXA, R. fil. β . FLAVIDA, Par. and R. fil. C.P. 316 and 317.
7. L. LUTEOLA, Lindl. Gen. and Sp. p. 32. C.P. 155.
8. L. JOVIS-PLUVII, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 154. C.P. 323.
9. L. CONDYLO-BULBOS, R. fil. in Hamb. Gart. Zeit. 1862, p. 34. C.P. 71.
10. L. GREGARIA, Lindl. Gen. and Sp. p. 33. C.P. 332.
11. L. LONGIPES, Wallich. Pl. As. rar. 35. Wight's Icon. t. 906. Bentham in Flora Hong-kong, p. 352. C.P. 318.
12. L. OLIVACEA, Lindl. Gen. and Sp. p. 27. Wight's Icon. t. 903. C.P. 367.

Malaxis, Sw. (*Oberonia* of Lindl.), Gen. and Sp. Orch. x. p. 15.

1. M. MYOSURUS, Wall. Cat. No. 1947. Lindl. Gen. and Sp. p. 16. C.P. 300.
2. M. IRIDIFOLIA, Lindl. Gen. and Sp. p. 15. R. fil. in Walp. Ann. vi. 208. C.P. 290.
3. M. ENSIFORMIS, Smith in Rees' Encycl. C.P. 288.
4. M. GRIFFITHIANA, R. fil. Walp. Ann. vi. p. 208. Lindl. Sert. Orch. C.P. 59 and 345.
5. M. BRUNONIANA, R. fil. Walp. Ann. vi. p. 209. Wight's Icon. t. 1622. C.P. 287.
6. M. ANTHROPOPHORA, Lindl. Gen. and Sp. Orch. (*vide ejusdem*). C.P. 58.
7. M. RUFILABRE, Lindl. Gen. and Sp. Orch. (*vide ejusdem*). C.P. 255.
8. M. ANCEPS, Lindl. Gen. and Sp. Orch. (*vide ejusdem*). C.P. 256.
9. M. BRACHYSTACHYS, Gen. and Sp. Orch. (*vide ejusdem*). C.P. 257.

Bulbophyllum, Lindl. Gen. and Sp. Orch. xxxi. (including CIRRHOPETALUM and TRIAS).

1. B. PSITTACOGLOSSUM, R. fil. Botanical Magazine, tab. 5408. C.P. 140.
2. B. LOBBII, Lindl. var. SIAMENSE, Par. and R. fil. *vide* Bot. Mag. t. 4532. C.P. 187. Saund. Ref. Bot. t. 116.
3. B. MACRANTHUM, Lindl. Bot. Reg. 1844, t. 13. C.P. 158.
4. B. (TRIAS) OBLONGUM, Wall. Cat. No. 1977. Lindl. Gen. and Sp. p. 60. C.P. 90.
5. B. (TRIAS) PICTUM, Par. and R. fil. Trans. Linn. Soc. xxx. p. 150. C.P. 264.
6. B. (TRIAS) NASUTUM, R. fil. Gardeners' Chronicle, 1871, p. 1482. C.P. 263. p. 128, t. 144. Bot. Mag. t. 6119. Saund. Ref. Bot. t. 115. C.P. 358.
7. B. (TRIAS) DAYANUM, R. fil. Gard. Chron. 1865, p. 434. Xenia Orchidacea,
8. B. CAPILLIPES, Par. and R. fil. Trans. Linn. Soc. xxx. p. 150, tab. 30 A. C.P. 301.
9. B. MONILIFORME, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 151. C.P. 96.
10. B. PENICILLIUM, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 151, *compare* B. CALAMARIA, Bot. Mag. t. 4088, and Bot. Reg. 1843, p. 70, No. 109. C.P. 303.
11. B. LEMNISCATUM, Par. in Bot. Mag. t. 5961. C.P. 211.
12. B. LEMNISCATUM var. TUMIDUM, Par. and R. fil. Trans. Linn. Soc. xxx. p. 151. C.P. 211 β .
13. B. ALCICORNE, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 151. C.P. 260.
14. B. XYLOPHYLLUM, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 151. C.P. 82 β .
15. B. KHASYANUM, Griff. Notulæ, p. 284. C.P. 82 *a*.

16. *C. CAREYANUM*, Spreng. Wall. Cat. No. 1990. Hook. Exot. Fl. 149. Lindl. Gen. and Sp. p. 51. Bot. Mag. t. 4166. C.P. 49.
17. *B. CUPREUM*, Lindl. Bot. Reg. 1838. Misc. p. 183. Bot. Mag. 5316. C.P. 193 *a*.
18. *B. SICYOBULBON*, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 152. C.P. 193 *β*.
19. *B. CUPREUM* var. *SILNOSEPALUM*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 152. C.P. 306.
20. *B. PARVIFLORUM*, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 152. C.P. 305.
21. *B. AURICOMUM*, Wall. Cat. No. 1985. Lindl. Gen. and Sp. p. 50. R. fil. Trans. Linn. Soc. vol. xxx. p. 152. C.P. 16.
22. *B. LINDLEYANUM*, Griff. Notulæ, p. 287. C.P. 87.
23. *B. GRACILE*, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 152 (not of Thouars). C.P. 208.
24. *B. LIMBATUM*, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 152. C.P. 336.
25. *B. RUFILABRE*, Par. and R. fil. C.P. 262.
26. *B. TRISTE*, Par. and R. fil. in Walp. Ann. vol. vi. p. 253. C.P. 207. Saund. Ref. Bot. t. 117.
27. *B. ODORATISSIMUM*, Lindl. Gen. and Sp. p. 55. C.P. 50.
28. *B. OVALIFOLIUM*, Wight's Leon. 1736. *B. TRISEFORUM*, Griff. Pl. As. t. 293. (*ONYSEPALA OVALIFOLIA*). C.P. 84.
29. *B. RADIATUM*, Lindl. Gen. and Sp. p. 55. Benth. Fl. Hong-kong, p. 353. C.P. 114.
30. *B. STENOBULBON*, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 153. C.P. 337.
31. *B. TENIOPHYLLUM*, Par. and R. fil. Otia Bot. Hamb. 1878, p. 49. C.P. 350.
32. *B. SIMILLIMUM*, Par. and R. fil. Otia Bot. Hamb. 1878, p. 49. C.P. 366.
33. *B. (CIRRHOPEFALUM) LASIOCHILUM*, Par. and R. fil. Trans. Linn. Soc. vol. xxx. p. 153. C.P. 307.
34. *B. (CIRRHOPEFALUM) PICTURATUM*, R. fil. Walp. Ann. vi. p. 262. C.P. 23.
35. *B. (CIRRHOPEFALUM) RETUTUSCULUM*, R. fil. in Gard. Chron. 1869, p. 1182. C.P. 142.
36. *B. (CIRRHOPEFALUM) BOOTANENSE*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 153, tab. 32 B. C.P. 293.
37. *B. (CIRRHOPEFALUM) PUMILIO*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 153. C.P. 220.
38. *B. (CIRRHOPEFALUM) GRIFFITHIANUM*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 153. *CIRRHOPEFALUM GANOSEPALUM*, Griff. Not. Part 3, p. 296? C.P. 138.
39. *B. (CIRRHOPEFALUM) TRIPUDIANS*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 154. C.P. 308.
40. *B. (CIRRHOPEFALUM) MERGUENSE*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 154. C.P. 201.
41. *B. (CIRRHOPEFALUM) BLEPHARISTES*, R. fil. in Flora, 1872, p. 278. C.P. 99.

Epicranthes, Bl. Bijdr. 306, tab. 9. Lindl. Gen. and Sp. Orch. xxxvi. p. 61.

1. *E. JAVANICA*, Lindl. Gen. and Sp. p. 61. R. fil. Otia Bot. Hamb. 1878, p. 48. C.P. 351.

Drymoda, Lindl. Sertum Orchidaceum, p. 8.

1. *D. PICTA*, Lindl. Sert. Orch. tab. 3. Bot. Mag. t. 5904. C.P. 289.

Dendrobium, Sw. Lindl. Gen. and Sp. Orch. xlvii. p. 74.

1. *D. (OXYSIOPHYLLUM, BL.) ATROPURPUREUM*, Miquel Fl. Ind. Bot. iii. p. 614. (*APORUM CONCINNUM*, Lindl. MSS. distrib. Wallich). R. fil. Trans. Linn. Soc. vol. xxx. p. 149. C.P. 265.
2. *D. CELOGYNE*, R. fil. in Gard. Chron. 1871, p. 136. Compare *D. AMPLUM*, Lindl. Gen. and Sp. p. 74. Wall. Cat. No. 2001. C.P. 221 and 330.
3. *D. (APORUM) SERKA*, Lindl. Journ. Linn. Soc. iii. p. 3. Gen. and Sp. p. 71. C.P. 374.

4. *D. (APORUM) ANCEPS*, Roxb. Fl. Ind. iii. p. 487. Griff. in Journ. of Nat. Hist. Calcutta, v. 369. Bot. Mag. t. 3608. Bot. Reg. t. 1239. Lindl. Gen. and Sp. p. 71. Journ. Linn. Soc. iii. p. 4. (*D. CUSPIDATUM*, Wall. in Bot. Reg. 1841, Misc. 7.) C.P. 35.
5. *D. (APORUM) EULOPHOTUM*, Lindl. in Journ. Linn. Soc. iii. p. 5. C.P. 32.
6. *D. (APORUM) TERMINALE*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 149. C.P. 33.
7. *D. (APORUM) MULTIFLORUM*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 149, t. 31 B. C.P. 266.
8. *D. (STRONGYLE) ACEROSUM*, Lindl. Bot. Reg. 1841. Misc. p. 86. (*D. SUBTERES*, Griff.) Lindl. in Journ. Linn. Soc. iii. p. 4. C.P. 34.
9. *D. MACREI*, Lindl. Gen. and Sp. p. 75. Journ. Linn. Soc. iii. p. 6. C.P. 85.
10. *D. CRUMENATUM*, Sw. Roxb. Fl. Ind. iii. p. 480. Lindl. Gen. and Sp. p. 88. Bot. Reg. 1839, t. 22. Bot. Mag. t. 4013. C.P. 30.
11. *D. ANGULATUM*, Wall. Cat. No. 2010. Lindl. Gen. and Sp. p. 88. C.P. 88.
12. *D. LAMELLATUM*, Bl. Bijdr. 326, t. 10. Lindl. Gen. and Sp. p. 89. Bot. Reg. Misc. 76, 1844, tab. 53. *D. COMPRESSUM*, R. fil. Otia Bot. Hamb. 1878, p. 48. C.P. 354.
13. *D. AGGREGATUM*, Roxb. Fl. Ind. iii. p. 477. Bot. Reg. t. 1695. Bot. Mag. t. 3643. C.P. 13.
(*D. GRIFFITHIANUM*, Lindl. Bot. Reg. xxi. t. 1756. C.P. 375.)
14. *D. CHRYSOTOXON*, Lindl. Bot. Reg. 1847, sub. t. 19. Bot. Mag. t. 5053. C.P. 7.
15. *D. TORTILE*, Lindl. in Gard. Chron. 1847, p. 797, cum Icône. Bot. Mag. t. 4477. C.P. 17.
16. *D. PYGMEUM*, Lindl. Gen. and Sp. p. 85. "Prome" *fide* Wallich. Bot. Reg. 1844, Misc. p. 62. C.P. 339.
17. *D. PECTANUM*, Lindl. Journ. Linn. Soc. iii. p. 19. C.P. 91.
18. *D. PUMILUM*, Roxb. Fl. Ind. iii. p. 479 (first part only). Journ. Linn. Soc. iii. p. 6. Griff. Not. iii. 315. R. fil. Trans. Linn. Soc. xxx. p. 150, tab. 31 A. in part. C.P. 98.
19. *D. FUGAX*, R. fil. in Gard. Chron. 1871, p. 1287. C.P. No. ?
20. *D. FARMERI*, Lindl. Bot. Mag. 4659. Lindl. Mag. of Bot. v. 15, cum Icône. C.P. 14a.
21. *D. FARMERI AUREO-FLAVUM*, Hook, Bot. Mag. 5451. C.P. 14β.
D. PALPEBRE, Lindl. Paxton Fl. Gard. i. p. 48. Journ. Hort. Soc. v. (1850) p. 33. C.P. 377.
22. *D. CAPILLIPES*, R. fil. in Gard. Chron. 1867, p. 897. C.P. 186.
23. *D. ALBOSANGUINEUM*, Lindl. Paxton's Fl. Gard. v. 2, t. 5. Bot. Mag. 5130. C.P. 15.
24. *D. DENSIFLORUM*, var. *ALBO-LUTEA*, Hook. Bot. Mag. 3418. *Compare* Wall. Plant As. var. 34 t. 40. C.P. 190.
25. *D. CHRYSOCREPIS*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 150. Bot. Mag. 6007. C.P. 309.
26. *D. REVOLUTUM*, Lindl. Bot. Reg. 1840, Misc. p. 110. *D. UNIFLORUM*, Griff. Icon. 303. C.P. 112.
27. *D. BICAMERATUM*, Lindl. Bot. Reg. 1839, Misc. p. 85. *D. BREVEFLORUM*, Lindl. Journ. Linn. Soc. iii. p. 14. C.P. 278.
28. *D. INCURVUM*, Lindl. Journ. Linn. Soc. iii. p. 18. Griff. Not. iii. 314, No. 9. C.P. 176.
29. *D. CUSPIDATUM*, Lindl. Wall. Cat. No. 2015. Gen. and Sp. p. 84. Bot. Reg. 1841, Misc. p. 7. C.P. 151.
30. *D. PYCNOSTACHYUM*, Lindl. Journ. Linn. Soc. iii. p. 19. C.P. 67.
31. *D. POLYANTHUM*, Wall. Cat. No. 2009. Lindl. Gen. and Sp. p. 81. "Moulmayne" *fide* Wallich. C.P. 340.
32. *D. PARCUM*, R. fil. in Gard. Chron. 1866, p. 1042. C.P. 81.
33. *D. RAMBUSTIFOLIUM*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 149. C.P. 188.
34. *D. PACHYGLOSSUM*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 149. C.P. 145.
35. *D. SPHEGIDOGLOSSUM*, R. fil. Otia Bot. Hamb. 1878, p. 47. C.P. 353.

36. *D. SECUNDUM*, Wall. Cat. No. 1996. Lindl. Gen. and Sp. p. 81. Bot. Reg. t. 1291. Bot. Mag. t. 4352. (*D. PURPUREUM*, Roxb. Fl. Ind. iii. p. 481.) C.P. 333.
37. *D. FORMOSUM*, Roxb. Fl. Ind. iii. p. 485. Lindl. Gen. and Sp. p. 81. Bot. Reg. t. 64. Wall. Plant. As. rar. t. 39. C.P. 6.
38. *D. EBURNÆUM*, Par. Bot. Mag. t. 5459. C.P. 131.
39. *D. JAMESIANUM*, R. fil. in Gard. Chron. 1869, p. 551. C.P. 132*a*.
40. *D. DRACONIS*, R. fil. in Bot. Zeit. 1862, p. 214. C.P. 132*β*.
41. *D. INFUNDIBULUM*, Lindl. in Journ. Linn. Soc. iii. p. 16. Bot. Mag. t. 5446. C.P. 130.
42. *D. XANTHOPHILEBIUM*, Lindl. in Gard. Chron. 1857, p. 268, and 1856, No. 196. Journ. Linn. Soc. iii. p. 16. Bot. Mag. t. 5454. C.P. 133.
43. *D. SENILE*, Par. Bot. Mag. t. 5520. C.P. 135.
44. *D. SCABRILINGUE*, Lindl. Journ. Linn. Soc. iii. p. 15. R. fil. Trans. Linn. Soc. xxx. p. 150. (*D. HEDYOSMUM*, Bateman, Bot. Mag. 5515.) C.P. 134.
45. *D. DALHOUSIANUM*, Paxt. Mag. of Bot. xi. t. 145. Bot. Reg. 184, t. 40. Griff. Not. iii. 313, No. 7. C.P. 19.
46. *D. CALCEOLARIA*, Hook. Exot. Flora, 184. Lindl. Gen. and Sp. p. 83. (*D. CUPREUM*, Bot. Reg. 1779.) C.P. 136.
47. *D. MOSCHATUM*, Wall. Pl. As. rar. ii. 195. Lindl. Gen. and Sp. p. 82. Bot. Mag. tab. 3857. (*D. CALCEOLUS*, Roxb. Fl. Ind. iii. p. 488.) C.P. 8.
48. *D. FIMBRIATUM*, Wall. Cat. No. 2011. Hook. Exot. Fl. 71. Lindl. Gen. and Sp. p. 83. Bot. Mag. 4160. C.P. 88.
49. *D. BINOCULARE*, R. fil. Gard. Chron. 1869, p. 785. Otia Bot. Hamb. No. 23; p. 48. C.P. 344.
50. *D. BRYMERIANUM*, R. fil. in Gard. Chron. 1875, p. 323, and 1876, p. 366. Bot. Mag. tab. 6383. C.P. 369 b.
51. *D. PIERARDII*, Roxb. Fl. Ind. iii. p. 482. Lindl. Gen. and Sp. p. 79. Wight's Icon. 908 (indifferent). Bot. Mag. 2584. C.P. 10.
52. *D. TRANSPARENTIS*, Wall. Cat. No. 2008. Lindl. Gen. and Sp. p. 79. Bot. Mag. 4663? C.P. 185.
53. *D. GRATIOSISSIMUM*, R. fil. in Bot. Zeit. 1865, p. 99. (*D. BULLERIANUM*, Bateman, Bot. Mag. 5652.) C.P. 202 and 206.
54. *D. BOXALLII*, R. fil. Xenia, vol. ii. t. 194. Jennings Orch. t. 19. Floral Mag. new series, t. 114. C.P. 360.
55. *D. CRYSTALLINUM*, R. fil. in Gard. Chron. 1868, p. 570. Xenia Orchidacea, vol. ii. p. 211, tab. 193, f. 1. C.P. 206 b.
56. *D. PARISHII*, R. fil. in Bot. Zeit. 1863, p. 236. Bateman in Bot. Mag. 5488. C.P. 18.
D. RHODOPTERYGIUM, R. fil. in Gard. Chronicle. C.P. 376.
57. *D. BENSONÆ*, R. fil. Bot. Mag. 5679. C.P. 203.
58. *D. FYTCHIANUM*, Par. Bot. Mag. t. 5444. Compare *D. BARBATELUM*, Bot. Mag. t. 5918, also Wight's Icones, 910. C.P. 126.
59. *D. DEVONIANUM*, Paxt. Mag. i. p. 169. Bot. Mag. 4429, *β*. *RHODONEURUM*. R. fil. in Gard. Chron. 1868, p. 682. C.P. 310.
60. *D. FALCONERI*, Hook. Bot. Mag. 4944 and 5058. C.P. 359.
61. *D. HETEROCARPUM*, Wall. Pl. As. rar. 196. Lindl. Gen. and Sp. p. 78. (Bot. Reg. Misc. p. 49, No. 11. *D. AUREUM*). Bot. Mag. 4708 and 4970. var. *HENSHALLII*, Bot. Mag. 4970. C.P. 137.
62. *D. FINDLAYANUM*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 149. C.P. 192.
63. *D. CRASSINODE*, R. fil. Gard. Chron. 1869, p. 164. Bot. Mag. 5766. C.P. 26.
64. *D. NODATUM*, R. fil. Bot. Mag. 5470. C.P. 106.
65. *D. LUTEOLUM*, Balf. Bot. Mag. 5141. Gard. Chron. 1861, p. 269. C.P. 139.
66. *D. CUMULATUM*, Lindl. in Gard. Chron. 1855, p. 756. Bot. Mag. 5703. C.P. 200.
67. *D. LASIOGLOSSUM*, R. fil. in Gard. Chron. 1868, p. 682. Bot. Mag. 5825. C.P. 304.
68. *D. CILIATUM*, Par. Bot. Mag. 5430. C.P. 156.

69. *D. DIXANTHUM*, R. fil. Gard. Chron. 1865, p. 674. Bot. Mag. 5564. C.P. 21.
 70. *D. CRETACEUM*, Lindl. Bot. Reg. vol. 33, t. 62. Bot. Mag. 4686. C.P. 65.
 71. *D. CREPIDATUM*, Lindl. Paxt. Fl. Gard. v. 1. Gleanings, No. 99, f. 95. Bot. Mag. 4993 and 5011. C.P. 66.
 72. *D. LUTEIFLORUM*, Lindl. Gard. Chron. 1856, p. 185. *D. HAMBRYANUM*, R. fil. in Bonplandiä, vol. iv. p. 357.

Tribe II. *EPIDENDREÆ*.

Pollen-masses attached to a distinct caudicle, or joined together by some elastic material, but without a gland.

Cryptochilus, Wall. Lindl. Gen. and Sp. Orch. cxix. p. 193.

1. *C. MERAX*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 148. (*AGGELANTHUS MARCHANTIODES*, Wight's Icones, 1737?). C.P. 251.

Eria (including *ANIA*), Lindl. Gen. and Sp. xlii. p. 65, and lxvi. p. 129.

1. *E. (ANIA) HOLOGLOSSA*, Par. and R. fil. Trans. Linn. Soc. xxx. p. 148. (*ANIA LATIFOLIA*, Lindl. Gen. and Sp. p. 130. Wight's Icon. 914?). C.P. 253.
 2. *E. ANIA*, R. fil. in Walpers' Ann. vi. p. 70. *ANIA ANGUSTIFOLIA*, Lindl. ? Gen. and Sp. p. 129 "Tavoy." *CALANTHE VIRIDIFUSCA*, Bot. Mag. 4669? C.P. 244 and 73.
 3. *E. DISCOLOR*,¹ Lindl. Journ. Linn. Soc. iii. p. 51. *CALLOSTYLIS RIGIDA*, Bl. ? Lindl. Gen. and Sp. p. 129. C.P. 314. Same as following?
 4. *E. PULCHELLA*, Lindl. Wall. Cat. No. 7407. Bot. Reg. 1841. Misc. 106. Journ. Linn. Soc. p. 51. C.P. 314 (not *E. PULCHELLA* of Griff.). Same as preceding?
 5. *E. ORNATA*, Lindl. Gen. and Sp. p. 66. Journ. Linn. Soc. iii. p. 48. *E. ARMENIACA*, Bot. Reg. 1841, t. 42. C.P. 109.
 6. *E. ELONGATA*, Griff. Not. iii. 301. Lindl. Journ. Linn. Soc. iii. p. 49. (*ERIA FLAVA*, Griff.) C.P. 119.
 7. *E. LANATA*, Griff. Not. iii. 301. Lindl. Journ. Linn. Soc. iii. p. 49. C.P. 51?
 8. *E. PANNEA*, Bot. Reg. 1842. Misc. 79. (*E. TERETIFOLIA*, Griff. Notul. iii. 298, t. 300, fig. 2. Itinerary, 202, No. 1185.) Lindl. Journ. Linn. Soc. iii. p. 50. C.P. 313.
 9. *E. SICARIA*, Lindl. Journ. Linn. Soc. iii. p. 50. C.P. 100.
 10. *E. FRAGRANS*, R. fil. in Bot. Zeit. 1864, p. 415. (*E. STELLATA*, Sp. aff. B.M. 3605 and Bot. Reg. t. 904.)
 11. *E. ORESA*, Lindl. Gen. and Sp. p. 68. Journ. Linn. Soc. iii. p. 53. (*E. LINDLEYANA*, Griff. Not. iii. 300.) Bot. Mag. 5391. C.P. 24.
 12. *E. ACERVATA*, Lindl. Paxton Fl. Gard. i. p. 170. C.P. 276.
 13. *E. AFFINIS*, Griff. Not. iii. p. 297. Lindl. Journ. Linn. Soc. iii. p. 54. C.P. 196.
 14. *E. GRIFFITHII*, R. fil. in Xenia, Orch. ii. p. 163. (*E. PULCHELLA*, Griff. Not. iii. p. 297. Lindl. Journ. Soc. iii. p. 54.) Very near to *E. BRACDESCENS*. C.P. 102 and 107.
 15. *E. CONCOLOR*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 148. C.P. 128.
 16. *E. DASYPUS*, R. fil. in Bot. Zeit. 1864, p. 416. C.P. 235.
 17. *E. ERIOPSIDOBULBON*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 148. C.P. 281.
 18. *E. CONVALLARIOIDES*, Lindl. Gen. and Sp. p. 70. Bot. Reg. 1841, t. 62, and 1847, t. 63. Wall. Pl. Asiat. rar. ii. 159. C.P. 141.
 19. *E. FLORIBUNDA*, Lindl. in Bot. Reg. 1844, t. 20. C.P. 282.
 20. *E. RINGENS*, R. fil. in Bonplandiä, 1855, p. 222. (*E. OVATA*, Bot. Reg. 1844, sub tab. 29). C.P. 321.
 21. *E. PULVINATA*, Griff. Mergui, No. 2, Aug. 17, 1834. Lindl. Journ. Linn. Soc. iii. p. 56. C.P. 274.

¹ I incline to believe that *E. pulchella* No. 277 and *E. discolor* No. 278 of p. 51, Journ. Linn. Soc. iii. together with *Callostylis rigida*, are all one and the same.—C.P.

22. *E. TRUNCATA*, Lindl. Journ. Linn. Soc. iii. p. 58. "Moulmein T. Lobb." C.P. 273.
23. *E. DASYPHYLLA*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 147. C.P. 79.
24. *E. PUMILA*, Lindl. Gen. and Sp. p. 68. C.P. 234.
25. *E. MEXICENSIS*, Lindl. Journ. Linn. Soc. iii. p. 52. C.P. 52.
26. *E. MYRISTICIFORMIS*, Hook. Bot. Mag. t. 5415. C.P. 413.
27. *E. MUSCICOLA*, Lindl. Journ. Linn. Soc. iii. p. 47. R. fil. Linn. Soc. Trans. xxx. p. 148. (*DENDROBIUM MUSCICOLA*, Lindl. Gen. and Sp. p. 75. *D. FILIFORME*, Wight Icon. 1642. *E. DALZELLI*, Lindl. Journ. Linn. Soc. iii. p. 47) C.P. 320.
28. *E. PARISHII*, Lindl. R. fil. Linn. Soc. Trans. xxx. p. 147. C.P. 61.
29. *E. USTULATA*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 147. C.P. 62.
30. *E. EXTINGUATORIA*, Hook. fil. Bot. Mag. t. 5910. (*DENDROBIUM EXTINGUATORICUM*, Lindl. Bot. Reg. sub t. 1756. Journ. Linn. Soc. iii. p. 11.) R. fil. Walp. Ann. vi. p. 308. C.P. 74.
31. *E. PLEUROTHALLIS*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 147, tab. 30 C. C.P. 160.
32. *E. VESUITA*, Lindl. Bot. Reg. 1844. Misc. 1845, p. 79, t. 2. Walp. Ann. vi. p. 284. Lindl. Gen. and Sp. p. 82. (*DENDROBIUM VESTITUM*, Wall. Cat. 2005). C.P. 64.
33. *E. PERPUSILLA*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 148. C.P. 97.

Dendrochilum, Bl. Lindl. Gen. and Sp. Orch. xx.

1. *D. PALLIDE-FLAVENS*, Bl. Bijdr. 398, t. 52, Lindl. Gen. and Sp. p. 34. C.P. 270.

Celoglyne, Lindl. (including *PHOLIDOTA*, *OTOCHILUS* and *PLEIONE*), Lindl. Gen. and Sp. Orch. xxv.

1. *C. (OTOCHILUS) PORRECTA*, Lindl. Gen. and Sp. p. 36. R. fil. Walp. Ann. vi. p. 236. C.P. 209.
2. *C. (OTOCHILUS) FUSCA*, Lindl. Gen. and Sp. p. 35. Bot. Mag. 3921. C.P. 342.
3. *C. (PHOLIDOTA) IMBRICATA*, Lindl. Gen. and Sp. p. 36. Bot. Reg. t. 1213. Wight Icon. 907. C.P. 39.
4. *C. (PHOLIDOTA) ARTICULATA*, Lindl. Gen. and Sp. p. 38. C.P. 38.
5. *C. (PHOLIDOTA) CONVALLARIA*, R. fil. in Flora, 1872, p. 277. C.P. 210.
6. *C. (PHOLIDOTA) ADVENA*, Par. and R. fil. Otia Bot. Hamb. Fase. I. 1878, p. 47. (*CHELONANTHERA GIBBOSA*, Bl. Lindl. Gen. and Sp. p. 178?) C.P. 296.
7. *C. (PLEIONE) REICHENBACHIANA*, Hook. fil. Bot. Mag. 5753. C.P. 72.
8. *C. (PLEIONE) PRÆCOX*, Lindl. Gen. and Sp. p. 43. (*C. WALLICHIANA*, an eadem? Bot. Mag. 4496.) C.P. 213.
9. *C. (PLEIONE) SCHILLERIANA*, R. fil. in Koch. Berl. Allg. Gart. Zeit. 1858, p. 189. Bot. Mag. 5072. C.P. 40.
10. *C. UNIFLORA*, Lindl. Gen. and Sp. p. 42. R. fil. Linn. Soc. Trans. xxx. p. 146. C.P. 129.
11. *C. TESTACEA*, Lindl. Bot. Reg. 1843, Misc. 34. Bot. Mag. 4785. C.P. 41.
12. *C. LENTIGINOSA*, Lindl. Fol. Orch. (*C. FULIGINOSA*, p. 3). Bot. Mag. 5958. C.P. 189.
13. *C. CYNOCHES*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 147. C.P. 195.
14. *C. FUSCESCENS*, VAR. *BRUNNEA*, Lindl. Fol. Orch. and in Gard. Chron. 1848, p. 71, cum icone. Bot. Mag. 5494. C.P. 161.
15. *C. OCHRACEA*, Lindl. Bot. Reg. 1846, t. 69. *C. CONFERTA*, sub-species, Par. and R. fil. Linn. Soc. Trans. xxx. p. 146, tab. 30 B. C.P. 150.
16. *C. GRAMINIFOLIA*, Par. and R. fil. Linn. Soc. Trans. p. 146. C.P. 252.
17. *C. ELACIDA*, Lindl. Gen. and Sp. p. 39. Bot. Mag. 3318. (*C. HORTNERIANA*? R. fil.) Compare *C. OCELLATA*, Bot. Mag. t. 3767. C.P. 143.
18. *C. PROLIFERA*, Gen. and Sp. p. 40. C.P. 174 B.
19. *C. RIGIDA*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 146. C.P. 42.
20. *C. USTULATA*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 146. C.P. 174 A.

21. *C. FIMBRIATA*, Lindl. Gen. and Sp. p. 41. Griff. Icon. Pl. As. t. 291, No. 1. C.P. 118.
22. *C. OVALIS*, Lindl. Bot. Reg. 1838, Misc. p. 171. C.P. 243.
23. *C. APICULATA*, Par. and R. fil. in Walp. Ann. xvii. p. 225. C.P. 214.
24. *C. TRINERVIS*, Lindl. Gen. and Sp. p. 41. C.P. 343.
25. *C. PARISHII*, Hook. fil. Bot. Mag. 5323. C.P. 105.

Smipia, Buchan. in Rees' Cyclop. Lindl. Gen. and Sp. Orch. cviii.

1. *S. SCARIOSA*, Lindl. in Wall. Cat. 7373. Gen. and Sp. p. 179. Sert. Orch. Frontispiece, x. C.P. 271.

Agrostophyllum, Bl. Lindl. Gen. and Sp. elxiii.

1. *A. PLANICAULE*, R. fil. in Walp. Ann. vi. p. 909. APPENDICULA HASSELTII of Wight's Icones, t. 1748, iii. Lindl. Gen. and Sp. p. 230. See *A. JAVANICUM*. Bl. Tabellen 53. C.P. 103.

Spathoglottis, Bl. Lindl. Gen. and Sp. Orch. lix.

1. *S. PUBESCENS*, Lindl. Wall. Cat. 3744. Gen. and Sp. p. 120. Wight's Icon. 1739. (*PACHYSTOMA WIGHTII*, R. fil. Walp. Ann. vi. p. 464.) C.P. 153.
2. *S. LOBBII*, R. fil. Walp. Ann. vi. 455. Gard. Chron. 1856, p. 534. C.P. 368.
3. *S. HARDINGIANA*, Par. and R. fil. Otia Bot. Hamb. Fasc. i. p. 45. C.P. 352.

Calanthe, R. Br. Lindl. Gen. and Sp. Orch. clxiv.

1. *C. VESTITA*, Wall. Cat. 7345. Lindl. Gen. and Sp. p. 250. Paxt. Fl. Gard. v. i. p. 106, t. 72. Bot. Mag. 4671. C.P. 20.
2. *C. BILOBA*, Lindl. Fol. Orch. (var. *OBTRUSATA*, Par. and R. fil. Linn. Soc. Trans. vol. xxx. p. 144). C.P. 254.
3. *C. VIRIDIFUSCA*, Bot. Mag. 4669 (vide sub *ERIA ANIA*, *suprà*). C.P. 73 and 244.

Limatodes, Bl. Lindl. Gen. and Sp. Orch. clxvi.

1. *L. ROSEA*, Lindl. in Paxt. Fl. Gard. t. 81. Bot. Mag. t. 5312. C.P. 11.

Arundina, Bl. Lindl. Gen. and Sp. Orch. lxii.

1. *A. BAMBUSIFOLIA*, Lindl. Wall. Cat. 3751. Gen. and Sp. p. 123. Wight's Icon. t. 1661. (*CYMBIDIUM BAMBUSIFOLIUM*, Roxb. Fl. Ind. iii. p. 460.) C.P. 362.

Phaius, Lour. Lindl. Gen. and Sp. Orch. lxiii.

1. *P. BLUMEI*, Lindl. Gen. and Sp. p. 127. C.P. 371.

Thunia, R. fil.

1. *T. XANTHOPHLEBIA*, Par. and R. fil. (*T. PULCHRA*, R. fil. in Flora, 1872, p. 276.) C.P. 5.
2. *T. BENSONLE*, Hook. fil. Bot. Mag. 5694. C.P. 199.
3. *T. ALBA* (*PHAIUS ALBUS*). Lindl. Gen. and Sp. p. 128. Wall. Pl. As. rar. vol. ii. t. 198. C.P. 378.

Tribe III. *VANDEÆ*.

Pollen-masses with a caudicula, united to a deciduous stigmatic gland.

Monomeria, Lindl. Gen. and Sp. Orch. xxxvii.

1. *M. CRABRO*, Par. and R. fil. in Linn. Soc. Trans. vol. xxx. p. 143, tab. 28. (*Compare* Lindl. Sert. Orch. Frontispiece and Gen. and Sp. p. 61. *MONOMERIA BARBATA*.) C.P. 312.

Eulophia, R. Br. Lindl. Gen. and Sp. Orch. cx.

1. *E. BRACTEOSA*, Wall. Cat. 7366. Lindl. Gen. and Sp. p. 180. (Journ. Linn. Soc. iii. p. 23, *E. GRANDIFLORA*.) C.P. 157.

2. *E. PROMENSIS*, Wall. Cat. 7365. Lindl. Gen. and Sp. p. 181. C.P. 242.
3. *E. GRAMINEA*, Wall. Cat. 7372. Lindl. Gen. and Sp. p. 182. C.P. Nos. 205 and 295.
4. *E. ANDAMANENSIS*, R. fil. in Flora, 1872, p. 276. C.P. 94.

Cyrtopera, Lindl. Gen. and Sp. Orch. cxv.

1. *C. MACROBULBON*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 144. C.P. 37.
2. *C. SQUALIDA*, R. fil. in Bonpl. Feb. 15, 1857. Otia Bot. Hamb. 1878, p. 44. (*EULOPHIA SQUALIDA*, Lindl. Bot. Reg. 1844, Misc. 161.) C.P. 347.

Geodorum, Jackson. Lindl. Gen. and Sp. Orch. cii.

1. *G. CANDIDUM*, Lindl. Fol. Orch. No. 8. Gen. and Sp. p. 176. (*G. PALLIDUM*, Don) C.P. 111.
2. *G. CITRINUM*, Lindl. Bot. Reg. 626. Gen. and Sp. p. 176. Jackson in Bot. Rep. t. 626. Bot. Mag. 2495. C.P. 275.
3. *G. CITRINUM*, var. *ALBIDOPURPUREUM*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 145. (*G. DILATATUM*, R. Br. Lindl. Bot. Reg. t. 675. Gen. and Sp. p. 175. *LIMODOLUM RECURVUM*, Roxb.) C.P. 180.

Cymbidium, Sw. Lindl. Gen. and Sp. Orch. cxvii.

1. *C. ALBOFOLIUM*, Sw. Willd. iv. 401. Lindl. Gen. and Sp. p. 165. Wight's Icon. 1687. Bot. Mag. t. 387. Roxb. Fl. Ind. iii. 6, 458. C.P. 12.
2. *C. LOWIANUM*, R. fil. in Gard. Chronicle. C.P. 361.
3. *C. TIGRINUM*, Par. Bot. Mag. 5457. C.P. 144.
4. *C. PARISHII*, R. fil. Linn. Soc. Trans. vol. xxx. p. 144. (*CYMBIDIUM EBURNÆUM*, var.? See Bot. Mag. 5126. Bot. Reg. v. 33, t. 67.) C.P. 56.

Thecstete, R. fil.?

1. *T. ALATA*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 144, t. 29. (*T. ZOLLINGERI*, R. fil. in Bonplandiâ, v. 37, 1857. Xenia, ii. t. 147, p. 133. (*CYMBIDIUM ALATUM*, Roxb. iii. p. 459.) C.P. 47.

Bromheadia, Lindley, Wight's Icon. vol. v. p. 18.

1. *B. APOROIDES*, Par. and R. fil. Otia Bot. Hamb. 1878. Fasc. i. p. 41. C.P. 346.

Luisia, Gaudichaud?

1. *L. BRACHYSTACHYS*, Lindl. *L. FLAVEOLA*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 144. C.P. 43.
2. *L. PLATYGLOSSA*, R. fil. Linn. Soc. Trans. xxx. p. 144. Walp Ann. vi. p. 622. (*CYMBIDIUM TRISTE*, Wight's Icon. 911 1689. Bot. Mag. 3648.) C.P. 41.
3. *L. PRIMUMINA*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 144, t. 30 A. C.P. 302.
4. *L. PSYCHE*, R. fil. in Bot. Zeit. 1863, p. 38. Bot. Mag. 5558. C.P. 121.
5. *L. BERMANNICA*, Griff.

Coltonia, Lindl. Wight's Icones, 1755.

1. *C. CHAMPIONI*, Lindl. in Hook. Journ. vii. p. 35. Journ. Linn. Soc. iii. p. 89. Bentham Fl. Hong-kong, p. 357. C.P. 277.

Trichoglottis, Bl. Lindl. Gen. and Sp. Orch. cxxxv.

1. *T. DAWSONIANA*, R. fil. in Gard. Chron. 1872, p. 699. C.P. 163 and 179.

Phalanopsis, Bl. Lindl. Gen. and Sp. Orch. cxxxiv.

1. *P. CORNU-CLAVI*, R. fil. in Gard. Chron. Bot. Mag. 5570. C.P. 54.
2. *P. LOWII*, R. fil. in Bot. Zeit. 1862, p. 244. Bot. Mag. 5345. C.P. 125.
3. *P. PARISHII*, R. fil. in Gard. Chron. 1865, p. 410. Bot. Mag. 5815. Saunders Refugium Bot. t. 85. C.P. 410.
4. *P. WIGHTII*, R. fil. in Bot. Zeit. 1862, p. 244. C.P. 175.

Vanda, R. Br. Lindl. Gen. and Sp. Orch. cxxxvii.

1. *V. (ACAMPE) WIGHTIANA*, Wight's Icon. 1670. C.P. 77.
2. *V. (ACAMPE) LONGIFOLIA*, Wall. Cat. 7322, Lindl. Gen. and Sp. 215. C.P. 78.
3. *V. GIGANTEA*, Wall. Cat. 7326, Lindl. Gen. and Sp. p. 215. Bot. Mag. 5189. C.P. 1.
4. *V. PARISHII*, R. fil. Xenia, ii. p. 138. Gard. Chron. 1870, p. 800. C.P. 178.
5. *V. ROXBURGHII*, var. *UNICOLOR*, Bot. Mag. 3416. C.P. 177.
6. *V. BENSONI*, Veitch, R. fil. in Gard. Chron. 1867, p. 180. Bot. Mag. 5611. C.P. 204.
7. *V. DENISONIANA*, R. fil. in Gard. Chron. 1868, p. 528. Bot. Mag. 5811. C.P. 294.
8. *V. CERULESCENS*, Griff. Not. p. 352. Icon. 331. Lindl. Fol. Orch. Vand. p. 9. Walp. Ann. vol. vi. p. 868. Gard. Chron. 1870, p. 529. Fig. 97. Bot. Mag. 5834. C.P. 335.
9. *V. CERULESCENS*, var. *BOXALII*, R. fil. in Gard. Chron. 1877, p. 749. C.P. 372.
10. *V. PARVIFLORA (AERIDES WIGHTIANUM, infra)*, Lindl. Bot. Reg. 1844. Misc. p. 57. *Vide* Bot. Mag. 5138. Wight's Icon. 1669. *V. TESTACEA*, R. fil. Gard. Chron. C.P. 22 and 162.
11. *V. TERES*, Wall. Cat. 7324. Lindl. Gen. and Sp. p. 217. Bot. Mag. 4114. Bot. Reg. 1809. (*DENDROBIUM TERES*, Roxb. iii. p. 485.) C.P. 9.

Grammatophyllum, Bl. Lindl. Gen. and Sp. Orch. C.

1. *G. SPECIOSUM*, Bl. Bijdr. p. 377. Lindl. Gen. and Sp. p. 176. Blume, Rumphia, v. 4, p. 47, t. 191. Paxton, Fl. Gard. t. 69. Bot. Mag. t. 5157. C.P. 168.

Rouanthera, Lour. Lindl. Gen. and Sp. Orch. cxxxviii.

1. *R. COCCINEA*, Loureiro, Flor. Cochinch. ii. p. 637. Bot. Mag. 2997-8. C.P. 167.
2. *R. BILINGUIS*, R. fil. Xenia, i. p. 7, t. 4. C.P. 201.

Ecceoclades, Lindl. in Bot. Reg. fol. 1522, Gen. and Sp. clvi.

1. *EC. FLEXUOSA*, Lindl. Gen. and Sp. p. 236, "ad ripas fluminis Attaran," Wallich. C.P. 261.

Aerides, Lour. Lindl. Gen. and Sp. clvii.

1. *A. VIRENS (ODORATUM, var.)*, Lour. Bot. Reg. 1843, Misc. 48. *Vide* Bot. Mag. 4139. C.P. 2.
2. *A. LOBBI*, Hort. L'illustration Horticole. Gaud. 1868, pl. 559. C.P. 25.
3. *A. AFFINE*, var. *ROSEUM*, Wall. Cat. 7316. Sert. Orchid. t. 15. Bot. Mag. 4059. Lindl. Gen. and Sp. p. 41. (*A. ROSEUM*, Loddiges, Paxt. Fl. Gard. t. 60). Warner's Select Orchids, 21. C.P. 63.
4. *A. CRASSIFOLIUM*, Par. and R. fil. Linn Soc. Trans. xxx. p. 145. Gard. Chron. t. 96. C.P. 146.
5. *A. CRISPUM*, Lindl. Gen. and Sp. p. 41. Bot. Reg. 1842, t. 55. Bot. Mag. 4127. (*A. BROOKER*, Batm.) *SACCOLABIUM SPECIOSUM*, Wight's Icon. 1674. C.P. 183.
6. *A. DIFFORME*, Wall. Lindl. Gen. and Sp. p. 242. Sert. Orch. Frontispiece. C.P. 184.
7. *A. WIGHTIANUM*=*VANDA PARVIFLORA, supra*. C.P. 22 and 162.

Saccolabium, Bl. Lindl. Gen. and Sp. Orch. cxliv.

1. *S. GIGANTEUM*, Wall. Cat. 7306. Lindl. Gen. and Sp. p. 221. Bot. Mag. 5635. C.P. 83.
2. *S. BLUMEI*, Sert. Orch. t. 47. Bot. Reg. 1841. Misc. 115. L'illustr. Hort. 1868, pl. 545. C.P. 3.
3. *S. CURVIFOLIUM*, Lindl. Gen. and Sp. p. 222. (*S. MINIATUM*, Lindl. Bot. Reg. 1847, t. 26, 1848, t. 58.) L'illustr. Horticole, 1866, pl. 493. C.P. 4.
4. *S. AMPULLACEUM*, Lindl. Bot. Mag. 5595. *S. RUBRUM*, Lindl. Gen. and Sp.

- p. 222. Wall. Cat. 7310. *AERIDES AMPULLACEUM*, Roxb. Fl. Ind. iii. p. 476. Sert. Orch. t. 17. C.P. 50.
5. *S. FRAGRANS*, Par. and R. fil. Otia Bot. Hamb. Fasc. i. 1878, p. 41. C.P. 349.
 6. *S. MICRANTHUM*, Wall. Cat. 7300. Lindl. Gen. and Sp. p. 220. Saund. Ref. Bot. t. 110. C.P. 45.
 7. *S. PAPPILLOSUM*, Lindl. Bot. Reg. t. 1552. Gen. and Sp. p. 222. Wight's Icon. 1672. (*CYMBIDIUM PRÆMOISUM*, Roxb. iii. p. 465.) Very like an *ACAMPE!* C.P. 258.
 8. *S. RAMOSUM*, Lindl. Gen. and Sp. p. 224. Wall. Icon. t. 654. C.P. 29.
 9. *S. CALCEOLARE*, Wall. Cat. 7302. Lindl. Gen. and Sp. p. 223. Griff. Not. 356, t. 334. Paxt. Mag. vi. 97. Journ. Linn. Soc. iii. p. 33. (*VANDA PULCHELLA*, Wight's Icon. 1671.) Sert. Orch. Front. C.P. 95.
 10. *S. DENTICULATUM*, Paxton. Mag. vii. 145. Bot. Mag. 4772. R. fil. Otia Bot. Hamb. Fasc. i. 1878, p. 42. C.P. 95 B.
 11. *S. BIGIBBUM*, R. fil. Bot. Mag. 5767. C.P. 279.
 12. *S. BUCCOSUM*, R. fil. in Gard. Chron. 1871, p. 938. C.P. 268.
 13. *S. BIPUNCTATUM*, Par. and R. fil. in Linn. Soc. Trans. xxx. p. 145. C.P. 280.
 14. *S. GRIFFITHII*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 145, in appearance like a *TMESIPTERIS*. C.P. 334.

Sarcanthus, Lindl. Gen. and Sp. Orch. cliii.

1. *S. TERETIFOLIUM*, Lindl. Gen. and Sp. p. 234. (*AERIDES APPENDICULATUM*, Lindl. Gen. and Sp. p. 242. *A. TERETIFOLIUM?* Bot. Reg. t. 676.) Wall. Cat. 7315. Bot. Mag. 3571. C.P. 28.
2. *S. WILLIAMSONI*, R. fil. in Hamb. Gart. Zeit. 1865, p. 353. Gard. Chron. 1865, p. 674. C.P. 272.
3. *S. FILIFORME*, Lindl. Bot. Reg. 1842. Misc. p. 61. Bot. Mag. 4639. (Wight's Icon. 1684?) C.P. 284.
4. *S. PARISHII*, Hook. fil. Bot. Mag. 5217. C.P. 27.
5. *S. LAXUM*, R. fil. Bot. Zeit. 1866, p. 378. Saund. Ref. Bot. t. 139. C.P. 153.
6. *S. ERINACEUM*, R. fil. Bot. Zeit. 1864, p. 298. C.P. 149.
7. *S. OXYPHYLLUM*, Wall. in Lindl. Bot. Reg. xxvi. Misc. 123. C.P. 86.
8. *S. DENSIFLORUM*, Par. and R. fil. (*SACCOLABIUM DENSIFLORUM*, Lindl. Gen. and Sp. p. 220.) Wall. Cat. 7311. C.P. 194.
9. *S. PANICULATUM*, Lindl. Illust. of Orch. pl. t. 9. Gen. and Sp. p. 233. C.P. 283.
10. *S. INSECTIFER*, R. fil. in Bot. Zeit. 1857, p. 159. C.P. 267.
11. *S. RUTILUS*, Par. MS. C.P. 197.
12. *S. LORIFORME*, Par. MS. C.P. 117.¹

Camarotis, Lindl. Gen. and Sp. Orch. cxli.

1. *C. PURPUREA*, Wall. Cat. 7329. Lindl. Gen. and Sp. p. 219. Sert. Orch. t. 19. C.P. 345.
2. *C. PALLIDA*, (*MICROPERA PALLIDA*, Lindl. Gen. and Sp. p. 219.) C.P. 46.
3. *C. OBTUSA*, Lindl. Bot. Reg. xxx. Misc. 71. C.P. 148.

Cleisostoma, Bl. Lindl. Gen. and Sp. Orch. cxlvi.

1. *C. LANATUM*, Lindl. Journ. Hort. Soc. iv. p. 164. C.P. 48.
2. *C. WENDLANDORUM*, R. fil. in Seem. Bonpl. iii. p. 219. C.P. 93.

Thrixspermum, Lour.

1. *T. LEOPARDINUM*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 145. C.P. 269.
2. *T. TERES*, R. fil. Xenia, ii. p. 121. C.P. 212.
3. *T. LUNIFERUM*, R. fil. in Gard. Chron. 1868, p. 786. C.P. 55.
4. *T. ARACHNITES*, R. fil. Xenia, x. p. 121. C.P. 246.
5. *T. HYSTRIX*, R. fil. Linn. Soc. Trans. xxx. p. 145. (*DENDROCOLLA HYSTRIX*, Bl. Bijdr. p. 291.) Mergui, Griffith n. 1066. C.P. 285.

¹ I am unable to identify these last two *Sarcantha* with Prof. Reichenbach's names. — C.P.

Acriopsis, Bl. Lindl. Gen. and Sp. Orch. lxxv.

1. A. INDICA, Wight's Icon. 1748 (bad). C.P. 76.
2. A. JAVANICA, Reinw. in Flora, 1825, ii. 4. Bl. Bijdr. 376. Griff. Pl. As. 318. C.P. 299.

Thelasis, Bl. Lindl. Gen. and Sp. Orch. clxviii.

1. T. PYGMEA, Lindl. Journ. Linn. Soc. iii. p. 63. (EUPHROBOSIS PYGMEA, Griff. in Calc. Journ. of Nat. Hist. v. 372, t. 26. Wight's Icon. t. 1732. C.P. 108.
2. T. CARINATA, Bl. Bijdr. p. 253. Lindl. Gen. and Sp. p. 253. C.P. 171.

Appendicula, Bl. Lindl. Gen. and Sp. Orch. clxvii.

1. A. CALLOSA, Bl. Lindl. Gen. and Sp. p. 230. R. fil. Otia Bot. Hamb. Fasc. i. p. 45. C.P. 355.
2. A. REDUPLICATA, Par. and R. fil. Otia Bot. Hamb. Fasc. i. p. 145. C.P. 365.

Podochilus, Bl. Lindl. Gen. and Sp. Orch. cliv.

1. P. LUCESCENS, Bl. Bijdr. p. 295, t. 12. Lindl. Gen. and Sp. p. 234. C.P. 159.
2. P. MICROPHYLLUS, Lindl. Wall. Cat. 7335. Gen. and Sp. p. 234. C.P. 247.
3. P. ULTRATUS, Lindl. Wall. Cat. 7336. Gen. and Sp. p. 234. C.P. 222.

II. Pollen-masses, powdery, granular or sectile. Lindl.

Tribe IV. *OPHRYPDEÆ*. Anther terminal, erect.

Acceras, R. Br. Lindl. Gen. and Sp. Orch. clxxiv.

1. A. ANGUSTIFOLIA, Wall. Cat. 7061. Lindl. Gen. and Sp. p. 282. Wight's Icones, tab. 1691. C.P. 250.

Gymnadenia, R. Br. Lindl. Gen. and Sp. Orch. clxxi.

1. G. SESAMOIDES.
2. G. HELFERI, R. fil. in Flora, 1872, p. 276. Otia Bot. Hamb. Fasc. i. 1878, p. 39. C.P. 2.

Platanthera, Rich. Lindl. Gen. and Sp. Orch. clxxvii.

1. P. SUSANNE, Wall. Cat. 7052. P. GIGANTEA.—Bot. Mag. 3374, HABENARIA GIGANTEA.—Lindl. Gen. and Sp. p. 295. Wight's Icon. 920. Bentham in Flora Hong-kong, p. 362. C.P. 122.
2. P. ROBUSTA, Wall. Cat. 7036. Lindl. Gen. and Sp. p. 296, "in regno Burmano, Proem." C.P. 370.

Hemipilia, Lindl. Gen. and Sp. Orch. clxxviii.

1. H. CALOPHYLLA, Par. and R. fil. Otia Bot. Hamburg, 1878, p. 38. C.P. 348.

Peristylus, Bl. Lindl. Gen. and Sp. Orch. clxxix.

1. P. CONSTRICTUS, Lindl. Gen. and Sp. p. 300. Wall. Cat. 7043. C.P. 181.
2. P. GOODENOIDES, Lindl. Gen. and Sp. p. 299. Wall. Cat. 7066. C.P. 169.
3. P. PARISHII, R. fil. Linn. Soc. Trans. xxx. p. 139. C.P. 216.

Habenaria, Willd. Lindl. Gen. and Sp. Orch. clxxxvii.

1. H. STENOSTACHYA, Benth. Fl. Hong-kong, p. 362. (PLATANTHERA, Lindl. in Kew Journ. Bot. vii. 37. CELOGLOSSUM CERNUUM, R. fil. in Bonpland. 1855, 250. C. PERISTYLOIDES, R. fil. in Bonpland. 1856, 321. Wight's Icon. 1702.) C.P. 231.
2. H. PELORIOIDES, Par. and R. fil. Linn. Soc. Trans. xxx. p. 139, tab. 27 a. C.P. 327.
3. H. TIPULIFERA, Par. and R. fil. Linn. Soc. Trans. vol. xxx. p. 139, No. 8. C.P. 232.

4. *H. CHLORANTHA*, Par. and R. fil. Linn. Soc. Trans. xxx. p. 140, No. 9. C.P. 218 and 245.
5. *H. DIGITATA*, Wall. Cat. 7063. Lindl. Gen. and Sp. p. 307. R. fil. Linn. Soc. Trans. vol. xxx. p. 140, No. 10. C.P. 124.
6. *H. SPATULIFOLIA*, Par. and R. fil. Linn. Soc. Trans. vol. xxx. p. 140, No. 11. C.P. 217.
7. *H. VIDUA*, Par. and R. fil. Linn. Soc. Trans. vol. xxx. p. 140, No. 12, tab. 27 B. C.P. 223.
8. *H. CORYMBOSA*, Par. and R. fil. Linn. Soc. Trans. vol. xxx. p. 141, No. 13. C.P. 329.
9. *H. TRICHOSANTHA*, Wall. Cat. 7208, Lindl. Gen. and Sp. p. 324, "*in regno Burmano.*" C.P. 219.
10. *H. GENICULATA*, Wall. Cat. 7542. Lindl. Gen. and Sp. p. 324, "*in regno Burmano.*" C.P. 226.
11. *H. COMMELINIFOLIA*, Wall. Cat. 7037. ORCHIS COMMELINIFOLIA, Roxb. iii. 451. Lindl. Gen. and Sp. p. 325. C.P. 227. "*in regno Burmano.*"
12. *H. ROSTRATA*, Wall. Cat. 7051. Lindl. Gen. and Sp. p. 325, "*in regno Burmano.*" C.P. 228.
13. *H. ACUFERA*, Wall. Cat. 7045. Lindl. Gen. and Sp. p. 325, "*Tavoy.*" C.P. 229.
14. *H. PROMENSIS*, Wall. Cat. 7033. Lindl. Gen. and Sp. p. 320, "*in montibus Pyome.*" C.P. 225.
15. *H. LUCIDA*, Wall. Cat. 7047. Lindl. Gen. and Sp. p. 319, *Rangoon.* C.P. 224.
16. *H. LACERTIFERA*, Bentham, Flora Hong-kong, p. 362. CLEOGLOSSUM LACERTIFERUM, Lindl. Gen. and Sp. p. 302. "*Tavoy,*" Wallich. C.P. 230.

Tribe V. *ARETHUSEÆ*. "Anther terminal, opercular," Lindl.

Galeola, R. fil. (ERYTHROCHIS, Bl.) Lindl. Gen. and Sp. Orch. cclxix.

1. *G. HYDRA*, Xenia, Orch. ii. p. 77. Otia Bot. Hamb. Fasc. i. 1878, p. 40. *G. ALTISSIMA*, R. fil. Linn. Soc. Trans. vol. xxx. p. 125. (ERYTHROCHIS ALTISSIMA, Bl. Lindl. Gen. and Sp. p. 438.) C.P. 70.

Vanilla, Plum. Lindl. Gen. and Sp. Orch. cclxvii.

1. *V. PARISHII*, R. fil. Otia Bot. Hamb. Fasc. i. 1878, p. 39. C.P. 286.

Pogonia, Juss. Lindl. Gen. and Sp. Orch. cccxxii.

1. *P. VELUTINA*, Par. and R. fil. Linn. Soc. Trans. vol. xxx. p. 142. (EPIPACTIS Plicata, Roxb. Fl. Ind. iii. 454. *POGONIA Plicata*, Lindl. Gen. and Sp. p. 415). Compare *P. DISCOLOR*, Bl. Flora Javæ, tom. 4, p. 128, tab. 53. C.P. 182.
2. *P. FLABELLIFORMIS*, Wall. Cat. 7400. Lindl. Gen. and Sp. p. 415. C.P. 164.
3. *P. MACULATA*, Par. and R. fil. Linn. Soc. Trans. vol. xxx. p. 143. C.P. 165.
4. *P. CUPREA*, Par. MS. (EPIPACTIS JULIANA, Roxb. iii. 453? *POGONIA JULIANA*, Lindl. Gen. and Sp. p. 414.) C.P. 166.
5. *P. PULCHELLA*, Par. MS. C.P. 322.

Tribe VI. *NEOTTEÆ*. "Anther dorsal," Lindley.

Cnemidia, Lindl. Gen. and Sp. Orch. cclxvi.

1. *C. SEMILIBERA*, Lindl. Gen. and Sp. p. 463. C.P. 239.

Monochilus, Lindl. Gen. and Sp. Orch. cclxxiv.

1. *M. FLAVUM*, Wall. Cat. 7380 (*EEFERIA FLAVA*). Lindl. Gen. and Sp. p. 487. C.P. 326.
2. *M. AFFINE*, Wall. Cat. 7383 (*EEFERIA AFFINIS*), Lindl. Gen. and Sp. p. 487. Wight's Icones, tab. 1728. C.P. 241.

Cheirostylis, Bl. Lindl. Gen. and Sp. Orch. cclxxv.

1. *C. FLABELLATA*, Wight's Icon. 1727. (*ZEPHINE MONILIFORMIS*, Griff. Not. iii. 397, t. 350. C.P. 311.

2. *C. MALLEIFERA*, Par. and R. fil. Linn. Soc. Trans. vol. xxx. p. 141. C.P. 248.
3. *C. PUBESCENS*, Par. and R. fil. Linn. Soc. Trans. vol. xxx. p. 141. C.P. 154.
4. *C. GRIFFITHII*, Lindl. Journ. Linn. Soc. i. p. 188. (GOODYERA, No. 9.) Griff. Not. iii. 393. C.P. 236.

Hemaria, Lindl. Gen. and Sp. Orch. cclxxvii.

1. *H. DISCOLOR*, Lindl. Gen. and Sp. p. 490. Ker. in Bot. Reg. fol. 271. R. fil. Linn. Soc. Trans. vol. xxx. p. 142. Var. *DAWSONIANA*, Benth. Fl. Hong-kong, p. 361. C.P. 324.

Etaria, Bl. Lindl. Gen. and Sp. Orch. cclxxxix.

1. *E. MOULMEINSIS*, Par. and R. fil. Linn. Soc. Trans. vol. xxx. p. 142. C.P. 237.
2. *E. MOLLIS*, Lindl. Journ. Linn. Soc. vol. i. p. 184, "*Burma, Griffith.*" C.P. 238.

Georchis, Lindl. Gen. and Sp. Orch. cclxxxvii.

1. *G. FOLIOSA*, Lindl. Gen. and Sp. p. 496. (GOODYERA, Griff. Icon. t. 346, i. "*in regno Burmano.*") C.P. 240.

Tropidia, Lindl. Gen. and Sp. Orch. cclxxxiv.

1. *T. CURCULIGOIDES*, Wall. Cat. 7386. Lindl. Gen. and Sp. p. 497, "*ad ripas fluminis Attaran,*" Wallich. Benth. Fl. Hong-kong, p. 359. C.P. 338.

Anactochilus, Bl. Lindl. Gen. and Sp. Orch. cclxxxvi.

1. *A. ALBOLINEATUS*, Par. and R. fil. Linn. Soc. Trans. vol. xxx. p. 141. C.P. 325.
2. *A. SETACEUS*, Bl. Bot. Reg. t. 2010. Lindl. Gen. and Sp. p. 499. Bot. Mag. t. 5208. C.P. 379.
3. *A. DAWSONIANUS*. C.P. 172.

B. Anthers 2.

Tribe VII. *CYPRIPEDÆÆ*.

Cypripedium, L. Lindl. Gen. and Sp. Orch. cxcix.

1. *C. CONCOLOR*, Par. in Gard. Chron. 1865, p. 626. Bot. Mag. 5513. L'illustration Horticole, 1865, tab. 444 (very good). C.P. 57.
2. *C. PARISHII*, R. fil. in Gard. Chron. 1869, pp. 814 and 1858. Bot. Mag. 5791. C.P. 198.
3. *C. VILLOSUM*, Lindl. in Gard. Chron. 1854, p. 135. C.P. 92.

CATALOGUE OF ORCHIDS

GATHERED IN THE ANDAMAN ISLANDS, BY S. KURZ.

1. *MICROSTYLIS TRILOBULATA*, KURZ.
2. *LIPARIS*, Sp. ?
3. *BULBOPHYLLUM ANDERSONII*, KURZ.
4. *BULBOPHYLLUM* (near to *B. TRISETORUM*, Griff. and *OXYSEPALA ORALIFOLIA*, Wight).
5. *DENDROBIUM CRUMENATUM*, SW.
6. *DENDROBIUM*, Sp. 2 = *OXYSTOPHYLLUM*, No. 5065 and 5066, Herb. Helfer.
7. *DENDROBIUM*, Sp. 3. (*APORUM*, near to *SERRA*.)
8. *ERIA KURZII*, T. ANDERSON.
9. *ERIA ELONGATA*? LINDL.
10. *PHOLIDOTA IMBRICATA*, SM.
11. *PHAJUS*? Sp.
12. *LUSIA*? Sp.
13. *VANDA*, No. 1. Flowers white, on Mt. Harriet.

14. VANDA, No. 2. Flowers rose-coloured. Common.
15. VANDA, No. 3?
16. VANDA TERES, Lindl.
17. TENIOPHYLLUM NORMALE, Kütz.
18. CLEISOSTOMA, Sp.? (as C. GALEATA, Thwaites?).
19. APPENDICULA, Sp.? (or AGROSTOPHYLLUM?).
20. CYMBIDIUM ALOIFOLIUM, Sw.
21. ACRIOPSIS, Sp.?
22. PERISTYLUS, Sp.?
23. VANILLA, Sp.?
24. ETERIA, Sp.?
25. TROPIDIA CURCULIGOIDES, Lindl.

* * * Albumen floury. Embryo distinct.

ANOMALES.

Flowers usually hermaphrodite and very irregular (except in *Bromeliaceæ*). *Perianth* of 5 or 6 segments. *Stamens* 6, with 1 or 5 anthers, the rest petaloid. (In *Bromeliaceæ* all bear anthers.) *Ovary* usually 3-celled. *Fruit* a berry or capsule.

Order BROMELIACEÆ.

Flowers hermaphrodite, regular or nearly so. *Perianth* sex-merous, bi-seriate, the exterior calycoid, the inner petaloid. *Stamens* 6. *Ovary* 3-celled. *Fruit* a berry indehiscent, or a 3-valved capsule. Generally stemless herbaceous plants, with perennial stock and fibrous roots and mostly epiphytic.

ANANASSA.

*A. SATIVA, Schult.

Cultivated all over Burma and the Nicobars.

Na-nat. Pine-apple.

The *Bromeliaceæ* are all American plants. The pine-apple is the most important, and when fine is the most delightful fruit of the tropics, being juicy, wholesome, and fragrant. The leaves yield a beautiful fibre, which in countries like Burma, where the pine-apple flourishes like a weed about villages, should become of commercial importance; and a cheap and simple way of extracting and preparing the fibre seems all that is necessary to insure its becoming so.

Order MUSACEÆ.

Flowers hermaphrodite or unisexual, irregular. *Perianth* superior, corolla-like, sexpartite in 2 distinct rows, the outer perianth triphyllous, the inner 3 segments developed, or the 2 perianths united into 2 lip-like segments. *Stamens* 6, adnate to the base of the perianth, or free, or often the postichous stamen aborted. *Anthers* linear, 2-celled, turned inwards. *Ovary* inferior, 3-celled, with many, or rarely a solitary ovule in each cell. *Style* simple; *stigma* usually trilobed. *Fruit* either a 3-celled woody capsule, opening loculicidally, or succulent and indehiscent or irregularly bursting. *Seeds* usually imbedded in pulp, or rarely with a hair-like arillus, the testa usually crustaceous. *Albumen* mealy. *Embryo* straight, oblong-linear, or mushroom-shaped.

A small order of great economical importance. It contains only a single woody tree, the rest being either low or tree-like tall herbs. The plantains and banana are well known as nutritive fruits, and many, if not all, of the species of *Musa* yield more or less valuable fibre, amongst which the Manilla-hemp (*Musa textilis*) is best known in commerce. The juice of most plantains may be used for blackening leather.

RAVENALA, *Sonnerat*.

* R. MADAGASCARIENSIS, Sonn.

Occasionally cultivated by Europeans.

The traveller's tree.

An evergreen palm-like tree, all parts glabrous; the trunk annulate. *Leaves* distichous and crowded at the apex of the trunk. *Flowers* large, whitish, sessile, $\frac{1}{2}$ -whorled at the base of the bract. *Capsules* 2 or 3-cornered, and 2 or 3 inches long, tardily dehiscing into 3 woody valves. *Seeds* numerous, covered with a beautiful azure, fibrous arillus. *Albumen* almost bony.

MUSA, *Linnaeus*.

* M. SAPIENTUM, L.

Cultivated throughout Burma and in Kamorta.

M. paradisiaca.

M. SIMIARUM, Rumph.

Kurz is uncertain if the wild plantains of Kamorta belonged to this species or not, as they were out of flower.

M. RUBRA, Wall.

Pegu. Martaban.

M. COCCINEA, Roxb. vol. i. p. 625. (P.)

M. SUPERBA, Roxb. vol. i. p. 667. (P.)

M. GLAUCA, Roxb. vol. i. p. 669. (P.)

Pegu.

Under the head of *M. paradisiaca*, Dr. Mason makes the following remarks: "The plantain or banana, though a far less palatable fruit, holds the same place in this country that the apple does in England and the United States. It is used as a vegetable as well as an article for dessert, the great proportion being eaten with rice and meat in the place of potatoes.

"Like the mango, the tree is indigenous, but the wild fruit is too full of seeds to be eatable. The plantain and banana, which were formerly regarded as distinct, are now considered by botanists as one species, but it embraces many varieties. I have the Burmese names of 25 before me. 'The numerous varieties,' writes Voight, 'we have in vain tried to put in some order. The attempt made for this purpose in Schultens appears to us to have only increased the confusion.'

"The *Manilla hemp*, from which a fabric of the finest texture is prepared, is made from the leaves of a species of plantain-tree, *M. textilis*. Another distinct species of this genus grows wild in our jungles and is rather an ornamental plant, which is all that it has to recommend it. Unlike the common plantain, it never throws up shoots from its roots. The name of the plantain in Pali is *Mauza*, which is its Arabic name *Mauz* with a final vowel added to pronounce the last consonant, no words in Pali ending in any consonant excepting *u*. Now if its Arabic name be so widely diffused, it seems quite certain, that had the plant been known to the Hebrews, the Hebrew being cognate with Arabic, it would have had a similar name. This fact is a sufficient refutation of the conjectural interpretations of certain passages of Scripture that we meet with from time to time. Thus, Loudolf's conjecture that *dudaim* (Mandrakes) were the fruit of *Musa paradisiaca* (plantain-tree), which has been recently revived in a modern work, cannot stand, on account of its name. For the same reason the conjecture that the grapes which the spies brought from Canaan were plantains cannot be sustained. The plantain seems a favourite plant to build fancies upon. Gesenius, in defining *tecnah*, the fig-tree, refers to Gen. iii. 7, 'where,' he says, 'the *Ficus indica*, or *Musa paradisiaca*, plantain-tree (Engl.), with very large leaves, seems to be meant.' This is perfectly conjectural, and is wholly unsustained by the usage of the word, as well as that it bears no resemblance to its Arabic name."

It is commonly supposed that the *Mandrake* of the above passage is the *Atropa mandragora* (see Kitto's Cyclopaedia); but according to S. J. Hooker (Maout and Decaisne's Botany, Trans. p. 580), the *Mandragora* has somewhat analogous properties to *Belladonna*, and was formerly used by sorcerers to produce delusions in their dupes. The *Dudaim* or '*Mandrake*' of Scripture was, however, used as a simple 'philtre,' just as over the entire East, the '*Salep*' is so esteemed, and there is no valid reason why some species of *Orchis*, or root having similar reputed virtue, may not

rather be the true Love-apples intended. Dudaim are but twice mentioned in Scripture (Gen. xxx. 14, 18, and in Solomon's Song, vii. 13), in both instances in connexion with scenes of love, or in other words as 'philtres' or provocatives of the passion; but for a fuller exposition of this subject reference may be made to Inman's work,¹ under the heading 'Mandrakes,' and La Mythologie des Plantes,² vol. ii. p. 213.

Order ZINZIBERACEÆ.

Flowers hermaphrodite, irregular. *Peduncle* superior, double; outer herbaceous, triphyllous; inner petaloid, irregular, composed of petals and staminodes. *Stamen* solitary, anterior. *Anther* 2-celled. *Ovary* inferior, usually 3-celled. *Ovules* anatropous. *Fruit* usually a capsule. *Seeds* with 2 albumens, a farinaceous and a horny. *Embryo* with the cotyledonary end sheathed by the vitellus, the radicular free and touching the hilum. Herbs with creeping or tuberous rhizome.

COSTUS, Linnaeus.

C. ARGYROPHYLLUS, Wall. (M.).

Pa-lang-toung-weh.
Thu-leh-lpe-dō (Sgau).

C. SPECIOSUS, Sm. (M.).

This is not the 'costum' of the ancients, which is still largely used in China in precisely the same way as it was in Rome for burning as incense.

"Costum molle date et blandi mihi thuris honores

Terque focum circa lanæus orbis cat."—*Propertius*, Lib. iv. 6, 5.

The root of *C. speciosus* is void of scent, and the plant above alluded to has been ascertained by Falconer to be the root of *Aucklandia costus*, Falconer, one of the *Compositæ*, which grows on the Himalaya between 7500 and 9000. Its name in Kashmir is 'Kooth,' and it is there used to scent shawls and protect them from the moth. The roots are dug up in September and simply dried, after being cut up in lengths of 6 inches. In Kashmir it costs about 1 rupee 3 annas a hundredweight, but at Jagadri, on the Jumna, the price averages 10 rupees, and nearly double in the Chinese ports, where it ultimately finds its way. In the markets of Calcutta and Bombay it is called Putchuk. See Balfour's *Cyclopædia of India*.

MONOLOPHUS, Wallich.

M. ELEGANS, Wall. (M.).

Kwōn-ka-dō.

CURCUMA, Linnaeus.

**C. LONGA*, Roxb.

Hsā-uwēn.

Common turmeric.

C. ROSCOEANA, Wall.

Hmān-then.

C. ERUGINOSA, Roxb.

C. ATTENUATA, Wall.

C. COMOSA, Roxb.

C. ELATA, Roxb.

C. ORNATA, Wall.

C. CORDATA, Wall.

C. PARVIFLORA, Wall.

C. PETIOLATA, Roxb.

C. PPLICATA, Wall.

C. STROBILINA, Wall.

¹ Ancient Faiths embodied in Ancient Names, by Thomas Inman, M.D. London, 1868.

² La Mythologie des Plantes ou les Legends du Règne vegetal, par Angelo de Gubernatis, Paris, 1882.

To the above species given by Mason may be added—

- C. ZEDOARIA, Roxb. Bengal. Chittagong. China.
C. aromatica, Salis.
 C. RUBESCENS, Roxb. Bengal. Pegu.

The genus *Curcuma* is a very important one, as yielding turmeric and arrowroot.

Turmeric is the root of *C. longa*, and some other species yield a similar but distinguishable condiment. The principal use of turmeric is as an ingredient of curries, as it assists digestion by its stimulant and carminative properties, care being taken to cook it thoroughly, whereby its peculiar odour is entirely dissipated. It is also universally applied externally with the belief in its curative powers in fever and other complaints, and though not used in European medicine, a decoction applied cold on a piece of linen to the eye is said by Waring¹ to give great relief to the burning sensation in ophthalmia. It is also used by dyers, and in various religious ceremonies among the Hindus. Paper coloured yellow by an alcoholic tincture of turmeric is a highly sensitive test of the alkalinity of any solution, an alkaline solution turning the yellow to red or brown. Various species of *Curcuma* yield arrowroot, collectively known as East Indian arrowroot, which, though inferior to the best West Indian, is, when well prepared, an excellent article, both as a food and for any purpose for which a pure starch is required. The species mostly used are *C. caulina*, *C. angustifolia*, *C. rubescens*, and *C. leucorhiza*, but the roots of many species of this order yield starch in profitable quantity.

KEMPFERIA, *Linnaeus*.

K. GALANGA, L. (M.).

Kha-noung.

So named by Linnæus, from its being supposed by him to yield the 'Galangal' root of commerce, a brown tuberous root with a faint aromatic smell, and pungent taste something between pepper and ginger. 'Galangal' root would, however, seem to be produced by several species of Zinziberaceous plants of the genus *Kempferia* and *Alpinia*.

*K. RÖTUNDA (M.).

Mye-ban-touk.

Cultivated, according to Mason, for its sweet scented flavour.

K. MARGINATA, Carey (M.).

K. CANDIDA, Wall. (M.).

Pan-n-hpyu (M.). Padat-zā (Th.).

K. ROSCOEANA, Wall. (M.).

K. PARVIFLORA (M.).

Ka-mung-ni.

Ka-mung-net.

K. ELEGANS, Wall.

K. PARISHII, Hook. fil. Bot. Mag. tab. 5763. (P.).

Mason gives as vernacular names for other species of *Kempferia*, Ka-mung-taing-byā. Ka-mung-kyet-lā. Kyo-ka-mung.

K. candida or an allied species is one of the most conspicuous harbingers of the hot season, thrusting up its crocus-like flowers from the parched earth as the hot weather begins to make itself felt. It is called padāt-za, from constituting the favourite food of the *Padāt* (*Liolepis guttatus*). It is also cooked and eaten.

AMOMUM, *Linnaeus*.

A. CARDAMOMUM, L.

Men or Ben.

¹ Manual of Therapeutics, E. J. Waring.

A. CORYMBOSTACHYUM, Wall. (M.).

Gung-men.

A. XANTHOIDES, Wall.

A. (DYMCEWICZKIA) FLUZZII, Kz. Kamorta (K.).

ELETTARIA, *Rheede*.

E. CARDAMOMUM, White (M.).

Ba-la or Pa-la.

ALPINIA, *Linnaeus*.

Ouler perianth tubular or campanulate, stiff, 3-toothed, and often splitting to the base. *Inner perianth* petal-like, united at the base, with the stamens in a tube, the limb of 3, usually unequal lobes. *Staminal whorl* consisting of 1 large petal-like labellum, opposite to a single fertile stamen, and in some species a small linear lobe on each side between the labellum and the stamen. *Filament* not dilated. *Anther* 2-celled. *Style* filiform, with a concave terminal stigma. *Ovary* 3-celled, with many ovules. *Fruit* globular, scarcely succulent, but not opening in valves. *Seeds* few, arillate. Erect herbs with a tuberous rhizome.

A. ALLUGHAS, Roscoe (M.).

A. BRACTEATA, Roxb. (M.)

A. NUTANS, Roscoe (M.). India. Ceylon. S. China.

Pa-gan-theing or Pa-gau-gyi.

A. PHENICEA, Kamphœvener. Nicobars (K.).

A. MALACCENSIS, Roscoe. Roxb. vol. i. p. 64. (P.).

Cardamoms are the product of several species of *Amomum*, *Elettaria*, *Renealmia*, and *Alpinia*, whereof the finest are produced by *E. cardamomum*, a native of Travankor and Canara, but included by Mason among the plants of Burma. Cardamom seeds are aromatic and stimulant, and highly prized in native cookery, and for chewing with 'pān,' and are also largely exported to Europe as spice.

ZINZIBER, *Gaertner*.

* Z. OFFICINALE, Roscoe (M.).

Khyen-seing.

Z. ZERUMBET, Roscoe (M.).

Z. PARDOCHILLUM, Wall. (M.).

Z. SQUARROSUM, Roxb. (M.).

Z. PANDURATUM, Roxb. (M.).

Z. BARBATUM, Wall. (M.).

Mi-tha-len.

The following vernacular names are also given by Mason for different species of *Zinziber*:—Kan-cik. Khung-htai-wen. Sa-kwā.

DISCHEMA, *Wight*.

D. GLAUCUM, Voigt. (M.).

HEDYCHIUM, *Kawig*.

* H. CORONARIUM, Koch. (M.).

Lan-theh or Thit-khet-lan-theh.

Of this species Mason writes: "The garland flower, a species of *Hedychium*, but regarded by Europeans as a lily, is much cultivated, both by natives and foreigners. The yellow and white varieties are both common. Mason also describes two other species, one "a very fragrant species with long narrow petals and an epiphytic habit, often seen in Tavoy, and another, with a "sulphur-coloured flower," found on the Bghai mountains.

H. BARBATUM, Wall. (M.).

GASTROCHILUS, *Wallich.*

G. PULCHERRIMUS, Wall.
G. LONGIFLORUS, Wall.

HEMIORECHIS,¹ *Kurz.*

Flowers spicate, sessile. *Calyx* tubular, trifold. *Perianth tube* filiform, shorter than the calyx. *Ovary* 1-celled, placentas 3, parietal. *Style* filiform. *Stigma* slightly thickened, obliquely truncate. *Capsule* 1-celled, subplicate 10-furrowed, 3-valved. *Seeds* conical, basally albo-arillate. Perennial herbs with the habit and essential character of *Gastrochilus*.

II. BURMANICA, Kz.

Pegu and Tenasserim.

MONOLOPHUS, *Wallich.*

M. ELEGANS, Wall.
Kwōn-ka-do.

GLOBBA, *Linnaeus.*

G. MARANTINA, L.
G. CAREYANA, Roxb.
Pa-dcing-ngō.

G. SCHOMBURGKII, Hook. fil. Bot. Mag. tab. 6298. (P.).

Dr. Mason writes: "On shady banks, where violets grow in England, the pretty orange-flowered *globba* is common. The long curved filament, ornamented with a large orange-coloured 2-lobed lip, or apron, attracts the attention of most observers. The Burmese call it "the weeping crinum."

G. EXPANSA, Wall.
G. BRACTEOLATA, Wall.

The root and seeds of *Zinziberaceæ* contain various volatile oils, an aromatic resin, a bitter principle, a variable amount of starch and sometimes a yellow colouring matter (*curcuminæ*), hence some species are cultivated for their stimulating and carminative properties and agreeable flavour, as those yielding ginger, turmeric, and cardamoms, whilst an excellent arrowroot is obtained from the tuberous rhizome of other species, in some cases possessing, however, a yellowish tint. 'Grains of Paradise' are the seed of an African species of *Anomum*, and are chiefly used for purposes of adulteration.

Order CANNACEÆ.

Flowers hermaphrodite, irregular. *Perianth* sex-partite, 3 outer segments herbaceous, regular; inner segments petaloid, irregular. *Stamen* 1, lateral. *Anther* 1-celled.

PHRYNIUM, *Willdenow.*

P. MACROSTACHYUM, Wall. (M.).

Wa-thaing.

Mason also gives as names for species of *Phrynum* Myen-wā and Yung.

MARANTA, *Linnaeus.*

M. (PHRYNIUM) SPICATA, Roxb. (M.).

*M. ARUNDINACEA, L.

Burma. Andaman.

Pen-bwā.

M. DICHOTOMA, Wall.

Katchall. Kamorta and Nankowry.

M. grandis, Miq.

Then.

The stems of this plant Mason says are split and made into mats.

¹ Characters abbreviated from Latin description, J.A.S.B. 1873, p. 108.

Mason observes, "The true arrowroot plant (*M. arundinacea*) was introduced several years ago by Mr. O. Riley, and is beginning to be largely cultivated. The arrowroot made is not inferior to any imported, while it is sold at half the price at a good profit. A gentleman at Tavoy has sold a considerable quantity for exportation this year, and has orders for more than a thousand pounds of the next crop."

The name 'arrowroot,' which of course refers to the specific term '*arundinacea*,' was originally applied to the plant from a belief in its efficacy as an antidote to the wounds made by arrows, poisoned with the juice of the *Manchineel*.

CANNA, *Linnaeus*.

Outer perianth of 3 short stiff persistent segments. *Inner perianth* petal-like, united at the base in a tube with the stamens, and deciduous with them; the limb of 3 nearly equal segments. *Staminal whorl* consisting of 4 petal-like segments, 3 barren (often called inner corolla), the fourth bearing a 1-celled anther on one side. *Ovary* 3-celled, with several ovules. *Style* flattened, with a terminal stigma. *Capsule* muriccate, 3-valved. Herbs with erect stems. *Flowers* on a terminal interrupted simple or branched spike.

C. INDICA, L. (M.).

Bud-da-tha-ra-nā.

C. GLAUCA, Ditcher.

Mopoon (Maulmain). (P.).

The seeds of several species of *Canna* can be used as a substitute for coffee, and some yield a blue dye. The plant is much cultivated by the Burmese, who use its seeds for their rosaries. Its addiction to marshy localities was alluded to by Ovid,

"Quam Platanus rivo gaudet, quam Populus unda
Et quam limosa Canna palustris humo,
Tam Venus otia amat."—*Remedium Amoris*, 141.

The *Cannaceæ* are by some united with the *Zinziberaceæ* which last, however, differ in their 2-celled anther and the presence of aromatic principles, which the former want.

*** *Albumen none. Embryo distinct.*

HYDRALES.

Flowers usually dichinous, regular. *Perianth* 6-partite. Three outer segments herbaceous, 3 inner petaloid or none. *Stamens* 3 or more, epigynous, or inserted on the base of the perianth-segments. *Ovary* 1, 3, or 6-celled. *Fruit*, a berry. Embryo distinct. Exalbuminous. Aquatic herbs.

Order HYDROCHARIDEÆ.

Flowers usually dichinous, inclosed in a membranous spathe. *Perianth* 6-merous, 2-seriate (*calyx* and *corolla*). *Fruit* a berry. *Leaves* usually radical. Aquatic plants.

STRATIOTIDIEÆ.

Stemless, scapigerous. Ovary many-celled. Stigmas 6.

ENHALUS, L. *C. Rich.*

E. ACOROIDES, Steud.

Shallows round the Nicobars, especially opposite the debouchures of rivers.

This plant, observes Kurz, forms submarine meadows, and grows to 4 feet in length. On the coral-reefs of Katchall a small form occurs with leaves never more than 6 inches long.

BOOTTIA, *Bigel.*

B. CORDATA, Wall. (M.).

VALLISNERIEÆ.

Stemless, scapigerous. Ovary 1-celled. Stigmas 3. Leaves all radicle, linear.

BLIXA, *Thouars.*

Flowers usually diœcious, in a long tubular spathe, 2-toothed at the top. *Male flowers* several in the spathe, protruding from it as they expand. *Perianth* of 3 outer herbaceous, and 3 inner petal-like segments. *Stamens* 8 or 9. *Anthers* linear. *Female flowers* solitary in the sheath, with a long filiform perianth-tube, the segments as in the males. *Ovary* linear, with 3 parietal placentas. *Stigmas* 3, entire. *Capsule* linear, with a few seeds.

B. ROXBURGHII, Rich.

Rivulets in Kamorta (K.). India.
Ceylon. S. China.

VALLISNERIA, *Linnaeus.*

This genus is not mentioned by Mason, but no doubt it occurs in Burma. As it grows submerged, a remarkable provision is noticeable with reference to its fertilization. *Vallisneria* is diœcious, but the male plants always grow near the female ones. "The *female flower*, protected by a spathe, is borne on a long peduncle which rises from a tuft of radical leaves, and the *ovary* bears three forked *stigmas*. The *male flowers* are borne on a very short peduncle, and are sessile on a conical axis enveloped in a spathe. At the flowering period the female peduncle gradually lengthens, so that the flower finally floats on the surface of the water, and opens its *perianth* of six very minute segments. Then the *male flowers*, which have hitherto remained submerged, detach themselves spontaneously from their peduncles, and rise to the surface, where numbers of them may be seen floating around the *female flower*, on which the *anthers* elastically project an abundance of pollen. After fertilization, the peduncle of the *female flower* contracts spirally, and the *ovary* descends to the bottom of the water to ripen its seed."¹

ANACHARIDIEÆ.

Canescent. *Leaves* opposite or whorled.

To this tribe belongs the American water weed *Anacharis*, which has proved such a nuisance in some English canals, where it flourishes luxuriantly, having been introduced probably into the English docks in timber.

CLASS IV. DICOTYLEDONS.

STEM WHEN PERENNIAL FURNISHED WITH A PITH, SURROUNDED BY CONCENTRIC LAYERS OF WOOD, AND THE WOOD BY A SEPARABLE BARK. FLORAL WHORLS USUALLY IN FOURS OR FIVES, OR MULTIPLES OF THOSE NUMBERS.

Sub-class GYMNOSPERMS.

Ovules naked. *Ovary* or *stigma* none (save in *Gnetaceæ*). Seeds naked, fertilized by the direct application of the pollen to the apex of the nucleus, which the pollen-tube penetrates. Flowers unisexual (except in *Welwitschia*).

Order CYCADEÆ.

Flowers diœcious, the *males* in large cones consisting of numerous thickened flat, or variously peltate scales bearing the numerous pollen-cells on the under-surface or on both surfaces. *Pollen-cells* dehiscing by a longitudinal slit, sessile or very shortly stalked, often stellately connected by threes or fours, rarely free. *Female flowers* either consisting of a carpellary leaf (spadix), and in this case crowded round the apex of the trunk, or more usually consisting of flat, or thickened, or variously peltate scales forming a large cone. *Ovules* large, sessile, either several inserted along the border of the spadical stalk, or solitary at each side of the scale. *Seeds* more or less ovoid, dry and hard, or the integument thin and coloured outside, and fleshy under the

¹ Maout and Decaisne, p. 156.

epidermis, so as to appear somewhat drupaceous. Endosperm copious, fleshy, or more usually hard and bony. *Embryo* usually solitary by abortion, minute, the radicle continuous with the persistent suspensory thread. *Cotyledons* 2, oblong, the plumule distinct. Small trees with a thick simple or sometimes branched, often scarred trunk, or the trunk very short or altogether subterranean. *Leaves* usually pinnate, rarely simply or doubly pinnatisect, of a very firm texture, and arising from and around the apex of the trunk. *Flower-cones* often peduncled, cylindrical or ovoid, terminal or lateral.

All species abound in a mucilaginous nauseous juice, with which is often mixed a great quantity of starch, which sometimes serves for food to the natives.

Cycas, *Linnaeus*.

Scales of the male cones almost imbricate, more or less euneate, and often produced in an acumen, the under side covered with pollen-cells. *Female spadices* loosely imbricated round the top of the trunk, rather thick, narrowed into a shorter or longer stalk, and more or less dilated above the ovules into an entire or pectinate blade. Ovules 1-5 on each side of the carpellary stalk, distant, alternate or opposite, more or less immersed and almost erect.

* *Fruits densely tomentose.*

C. REVOLUTA.

Coast of Tavoy (P.).

** *Fruits when ripe glabrous.*

‡ *Trunk epigeous, 6-30 feet high. Ovules 2-5 on each side of the frond-stalk.*

C. CIRCINALIS.

Limestone hills of Martaban (P.).

Female spadices with a pectinate-toothed sterile lamina tapering to a pectinate tip.

C. RUMPHII, Miq.

Beach forests of Southern Tenasserim. The Andamans.

Mu-daing.

Kamorta. Katchall and Car Nicobar (K.).

Female spadices with a sparingly toothed or almost entire sterile lamina, the tip quite entire.

The wood of this species is rich in sago, the seeds yield flour, and the stem exudes a resin used for dressing sores.

C. PECTINATA, Griff.

Female spadices with a very broad, deeply pectinate, lacerate sterile lamina, the tip entire.

‡‡ *Trunk hypogeous, or shortly protruding from the ground. Ovules solitary on each side of the frond-stalk.*

C. SIAMENSIS, Miq.

Eng forests of Prome.

Female spadices with a very broad, deeply pectinate, lacerate, sterile lamina, the acumen broad and as long as the lamina itself, with a few spiny serratures.

Exudes a whitish gum like tragacanth.

From the pith of the stems of some trees of this order a considerable quantity of sago is prepared by simply grating and washing it. The seeds also yield a sort of flour, and the mucilaginous sap of some species concretes into a gum resembling tragacanth.

Order GNETACEÆ.

Flowers in catkins, diœcious or monœcious, rarely polygamous. *Bracts* numerous, very rarely distinct, but usually more or less connate into an entire cup, or into a more or less deeply 2-lobed involucre. *Male flowers: Bractlets* 2, connate, and forming a perianth-like usually 2-lobed involucre to the anthers. *Perianth* none. *Stamen* 1 or few inserted on the bottom of the involucre; *filament* simple or bifid at the apex, or if several are present, connate at the base. *Anthers* 2-, very rarely 3-celled, opening by a terminal transverse slit or pore. *Female flowers: Bractlets* 2

to 4, decussately opposed and connate, forming a simple or double closed cup, perforated only at the apex, the outer cup, if present, winged, and rarely enlarging with ripening of the fruit. *Ovary* solitary in the axil of the bractlets, 1-celled, with a single erect ovule. *Stigma* obliquely ligulate, discoid, or fringed. *Seed* solitary, with coriaceous or fleshy testa, and forming a fleshy or dry drupe. *Albumen* fleshy. *Cotyledons* 2, large or small, and tooth-like. *Radicle* superior. Trees or shrubs, often scandent, with jointed branchlets. *Leaves* either broad and opposite, or reduced to a minute 2-4 toothed sheath at the joints. *Flowers* forming interrupted or imbricate dense globular or cylindrical catkins, arranged singly, or by twos, or a few on a brachiate branched peduncle.

GNETUM,¹ *Linnaeus*.

Flowers monœcious or diœcious, intermixed with bristle-like, jagged, jointed white or rusty-coloured scales. *Catkins* cylindrical, jointed, the females often interrupted. *Males*: *Involucre* 2-valved. *Stamens* 1. *Filament* simple, or forked at the apex. *Anthers* didymous. *Females*: *Involucre* consisting of decussate bractlets connate by pairs and forming an outer and inner ureole, each perforated at the apex. *Ovary* solitary, erect. *Style* long, filiform, with a fringed stigma.

* *Fruit* narrowed into a stalk. *Hair-like scales* round the flowers, tawny or rusty.

G. EDULE, Bl. *E.S.*

Tree forests of Arakan. Pegu. Tenasserim and the Andamans.

Gyut-dweh (Kurz).

Diœcious. Fruit covered with silvery scales, the stalk thick and short, leaves of a thinner texture, with a very lax thin net-venation.

G. FUNICULARE, Bl.²

Tree forests of Chittagong and Tenasserim.

Gyut-dweh (Kurz).

Diœcious. Fruits quite glabrous, the stalk slender, about 2-3 lines long or more. Leaves rigidly coriaceous, the net-venation rather close, elegant and conspicuous.

** *Ovary and fruit sessile and glabrous*.

G. NEGLECTUM, Bl.

Arakan and Southern Tenasserim.

A diœcious climber. Leaves rigidly coriaceous, turning black in drying. Hairs round the ovary copious, brown.

G. GNEMON, L.

Southern Tenasserim.

var. *macrophylla*.

Tree forests of Kamorta. Trice and Track.

A monœcious shrub. Leaves thick-membranous, remaining yellowish-green on drying. Hairs round the flowers copious, white. The Nicobar race is well marked.

¹ There would seem to be a difference of opinion among botanists as to the true structure of this peculiar plant. Lindley says of the Order: "*Ovary* O. Ovule pointed by a style-like process formed from a third membrane, surrounding the nucleus."—*Vegetable Kingdom*, p. 232. Endlicher, on the other hand, *Genera Plantarum*, vol. i. p. 262, says of the same Order, *Gnetaceæ*: "*Ovarium sessile, apice pervium*;" and under the genus *Gnetum*, he says (after repeating the previous words), "*Ovulum solitarium, e basi ovarii erectum, apice in styliformam attenuato, longe exserto, pertuso*."

To throw a little light on this remarkable discrepancy, the following observation is added from Lindley (*in loco*): "In the genus *Gnetum* the development of the ovule is so peculiar that botanists at one time, including myself, supposed that the real ovule was in truth an ovary pierced at the summit, for it consists of an exterior shell of considerable thickness and of a green colour: within which is a thinner envelope through which passes a *tubular projection fringed at the point*, and within lies a nucleus, etc." He adds further: "It is to Mr. Griffith that I owe the knowledge of these plants."

The "*tubular projection fringed at the point*" is doubtless Kurz's "style long erect, filiform with a *fringed stigma*." If, farther, for "ovary" we read "ovule," he will be in fair accord with Endlicher, though not with Lindley.—C. Parish.

² Bentham remarks: "Miquel after Blume describes the *G. funiculare* as diœcious. The Hongkong specimens I have examined have certainly the female flowers intermixed with the males, as described by Roxburgh."—*Flora Hongkongensis*, p. 336.

Kurz also adds for the Nicobars:

G. MACROPODUM, Kz.

Tree forests of Kamorta.

And Mason adds:

G. SCANDENS.

G. BRUNONIANUM.

Order CONIFERÆ.

Flowers monœcious or diœcious in catkins. *Bracts* in *males* numerous, inserted to the rachis, more or less crowded, and imbricate at the base, very often narrowed into a stalk, peltate or half-peltate at the apex, sometimes produced on the back in a resinous gland, bearing the anthers on the under-surface or laterally. *Stamens* usually reduced to sessile anthers, or rarely with a short filament, by twos or more, under each bract, the anthers arranged in a single or double row, 1-celled, opening by a longitudinal (rarely by a transverse) slit. *Bracts* in *females* 4 or more, free, or more or less connate, arranged in spirals decussately, or in whorls of 3 or 4 each, the lower and uppermost ones sometimes sterile, membranous, chartaceous, or coriaceous, or (along with the rachis) fleshy. *Involucre* (in *Taxinæ*) simple or double, short or urceolate, and inclosing the ovary. *Ovaries* 2 or more, rarely solitary, usually collateral or superposed, more or less compressed, with a solitary orthotropous ovule. *Style* short, or very short. *Stigma* almost orbicular, often more or less bifid. *Fruit-cones* either consisting of coriaceous or woody imbricate or decussate scales, or of variously connate fleshy ones, and truly or spuriously drupaceous. Nuts by twos, or more rarely solitary, usually shorter than the scales. *Pericarp* usually bony, woody or membranous, often with 1 or 2 or 3 wings, rarely wingless. *Embryo* (sometimes several embryos in the same seed) resting in the axis of the oily-fleshy or mealy albumen, and almost as long. *Cotyledons* 2, but often deeply lobed so as to simulate 3 or 5 separate cotyledons. The radicle short, inferior or superior. Trees or shrubs, usually evergreens, abounding in resin, with usually clustered or solitary linear, or more or less terete or angular, rarely broad leaves. *Catkins* terminal, solitary or variously clustered, racemose or racemose-panicled.

An order which is represented only by 5 species in Burma, but which is of the highest importance to the forester, especially in temperate climates. Deal, fir, pine, and cedar are all woods generally known, but the timber of most of the other species is of equal value. Some of them attain an enormous height, like *Sequoia sempervirens* and *gigantea*, of California, which reach 330 and even 450 feet in height, with a girth of 80-100 feet. Oil of turpentine, pitch, balsams, and resins are yielded by trees of this family in great quantity.

PINUS, *Linnaeus*.

Flowers monœcious in catkins. Scales numerous, narrowed at the base or almost stalked, the males bearing the 2 anthers on the under surface. The *female scales* composed of a fleshy or coriaceous lepidium, and a thin bract, either distinct or adnate to the base. *Nuts* in pairs, or solitary by abortion, with a membranous or bony pericarp, winged or wingless. Evergreen trees with linear or acicular leaves, solitary or clustered by 2-5 and sheathed at the base.

P. KASPA, Royle.

Lushai Hills and Martaban Hills at
3000 to 7000 feet.

Tin yu (Kurz). Generic.

Leaves by threes, opercle of scales not zonate. A stately tree growing to 200 feet in height according to Brandis. Wood very resinous.

P. LATTERI, Mason.

Salween and Thoug-yeen Valleys at
500 to 2500 feet.

P. Merkusii, Jungh.

P. Massoniana, Lamb (apud Brandis).

Leaves by pairs. Opercle zonate.

This pine appears to have been first noticed and described by Dr. Mason, who believed that "Capt. Latter was the first European to visit the locality where the tree

is indigenous, and from specimens of the foliage and fruit which he brought away, it appears to be a new species that must be characterized thus." After briefly describing it, Dr. Mason goes on to add: "The wood appears to contain more resinous matter than any other species of conifer I ever saw, and large quantities of both pitch and tar might be manufactured in the forests, if a remunerative price could be obtained for the article. A pine grows very abundantly beyond the water-shed East of Toung-ngoo, and a few in the South are seen on the West side. This Dr. Brandis regards as another new species, of which he has a description in preparation." This last species is doubtless the *P. Khasiana* of Dr. Brandis' list of 1862, where only the above 2 species are entered.¹

Of the pine De Gubernatis thus writes: "Arbre funéraire et phallique Nous avons déjà dit plusieurs fois que les arbres funéraires sont symboliques de l'immortalité, de la génération et de la vie éternelle. Le pin,² comme le cyprès et le sapin, à cause de la solidité de leur bois et de leur feuillage toujours vert, figurait la perpétuité de la vie; ce symbole semblait donc convenir aux cérémonies funéraires chez les peuples qui croyaient à l'immortalité de l'âme."

Horace, for example, in his Ode to Posthumus, alludes to the funeral use of the Cypress:

"Linquenda tellus et domus et placens
Uxor; neque harum quas colis arborum
Te, præter invisas cupressu
Ulla brevem dominum sequetur."—Lib. ii. Ode xiv.

The reason sometimes assigned for the selection of the Cypress as a funeral tree is that, when once cut down, it never, as some trees, sends up a new shoot from its stump; but De Gubernatis philosophically observes, "Mais le Cyprès est surtout honoré à cause de sa signification funéraire, en sa qualité d'arbre immortel, toujours verdoyant (*Cupressus sempervirens*), parfumé, dont le bois, comme celui du cèdre, est incorruptible. L'arbre de la mort, symbolisait en même temps l'immortalité."—*l.c.* p. 118.

According to De Gubernatis, "Dans les contes orientaux, le cyprès représente souvent le jeune amoureux, et la rose la bien-aimée." This remark gives additional interest and meaning to those exquisite lines of Byron on Zuleika's tomb—

"Within the place of thousand tombs
That shine beneath, while dark above
The sad but living cypress glooms
And withers not, though branch and leaf
Are stamped with an eternal grief,
Like early unrequited love,
One spot exists, which ever blooms,
Even in that deadly grove—
A single rose is shedding there
Its lonely lustre, meek and pale:
It looks as planted by despair—
So white—so faint—the slightest gale
Might whirl the leaves on high:
And yet, though storms and blight assail,
And hands more rude than wintry sky
May wring it from the stem—in vain—
To-morrow sees it bloom again!
The stalk some spirit gently rears,
And waters with celestial tears;

¹ For further remarks of a very interesting nature on the significance of pine-cones, but which cannot be reproduced here, reference may be made to Inman's "Ancient Faiths embodied in Ancient Names," vol. ii, p. 490.

² *Mythologie des Plantes*, ii, p. 289.

For well may maids of Helle deem
 That this can be no earthly flower,
 Which mocks the tempest's withering hour,
 And buds unsheltered by a bower;
 Nor droops, though Spring refuse her shower,
 Nor woos the Summer beam:
 To it, the livelong night there sings
 A bird unseen—but not remote:
 Invisible his airy wings,
 But soft as harp that Houris strings
 His long entrancing note!
 It were the bulbul; but his throat,
 Though mournful, pours not such a strain;
 For they who listen cannot leave
 The spot, but linger there and grieve
 As if they loved in vain!
 And yet so sweet the tears they shed,
 'Tis sorrow so unmixed with dread.
 They scarce can bear the morn to break
 That melancholy spell,
 And longer yet would weep and wake,
 He sings so wild and well!
 But when the day-blush bursts from high
 Expires that magic melody.
 And some have been who would believe
 (So fondly youthful dreams deceive,
 Yet harsh be they who blame)
 That note so piercing and profound,
 Will shape and syllable its sound
 Into Zuleika's name.
 'Tis from her cypress' summit heard,
 That melts in air the liquid word;
 'Tis from her lowly virgin earth
 That white rose takes its tender birth."

Bride of Abydos.

One curious legend may be here quoted, if only as a lesson to Christian missionaries when tempted to enlarge with unction on the folly of pagan legends, forgetting all the while, as they are too apt to do, the puerile legends which once flourished (and in some countries do so still) in connexion with the faith they themselves profess. "M. Pitré¹ nous a communiqué cette légende: 'Il pino si tiene in molta stima perchè fornisce l'incense per le funzioni religiose e richiama a Gesù Bambino. Raccogli una pina, sgusciane il frutto e tagliane verticalmente il gheriglio. Se tu vi guardi bene dentro, vedrai qualche cosa che somiglia a una mano; è quella del Bambino in atto di benedire. È da sapere che, nella Fuga in Egitto, la Sacra Famiglia non avendo ove adagiarsi, incontrato per via un Lupino (un lupin), vi si accostò. A quel tempo il Lupino, come il Tameriggio (*tamarix*), era un bell' albero e il frutto squisito assai. Il Lupino egoista si rifiutò ad accogliere sotto di sé i poveri fuggitivi, e strinse e raccolse e suoi larghi rami, sicchè essi rimasero allo scoperto e dovettero proseguire tra la stanchezza e il panico il doloroso viaggio; ma visto indi a non molto, un pino e sotto di esso ricoveratisi, il pino allargò e suoi bei rami ed amorosamente nascose nel suo frutto il Bambino. Da quel giorno in poi, ebbe il favore della mano del Bambinello e prosperò sempre, e il Lupino maladetto pe condannato a non sollevarsi una spanna sulla terra e il suo frutto ad essere amaro quale oggi si trova."

¹ Mythologie des Plantes, vol. ii. p. 291.

DACRYDIUM, *Solander.*

Flowers diœcious in catkins. *Male catkins* terminal, solitary, small. *Anther-bearing bracts* usually many, crowded and very shortly-stalked. *Female flowers* usually solitary, rarely collected by 3 or 9 in a stiff but lax spike. *Nut* minute, almost long, at the base surrounded by a lax outer involucre and inclosed in the inner fleshy involucre, gaping at the apex.

D. ELATUM, Wall. *E.T.*

Burma (probably Tenasserim).

All parts glabrous. Leaves of two sorts: one, scale-like, densely imbricate, ovate-linear, blunt, mucronate; the other acicular, 4-8 lines long, pungent-acute, somewhat 4-cornered, curved.

NAGEIA, *Gaertner.*

Flowers diœcious in catkins. *Anther-bearing bracts* numerous, crowded, very shortly-stalked. *Female flowers* solitary or few, the bracts connate with the fleshy rachis, and free only at the apex. *Fruit* fleshy, with a long pericarp, almost globular, or ovoid, seated on a fleshy thickened rachis. *Embryo* at the summit of the mealy albumen.

N. (PODOCARPUS) LATIFOLIA, Wall. *E.T.*

Tenasserim.

Agathis loranthifolia (apud Mason).

Dammara orientalis, Lamb (M.).

Thyt-myn.

Leaves opposite, or nearly so, many-nerved, oblong-lanceolate. Fruit the size of a small cherry. Wood pale yellowish, fine grained. Weight 41 lbs.

For some reason the Burmese highly value this tree as sacred, and often insert a wedge or plug of it into the stem of a new canoe or boat, to insure good luck. This must be the tree, I think, which Dr. Mason refers to under the name of Dammer pine: "Griffiths mentions *Agathis loranthiflora* (*sic*) or the dammer pine, as a member of the Tenasserim Flora, and I have seen the young plants of the tree to which he must refer. The leaf is precisely that of the dammer pine, but it is not known to yield any dammer. The wood is white, rather light, and bears considerable resemblance to some kind of pine. It is used by native carpenters for various purposes, and the Burmese have a superstition that the beams or balances of their scales ought to be formed of this wood. They call it 'Thyt-myn,' king of woods. It is used by them, says Major Berdmore, to avert evil, by driving a peg of it into a house post or a boat. It is very hard." This last remark, however, is an error of Major Berdmore. It is not a little curious that a somewhat similar observance seems to have traditionally come down to us, as performed in building the first ship, *Argo*. In the work of that name, by the Earl of Craufurd and Balcanes, Minerva is represented as appearing to Jason on the eve of his voyage, and commanding him to repair to Dodona and its holy oak.

"There in the midst, one tree stands hoar, sublime,
Whose date coeval, knows no peer but Time;
No sire it owns, no children, there is none
Like it on earth, it lives to God, alone."

* * * * *

I will be with thee to sustain thy prayer.
Thee praying, veiled thy face, and prostrate there;
A conscious limb will sever from on high,
That none may near, that none may touch but I.
Of Life and Truth, *this, within Argo's keel*
Will I imbed, that long as nightly wheel
The 'Dancers' round the Polestar, shall impart
A life immortal to her."

Argo, Book I. line 585 *et seq.*

The passage above quoted is, however, a mere poetic amplification of the allusion to the same fact by Apollonius Rhodius:

σειρῶαλέον εἰ Λιγὴν Περμασίῃος ἠδὲ καὶ αὐτῆ
 Πηλείδης ἰαχεν Ἄργῳ ἐπισπέρχουσα νέεσθαι
 ἐν γῆρ' οἱ ἔδρω θεῶν ἐλπίματο, τὸ ρρ' ἀνα νέεσσην
 στείραν Ἀθηναίῃ Δαδωνίδεος ἤρμοσε φηγοῦ.

Argonautica, Book A. v. 524.

The same story too is referred to by Claudian:

“Lict omnia vates
 In majus celebrata ferant, ipsamque secandis
 Argois trabibus jactent sudasse Minervam;
 Nec nemoris tantum junxisse carentia sensu
 Robora, sed, cæso Tivarij Jovis augure luco,
 Arbore præsaḡa tabulas animasse loquaces.”

De Bello Gatico, l. 14.

This incorporating a portion of a sacred tree in the keel of Argo is precisely what is now done with a new canoe in Burma, a piece of the Thit-myn or ‘Prince of trees,’ being substituted for the mystical oak of Dodona, and the interesting question rises (since we may be tolerably sure that the myth had no historical foundation *quoad* the building of the Argo), did the myth originate in a custom similar to that now practised in Burma, but in those early days, perhaps, far more widely extended, or did it originate in the highly coloured accounts of some such custom, which spread to Greece from the distant region, lying beyond the Golden Chersonese? Questions such as these, so easy to ask, so impossible to answer, only prove the vast fund of interesting materials bearing on the life history of our race, which has slipped and is slipping almost irrecoverably from our grasp.

Since writing the above I see that the custom exists in other parts of the world besides Burma, in a modified form. Speaking of the Argonautic voyage, De Gubernatis says: “L’aurore ou la *dame vert* du printemps, représentée par Médée, la belle magicienne, et la soleil, représenté par le jeune et beau Jason, se retrouvent dans le ciel oriental, après avoir voyagé toute la nuit, ou tout l’hiver, dans un navire sur lequel la fille de Zeus, la sage déesse Athènè, un fois elle-même plus élevée de l’aurore, avait prudemment placé un copeau du chêne de Dodone, pour garantir les Argonautes du naufrage. Il est fort curieux maintenant d’observer que la même superstition consacrée par l’ancien mythe hellénique existe encore, légèrement modifiée, dans la campagne de Roma et en Toscane; seulement il ne s’agit plus ici, comme de raison, d’un orage de mer, d’un naufrage, mais d’un orage terrestre.”—*Mythologie des Plantes*, vol. ii. p. 66.

N. BRACTEATA, Bl. *E.T.*

Tree forests of Tenasserim and the Andamans.

Thyt-myn (Kurz).

Leaves scattered, 1-nerved, linear to linear-lanceolate. Fruit the size of a large pea. Kurz describes the wood as pale brown, close-grained, weight 50 lbs.

I cannot here refrain from quoting¹ the curious mediæval legend of the Cross, wherein are incorporated the names of certain coniferous trees, which are known to have possessed a mystical significance ages before the date when the legend was conceived, and which, by a well-known process of purification, became transformed from symbols of what we, from our higher spiritual standpoint, should term impurity into the emblems of a Christian’s faith.

“When our first father was banished Paradise, he lived in penitence, striving to recompense for the past by prayer and toil. When he reached a great age and felt death approach, he summoned Seth to his side, and said, ‘Go, my son, to the terrestrial Paradise, and ask the archangel who keeps the gate to give me a balsam which will save me from death. You will easily find the way, because my footprints

¹ Curious Myths of the Middle Ages, by S. Baring-Gould, p. 379.

scorched the soil as I left Paradise. Follow my blackened traces, and they will conduct you to the gate whence I was expelled.'

"Seth hastened to Paradise. The way was barren, vegetation was scanty and of sombre colour; over all lay the black prints of his father's and mother's feet. Presently the walls surrounding Paradise appeared. Around them nature revived, the earth was covered with verdure and dappled with flowers. The air vibrated with exquisite music. Seth was dazzled with the beauty which surrounded him, and walked on forgetful of his mission. Suddenly there flashed before him a wavering line of fire, upright like a serpent of light continuously quivering. It was the flaming sword in the hand of the cherub who guarded the gate. As Seth drew nigh, he saw that the angel's wings were expanded so as to block the door. He prostrated himself before the cherub unable to utter a word. But the celestial being read in his soul better than a mortal can read a book the words which were there impressed, and he said, 'The time for pardon is not yet come. Four thousand years must roll away ere the Redeemer shall open the gate to Adam, closed by his disobedience. But as a token of future pardon, the wood whereon redemption shall be won shall grow from the tomb of thy father. Behold what he lost by his transgression.' At these words the angel swung open the great portal of gold and fire, and Seth looked in. He beheld a fountain, clear as crystal, sparkling like silver dust, playing in the midst of the garden, and gushing forth in four living streams. Before this mystic fountain grew a mighty tree, with a trunk of vast bulk, and thickly branched, but destitute of bark and foliage. Around the bole was wreathed a frightful serpent or caterpillar, which had scorched the bark and devoured the leaves. Beneath the tree was a precipice. Seth beheld the roots of the tree in Hell. There Cain was endeavouring to grasp the roots and clamber up them into Paradise; but they laced themselves around the body and limbs of the fratricide, as the threads of a spider's web entangle a fly, and the fibres of the tree penetrated the body of Cain as though they were endued with life.

"Horror-struck at this appalling spectacle, Seth raised his eyes to the summit of the tree. Now all was changed. The tree had grown till its branches reached heaven. The boughs were covered with leaves, flowers and fruit. But the fairest fruit was a little babe, a living sun, who seemed to be listening to the songs of seven white doves, who circled round his head. A woman more lovely than the moon bore the child in her arms.

"Then the cherub shut the door and said, 'I give thee now three seeds taken from that tree. When Adam is dead, place these seeds in thy father's mouth and bury him.'

"So Seth took the seeds and returned to his father. Adam was glad to hear what his son told him, and he praised God. On the third day after the return of Seth, he died. Then his son buried him in the skins of beasts, which God had given him for a covering, and his sepulchre was on Golgotha. In course of time, three trees grew from the seeds brought from Paradise: one was a Cedar, another a Cypress, and the third a Pine. They grew with prodigious force, thrusting their boughs to right and left. It was with one of these boughs that Moses performed his miracles in Egypt, brought water out of the rock, and healed those whom the serpents slew in the desert. After a while the three trees touched one another, then began to incorporate, and confound their several natures in a single trunk. It was beneath this tree that David sat when he bewailed his sins.

"In the time of Solomon, this was the noblest of the trees of Lebanon; it surpassed all in the forests of King Hiram, as a monarch surpasses those who crowd at his feet. Now, when the son of David erected his palace, he cut down this tree to convert it into the main pillar, supporting his roof. But all in vain. The column refused to answer the purpose; it was at one time too long, at another too short. Surprised at this resistance, Solomon lowered the walls of his palace to suit the beam, but at once it shot up and pierced the roof, like an arrow driven through a piece of canvas, or a bird recovering its liberty. Solomon, enraged, cast the tree over Cedron, that all might trample on it as they crossed the brook. There the Queen of Sheba found it, and she, recognizing its virtue, had it raised. Solomon

then buried it. Some time after, the King dug the pool of Bethesda on the spot. This pond at once acquired miraculous properties, and healed the sick who flocked to it. The water owed its virtues to the beam which lay beneath it.

“When the time of the Crucifixion of Christ drew nigh, this wood rose to the surface, and was brought out of the water. The executioners, when seeking a suitable beam to serve for the cross, found it, and of it made the instrument of death of the Saviour. After the Crucifixion it was buried on Calvary, but it was found by the Empress Helena, mother of Constantine the Great, deep in the ground with two others, May 3, 328; Christ’s was distinguished from those of the thieves by a sick woman being cured by touching it. The same event is, however, ascribed by a Syriac MS. in the British Museum, unquestionably of the fifth century, to Protonice, wife of the Emperor Claudius. It was carried away by Chosroes, King of Persia, on the plundering of Jerusalem; but was recovered by Heraclius, who defeated him in battle, Sept. 14th, 615: a day that has ever since been commemorated as the Feast of the Exaltation of the Cross.

“Such is the Legend of the Cross, one of the wildest of mediæval fancies. *It is founded, though unconsciously, on this truth, that the Cross was a sacred sign long before Christ died upon it.*”

The last sentence is the key, not only to this but many other legends, ceremonies, and symbols, which, although now called *Christian*, and as I have said purified of their original significance, are yet, all the same, built-up of materials originally symbolizing what we should term low and sensuous ideas. This may seem a truism to those who are well read on the subject; but owing to a mistaken reticence, it is by no means so widely known as, in the interest of abstract truth,¹ it deserves to be.

Sub-class *ANGIOSPERMS.*

Orules produced in a close ovary, fertilized by the pollen-tube traversing a stigmatic tissue, to reach the cavity of the ovary- and the embryo-sac of the ovule.

Division MONOCILAMYDEÆ or APETALOUS PLANTS.

Perianth really or apparently simple, the lobes or segments all calycine, or herbaceous, or all petaloid or scarious, or entirely wanting.²

¹ The relationship subsisting between Religions which still possess a living force (the Christian of course included) and those which may be termed ‘dead,’ from their having, wholly, or in part, lost their hold on men’s minds, is not only a curious subject for the consideration of all thoughtful men, but is an essential element in the History of the Science of Religion, and the laws regulating its development. Yet how carefully is any discussion of this momentous question, or I may even say any allusion to its existence, avoided by religious professors and teachers, as though they would imply that their particular Religion sprang into being as spontaneously and miraculously as Minerva did from the head of Jupiter! And yet our aforesaid religious teachers are ever complaining that they cannot command the same respect for their utterances they formerly did! My clerical friends, the mind of man has not stood still all these years, and hence you inevitably find yourselves (with some bright exceptions in the rear, and clinging to the skirts of the intelligence of the age rather than leading and directing it; but if you would only take to heart the words of a modern poet, you would once again not lack attentive and respectful audiences.—(W.T.)

“Leave your dry unfruitful dogmas, Faith unreasoning, Credence blind;
 All the little narrow circles, where you wander self-confined.
 Plashing in the mire and puddle of your small sectarian pond,
 Heedless of the mighty ocean and the boundless Heaven beyond.
 Is there nothing more to preach of than the letter of the Law?
 Nothing left to feed the People, but the barren husk and straw?
 Nothing for the Unbelievers in a creed their souls disclaim
 But Eternity of torment, and the Unconsuming Flame?
 Nobler themes than these invite you, if you’d throb as throbs the Time,
 And would speak to hearts responsive, words more Human, more Sublime,
 God is Love, and Love Eternal—All things change, but nothing dies.
 Find this Gospel, and expound it, in the Bible of the skies!”—*Gaualiel Brown.*

² Exceptions. A double floral envelope occurs in some *Paronychia*, *Euphorbiaceæ*, *Rafflesiacæ*, *Loranthaceæ*, *Santalaceæ*, and *Podostemaceæ*.

Sub-division *a*. OVARY INFERIOR. PERIANTH MORE OR LESS DISTINCT IN THE MALE, OR FEMALE, OR BOTH. Obscure in some *Balanophorea*.

SANTALES.

Flowers hermaphrodite or diclinous. *Perianth* usually conspicuous, coloured, polymorphous, and valvate. *Ovary* 1 or 2-celled. *Ovules* usually reduced to a naked nucleus. *Fruit* a 1-seeded berry or drupe. Parasitic herbs or shrubs.

Order BALANOPHOREÆ.

Flowers male or female, rarely hermaphrodite. *Perianth* of male usually trilobate, valvate, of female various or none. *Stamens* usually 3, monadelphous (in *Cynomorium*, 1). *Ovary* 1 or 2-celled, *cells* 1-ovuled. *Ovule* pendulous, often adnate to the cell-wall. *Embryo* undivided, in fleshy or granular albumen. Fleshy, scapigerous, leafless parasites, on forest trees.

EUBALANOPHORIEÆ.

Perianth in hermaphrodite flowers 3-5 lobed. In females, none. *Stamens* monadelphous. *Anthers* extrorse. *Ovary* 1-celled. *Style* 1. *Ovule* pendulous, anatropous.

BALANOPHORA, Forst.

B. TYPHINA, Wall. (M.).

B. GIGANTEA, Wall. (M.).

These parasites give rise to the enlarged knots on the roots of maple, oak, and other trees, from which the Tibetans manufacture drinking cups, which are susceptible of a good polish and are often handsomely mounted with silver. Dr. Mason, however, makes no mention of these knots being so used in Burma.

CYNOMORIEÆ.

Flowers hermaphrodite or unisexual by arrest; with a distinct perianth superior in the male, sometimes wanting in the female. *Stamens* free. *Anthers* 2-celled, dehiscing longitudinally. *Ovary* 1-celled. *Style* single. *Ovule* solitary, pendulous.

CYNOMORIUM.

C. sp.

Wallich records a species of this genus from Tenasserim, which is valuable for its styptic qualities. *C. coccineum* was similarly valued by the Crusaders for its styptic virtues in hæmorrhage and diarrhœa.

Order SANTALACEÆ.

Flowers hermaphrodite or polygamous. *Perianth* simple or very rarely double, the tube wholly or partially adnate to the ovary and confluent with the pedicel, the limb 3 or 5 lobed or cleft, valvate or nearly so, deciduous or persistent. *Stamens* as many as perianth lobes and opposite to them, inserted at the base or within the free part of them. *Filaments* short. *Anthers* 2-, rarely 4-celled, erect or dorsifixed, usually opening by longitudinal slits. *Disk* epigynous and often plain, sometimes with free margins and crenate. *Ovary* inferior or first free, and soon adnate, or half inferior (rarely superior), 1-celled, with 2 or 5 ovules suspended from a free central erect placenta. *Fruit* an indehiscent nut or berry, 1-seeded from abortion. *Albumen* fleshy. *Embryo* straight, with a superior radicle. *Cotyledons* linear or oblong, convex, shorter than the radicle. Shrubs or herbs, rarely trees, terrestrial, or sometimes parasitic with alternate, rarely opposite, simple leaves. *Stipules* none. *Flowers* usually small, green or purplish, in terminal or lateral heads, cymes or spikes.

* *Ovary inferior.*

† *Placenta slender, bearing the ovules at the apex.*

HENSLOWIA, *Blume.*

Flowers monœcious. *Perianth lobes* and *stamens* 5 or 6. *Disk* epigynous without free margins. *Drupe* very small. *Ovary* inferior, 1-celled, with 2-4 ovules suspended from the apex of the free central placenta. *Fruit* a fleshy drupe containing a hard 1-seeded putamen. Parasitic shrubs, with alternate 3-5 nerved simple leaves.

Flowers in peduncled involucred umbellets. *Bracts* acute, without membranous borders.

H. HETERANTHA, H. f. Hills east of Toung-ngoo at 4000 to 7000 feet.

Flowers sessile, or nearly so. *Perianth-lobes* 5. *Leaves* coriaceous.

var. *a heterantha.* *Flowers* sessile. *Perianth-lobes* 5.

var. *β coriacea.* *Flowers* shortly peduncled. *Perianth-lobes* 6.

H. ERYTHROCARPA, Kz. Tree forests of Kamorta.

†† *Placenta spindle-shaped, bearing the ovules near the base.*

SANTALUM, *Linnaeus.*

Perianth bell-shaped. *Lobes* and *stamens* 4 or 5. *Disk* conspicuously lobed. *Drupe* globose. Trees, parasitical while young.

* S. ALBUM, L. *E.T.* Chittagong (cultivated). Tenasserim (*vide* Mason).

San-da-ku.

All parts glabrous. *Leaves* opposite, 1½ to 3 inches long, coriaceous, glaucous beneath. *Flowers* small, yellowish, soon turning brownish-purple. *Drupe* globular, the size of a large pea. *Wood* yellowish, in young trees white. *Ground* to powder it is a favourite cosmetic, and in Burma replaces violet powder and other less innocuous preparations of the West. A valuable oil is distilled from the wood, from which also deliciously fragrant boxes, cabinets, and other small articles are made.

** *Ovary superior.*

LEMONURUS, *Blume.*

Calyx adnate to the cup-shaped disk. *Flowers* 4-merous. *Petals* 4 at base, cohering in a tube, valvate. *Stamens* 4, opposite the petals. *Filaments* very short. *Ovary* free, 1-celled. *Ovule* single, pendulous. *Stigma* sessile.

L. SYLVESTRIS, Bl. *E.T.* Ava Hills.

L. oblongifolius, Mart.

Leaves 6-8 inches long, very shortly petioled, entire, membranous, glabrous. *Flowers* small, white.

CHAMPEREIA, *Griffith* (not *Baillon*).

Flowers 5-merous. *Perianth* 5-sepalous, rotate. *Stamens* 5. *Hypogynous disk* annular. *Ovary* with a single erect anatropous ovule. *Style* none. *Flowers* minute. *Bracts* very minute.

C. GRIFFITHII, Planch. *E.T.* Tree forests of Tenasserim and the Andamans.

All parts glabrous. *Perianth-lobes* about ½ a line long, reflexed. *Drupe* ¼ inch long or more, orange-coloured, glabrous.

Order LORANTHACEÆ.

Flowers usually hermaphrodite, regular. *Calyx-tube* adnate to the ovary, the limb with as many lobes or teeth as petals, or forming an entire border, or none. *Petals* or *perianth* segments (when the calyx is inconspicuous) 4 to 6 or rarely more, usually 5-6, free, or united in a lobed corolla, inserted round an epigynous disk, valvate,

rarely wanting. *Stamens* as many as petals, opposite to and usually inserted on them. *Filaments* more or less adnate at the base. *Anthers* basifixed, adnate, or dorsifixed, sometimes versatile, opening by longitudinal slits or by pores. *Ovary* inferior, adnate to the calyx, and forming one mass of which only the upper part protrudes a little, 1-2-celled with 1 to 3 erect ovules, usually not perceptible till the flowering is past. *Style* filiform, or thick with a simple stigma. *Fruit* an indehiscent viscid-fleshy berry or drupe, with a single or 1-seeded putamen. *Albumen* fleshy. *Cotyledons* 2-4, semiterete, fleshy. *Embryo* fungiform, straight, with a superior radicle. Parasitical shrubs, usually much-branched, very rarely terrestrial shrubs or trees, with opposite, or rarely alternate simple leaves; sometimes the leaves reduced to mere scales, or wanting. *Bracts* usually present, rarely wanting. *Bractlets* 2, close under the flower, concave or united in a cup, sometimes wanting.

All the species are more or less injurious to trees, on account of their parasitism. The bark is usually astringent. Bird-lime is made from the berries of mistletoe and several *Loranthi*.

LORANTHUS, *Linnaeus*.

Flowers hermaphrodite. *Corolla* well developed, the lobes more or less united (rarely free). *Style* filiform, with a terminal stigma. *Albumen* perforated.

Kyi-boung. Generic.

* *Bracts* large, leaf-like, forming either a free 4-6 leaved involucre, or united in a monophyllous one.

L. INVOLUCRATUS, Roxb.

Chittagong.

Leaves glabrous, calyx tawny-tomentose, corolla whitish hairy, involucre 4-flowered and 4-leaved, the leaflets free and as long as the flowers.

** *Bracts* minute or small, supporting each single flower.

† *Each flower* 3 bracted, i.e. 1 bract and 2 bractlets, free or united at the base.

+ *Corolla* 6-lobed, the tube inflated, short and straight.

× *Flowers* sessile, in short spikes.

L. GLOBOSUS, Roxb.

Chittagong, Pegu and Tenasserim.

Corolla greenish-white, 5 lines long. From the base arceolate-inflated.

L. SUBGLOBOSUS, D.C.

Like the last, but corolla $\frac{1}{2}$ an inch long, and the leaves narrower and more coriaceous. It is probably a sessile-flowered variety of the next species (Kurz).

×× *Flowers* pedicelled on short racemes.

L. AMPULLACEUS, Roxb.

Martaban and Tenasserim.

Corolla greenish-purple, the tube angular, upwards under the limb inflated.

++ *Corolla* 5-lobed, straight or curved.

L. BRANDISIANUS, Kz.

Martaban, over 3000 feet.

Leaves not glaucous beneath. Corolla straight, and urecolate-inflated, nearly an inch long. Racemes glabrous, poor-flowered, cymose at apex.

L. HYPOGLAUCUS, Kz.

Leaves as in the last, but glaucous beneath, flowers by 2- or 3-clustered, on short glabrous peduncles. Corolla curved and slightly inflated, $1\frac{1}{2}$ to $1\frac{2}{3}$ inches long.

L. FORMOSUS, Bl.

Tenasserim.

Leaves one coloured and glossy on both sides. Corolla 2-3 inches long, curved and slightly inflated. Cymes reduced, usually 2-flowered, puberulous.

‡‡ *Each flower* with a single bract only, or the bract sometimes obsolete.

+ *Petals* united into a tubular corolla.

× *Flowers* 4-merous, the corolla usually slit laterally. Berries obconical to pear-shaped.

L. PUBERULENTUS, Wall. Ava and Kambalu Toung in the Pegu Range.

Indument of inflorescence, flowers, berries, and shoots densely tomentose, white, scurfy. Corolla $1\frac{1}{2}$ –2 inches long. Berries club-shaped.

L. SCURRULA, L. All over Burma and the Andamans
(except var. *a* not yet found).

Indument of inflorescence, flowers and young shoots velvety or villous, rusty to whitish. Corolla $\frac{1}{2}$ to $1\frac{1}{4}$ inch long. Berries club-shaped, 2–3 lines long.

var. *a scurrula*, L. Corolla long.

var. β *obtectus*, Wall. Petioles long.

var. γ *buddleioides*, Desv. Flowers smaller, whitish.

var. ϵ *graciliflorus*, Wall. Flowers small, tawny-velvety.

L. RHOPALOCARPUS, Kz.

Indument thin, puberulous, whitish or yellowish. Corolla $\frac{1}{2}$ to $\frac{3}{4}$ of an inch long. Berries elongate, club-shaped, $\frac{1}{2}$ an inch long, thin-velvety.

× × Flowers 5–6-merous, the corolla slit laterally. Berries rounded at the base.

† Shoots, inflorescence and flowers densely villous-tomentose.

L. SIAMENSIS, Kz. Siam.

Leaves thick, coriaceous, cordate, beneath rusty-tomentose. Bract 3 times longer than the ovary. Flowers long, spiked.

†† All parts glabrous.

L. PENTANDRUS, L. Pegu. Martaban and Tenasserim up to 3000 feet.

Racemes thinly greyish-tomentose. Corolla $\frac{1}{2}$ to 1 inch long, 5-merous, yellow or orange, the tube short, inflated, scurfy-tomentose outside.

var. *a pentandrus*. Pedicels $\frac{1}{2}$ to 1 inch.

var. β *farinosus*, Desv. Flowers on shorter pedicels or sessile.

L. LONGIFLORUS, Desv. All over Burma and the Andamans.

Racemes glabrous, rarely puberulous. Corolla 1–2 inches long, crimson or rose-coloured, curved and somewhat inflated in the middle, quite glabrous, 5-merous.

var. *a longiflorus*. Flowers only $1-1\frac{1}{4}$ inch long.

var. β *bicolor*, Roxb. Flowers $2-2\frac{1}{2}$ inches long.

var. γ *falcatus*, L.f. Leaves linear to linear-lanceolate, more or less falcate.

+ + Petals free to the base. Corolla bright red or crimson.

L. ELEUTHEROPETALUS, Kz. Tenasserim.

Flowers about $1\frac{1}{2}$ inch long, 6-merous. Petals equal and elongate-linear.

L. PENTAPETALUS, Roxb. Khakyen Hills and Upper Tenasserim.

Flowers only 4 lines long, 5-merous. The petals dilated at the base, and forming apparently a short ovately inflated straight tube. Leaves tapering at the base.

L. COCCINEUS, Jack. Tenasserim.

As the last, but flowers 4-merous. Leaves cordate at the base.

VISCUM, *Linnaeus*.

Floral parts reduced to an apparently simple perianth. Albumen solid. Anthers opening inwards by several pores. Flowers very small, monocious and clustered at the nodes or *diocious*, in the forks of the branches.

* Leafy shrubs. Perianth-lobes deciduous.

V. ALBUM, L. var. β Martaban above 5000 feet.

Branchlets terete. Leaves rounded at the apex. Flowers in sessile, or shortly-peduncled, cup-shaped involucre at the end of the branches or in their forks.

var. *a album*. Inflorescence sessile or nearly so. Perianth-lobes 4.

var. β *Karensium*. Inflorescences peduncled. Perianth-lobes 3.

V. ORIENTALE, Willd.

Chittagong.

Branchlets angular. Leaves blunt. Flowers dioecious, in peduncled cup-shaped involucre, and axillary.

V. MONOICUM, Roxb.

Martaban and Tenasserim.

Branchlets terete. Leaves acuminate. Flowers monoecious, in sessile cup-shaped involucre and axillary.

V. OVALIFOLIUM, Wall.

Tenasserim.

Branchlets terete. Leaves blunt. Flowers all solitary in the cup-shaped involucre, forming dense clusters in the leaf axils, or round the joints.

** *Leafless shrubs. Perianth-lobes usually persistent.*

V. ARTICULATUM, Burm.

All over Burma.

Articles slightly narrowed at the joints, longitudinally ribbed, each article of the lateral branchings placed at a right angle with the other and therefore decussate, but twisted so as to appear in one plane. Berries minute.

var. *a articulatum*. Articles narrow, 2 lines broad.

var. *β dichotomum*, Don. Articles broader, 3-4 lines broad.

V. MONILIFORME, W.A. Martaban, from 4000 to 6000 feet, on oaks and *Eurya*.

Articles all in one plane and complanate, without any other rib than the median one, at their truncate joints dilated into a complanate cup, in which the flowers rest.

The fruit of the Mistletoe, and that of other *Loranthaceæ*, yields a tenacious paste known as birdlime, commonly used by fowlers to secure small birds. The fowler provides himself with several light bamboo rods made to fit together like a fishing rod. Applying this substance to the terminal portion of the thin top joint, he gradually elevates it into some tree, wherein the bird is sitting he desires to capture. The fowler cautiously adds joint to joint from below, exciting no fear in the bird sitting unconsciously in the foliage till a sudden twist brings the stick daubed with the birdlime against the wings of the bird, which the fowler rarely then fails to secure. It is stated (with what truth I know not) that tigers and leopards are also taken by means of 'limel' leaves. A vast number of these are spread in some convenient spot, with a man armed with a gun or bow in ambush. On the tiger treading on one of these leaves, it adheres at once to his paw, which, cat-like, he shakes to rid himself of the encumbrance. Failing in this, he rubs his paw against his face, thereby transferring the leaf to his head, and in a short time several others also get attached in the same manner. The animal now rolls on the ground, and ends by getting so covered with leaves as to be half blinded by them. His roars of distress announce the helpless state of the animal, whom the hunter now finds small difficulty in destroying.

The reverence for the mistletoe grown on an oak among the Druids is well known, and in the Scandinavian mythology it was the same plant which was used by the envious Loki, to form the shaft which laid Balder, Odin's gallant son, low on the bed of death. The genesis of the myth etymologically considered is, according to A. L. Matthew, as follows: "Prof. Skeat, in his Dictionary, thinks he can explain why the 'mistletoe' in the legend should be, of all created things, the slayer of the Sun-god. The myth represents the tragedy of the solar year, the sun overwhelmed by the 'gloom' of midwinter. In ancient Scandinavian '*mist*' means 'gloom,' and '*mistel*' is used for the plant 'mistletoe.' So, according to Prof. Skeat, the mistletoe appears in the Balder myth as fatal to the solar hero from the similarity of the old Teutonic words for 'gloom' and the plant '*viscum*.'"—*Notes and Queries*, Dec. 24, 1881, p. 509.

The story runs, that the gods, who all love Baldr, are so confident in the obligation taken by all created things not to harm him, that they make his body the mark for their arrows in sport; but now the trick of Loki succeeds, and the mistletoe, the one thing in nature overlooked, and not included in the great oath, is placed in the hands of the luckless Hödr, the blind brother of Baldr, and the

playfully-intended shot takes fatal effect.¹ Neither, however, Prof. Skeat nor Mr. Cox dispose of the difficulty which exists in identifying Baldur, the son of Odin, with the Great Luminary, in the fact that in the Scandinavian mythology the Sun was feminine. On this Mr. W. Taylor observes²—"The Goths make the sun feminine and the moon masculine. This is natural in a cold climate. Among savages every male is a foe; every female a friend. Displeasing and unwelcome objects therefore are in their language masculine, pleasing and welcome objects feminine. In hot countries, where the night is more welcome than the day, an opposite allotment of gender takes place." In exemplification of this statement we find the place of torment assigned to the wicked, in religious systems originating in the East, a place of heat, where the worm dieth not and the fire is not quenched; whereas, among our Northern ancestors, Hell was a place of intense and unendurable cold! To support the statement that the Sun among the Scandinavian nations was a female deity, it will suffice to quote two couplets from the Cosmogonical Edda, entitled the "Lay of Vafthrudni" (Taylor, *l.c.* p. 27). The lay describes a contest of knowledge between Odin and Vafthrudni, King of the Jutes.

Odin asks—

"Far I've wander'd, much sojourn'd
In the kingdoms of the Earth:
But I've still a wish to know
Whence, to deck the empty skies,
Shall another Sun be drawn,
When the jaws of Fenrir ope
To ingorge the lamp of day?"

Vafthrudni replies—

"Ere the throat of Fenrir yawn
Shall the Sun a daughter bear,
Who, in spite of shower and sleet,
Rides the road her mother rode."

GINALLOA, *Worth.*

Flowers monœcious. *Perianth* 3-4-petalled. *Anthers* almost sessile, opening by longitudinal slits, 2-celled, and almost didymous. *Fruit*, a 1-seeded berry. *Flowers* spicate.

* *Spikes very slender, the flowers surrounded by an annular cup-shaped involucre. Leaves thin-coriaceous.*

G. HELFERI, Kz.

Tenasserim.

Leaves elongate, 5-nerved.

** *Spikes robust, the flowers immersed in grooves of the thick rachis, destitute of the annular cup-shaped involucre.*

G. ANDAMANICA, Kz. Tree forests of South Andaman on *Artocarpus Chaplasha*.

Leaves thick coriaceous.

QUERNALES.

Flowers diclinous, male in catkins, female solitary or in spikes. *Perianth* green; if male, lobed or reduced to a scale; if female, minute, lobed or toothed. *Ovary* inferior, 1 to 6-celled. *Ovule* 1, basal or 1 or more pendulous. *Fruit* 1-seeded. *Albumen* none.

¹ Mythology of the Aryan Nations, by Rev. G. W. Cox, vol. ii. p. 95.

² Historic Survey of German Poetry, vol. i. p. 28, *note* 1.

Order JUGLANDACEÆ.

Flowers unisexual, the males in axillary spikes or catkins, the females solitary, or in terminal or axillary spikes or clusters. *Males: Perianth* simple, irregularly 2-6-cleft, adnate to the scale-like bracts. *Stamens* indefinite, sometimes 3 or more in 2 or many rows. *Anthers* sessile or nearly so, 2-celled, the cells opening longitudinally. *Female flowers* more or less connate with the bract, or free. *Perianth* double or simple; if double, the outer one more or less connate with the ovary, cup-shaped, 3 or more toothed at the apex, or forming a bracted involucre, the inner perianth connate with the ovary, 4-toothed; if simple, forming a 4-toothed cup. *Ovary* inferior, 1-celled (or 2- or 4-celled at the base) with a solitary erect or pendulous ovule in each cell. *Style* short. *Stigmas* usually 2, rarely 4. *Fruit* a drupe with a fleshy or membranous pericarp (the enlarged perianth), indehiscient, or dehiscing irregularly or in 4 valves. *Nut* consisting of the indurated ovary bony, usually free from the pericarp. *Testa* membranous. *Albumen* none. *Cotyledons* fleshy, with a superior radicle. *Trees* with unpaired or rarely spuriously abruptly pinnate leaves. *Stipules* none.

The timber of all the members of this family is valuable. The bark is acrid and often astringent.

JUGLANS, *Linnaeus*.

Fruit a large drupe, with a fleshy pericarp.

J. REGIA, L.

Ava Hills.

Walnut.

Valuable for furniture. The nearest approach to this wood in appearance among common Burmese woods is *Hpangah* (*Terminalia tomentella*), selected planks of which would be no bad substitute for ordinary walnut. Logs of walnut wood are transplanted from Kashmir across the passes on men's shoulders to Janu, and thence by cart to Wazirabad, whence they go by rail to Bombay, and so to Europe! In sight of this fact, the result of private energy and industrial perseverance, is it not strange that some of the many fine fancy woods of Pegu and Tenasserim should not ere this have been brought to the notice of European dealers and a trade therein established? Burma, one of the richest areas for its size in the world for the finer sorts of woods, with its matchless sea-board, and intersected by rivers and creeks penetrating the virgin forest, is actually distanced in the race by an inaccessible valley, more than a thousand miles from its only available port!! In the one case, however, the development of the resources of the soil is undertaken by private enterprise, whilst in the other, everything is in the hands of a department, vigilant, no doubt, and inexorable in enforcing its own rules, but which has hitherto done less than might be expected towards the practical development of the magnificent resources it guards.

Kurz remarks: "In the Shan States east of Ava grows another species of *Juglans*, with smaller, almost globose, quite smooth nuts, but nothing is known about the tree itself."

The term Walnut is a corruption of the Anglo-Saxon *wealh-hnut*, or foreign nut, the tree having been introduced into Northern Europe from Italy (Prior).¹

Regarding the mythological stories and virtues attached to the walnut, De Gubernatis writes: "Il convient de faire une distinction mythologique entre la noix et le noyer: la noix est le plus souvent considérée comme propice, favorable aux mariages, à la génération et symbole d'abondance; le noyer au contraire est craint comme un arbre triste, haï avec prédilection par les sorcières." It was perhaps the estimation in which the walnut was held that led to its finding a place in the renowned (though absurdly simple as it appears to us) prescription of Mithridates—

"Bis denum rutæ folium, salis et breve granum
Juglandæ que duas, teruo cum corpore ficus."

And after relating many customs connected with this fruit, De Gubernatis remarks: "La noix, et sans doute, tout spécialement la noix à trois noëuds, est le *Deus ex*

¹ Popular Names of British Plants, p. 248.

machina des contes populaires de cette partie de l'Italie." One or two of these customs may be here noted. In the Landes it is the custom for the young Frenchman who is paying his addresses to a girl, to visit her in company with two friends, and pass the night in eating and drinking and telling entertaining and marvellous stories. Towards day-break, when about to take his departure, his sweetheart, if she wishes to reject his suit, signifies the fact by placing before her lover a dish of walnuts. Again, in Belgium, on the 29th of September, or St. Michel's Day, walnuts are used by girls as a means of discovering the sort of husband they are destined to obtain. A number of walnuts emptied of their contents and then carefully closed are mixed with others which are untampered with, and with the eyes shut, a chance selection is made. A full nut gives promise of a good husband, thanks to St. Michel, who of course regulates a rite performed by his worshippers on his special day. Space, however, does not permit a further enumeration of the curious tales connected with the walnut collected by De Gubernatis.

ENGELHARDTIA, *Leschenault*.

Flowers monoëcious, sessile or nearly so. *Male perianth* unequally 3-6-cleft on a 3-lobed bract. *Stamens* 5-13, filaments very short. *Female flowers* very numerous, adhering to the base of a 3- or 5-lobed bract. *Perianth* consisting of 4-5 teeth or lobes, superior. *Styles* 2-4, unequal. *Drupe*s small, dry, on the enlarged wing-like 3-lobed bract.

E. SPICATA, Bl.

Chittagong, Pegu. Tenasserim.

Leaflets entire, without net venation, glabrous; base of female bracts bispid.

E. VILLOSA, Kz. Hills east of Toung-ngoo and Tenasserim at 1000 to 3000 feet.

Leaflets serrate, rarely entire, with strong conspicuous net-venation, and pubescent beneath. Base of female bracts glabrous.

ASURALES.

Flowers hermaphrodite or diclinous. *Perianth* usually coloured. *Stamens* epigynous in the hermaphrodite flowers. *Ovary* inferior, 1 to many-celled. *Fruit* a capsule or berry.

Order RAFFLESIACEÆ.

Flowers dioëcious, rarely hermaphrodite. *Perianth* regular, valvate or imbricate. Leafless root-parasites.

To this order belongs the remarkable genus *Rafflesia* (of the *Rhizanthæa* of Lindley), one species of which has been noticed in Burma by the Rev. C. Parish, who has kindly contributed the following note respecting it.

I copy the following from Lindley, *Vegetable Kingdom*, p. 83: "Rhizogens are parasitical plants destitute of true leaves, in room of which they have cellular scales. Their stem is either an amorphous mass, or a ramified mycelium,¹ sometimes, perhaps always, appearing to be lost in the tissue of the plant on which it grows. No instance of green colour is known among them; but they are brown, yellow or purple. They are furnished with true flowers having genuine stamens and carpels, surrounded by a tripartite or quinquepartite calyx, or absolutely naked.

"Rhizogens all agree in being of a fungus-like consistence, and in their habits of living parasitically on the roots of other plants. They very generally stain water, or spirits, of a deep blood-red colour. Their forms are exceedingly diversified; some have the aspect of a mushroom, or develop a head like a bulrush (*Typha*). Others push forth a thyrsus of flowers, or an elegant panicle; while some have their bloom in a head like that of some Cyueraceous² plant."

¹ Mycelium is the name given to fungus-spawn. Soft cottony-threads which penetrate the soil in a ramified manner, from which, as every gardener who grows mushrooms knows, the plant can be produced.

² The *Thistle-headed* division of *Compositæ*—for example, the flower of the Globe Artichoke.

Lindley divides his Rhizogens into three Orders, *Balanophoraceæ*, *Cytinaceæ*, and *Rafflesiaceæ*. Some botanists, however, separate these Orders, by a long distance in their vegetable system. We are concerned here with the last Order only.

RAFFLESACEÆ, *R. Brown.*

The order is thus described in *The Treasury of Botany*: "A small order of parasitical plants. The plants which compose it have no stem, but consist of flowers only, sometimes of gigantic size, surrounded by a few scales, and sessile on the stems or rhizomes of woody or perennial plants. These flowers consist of a campanulate or globular five-cleft perianth, with numerous anthers on a central column. The ovary is inferior, 1-celled, with many-seeded parietal placentæ, and as many styles as placentæ, more or less united within the column, where the flowers are hermaphrodite; or, in the centre of female flowers. The fruit is indehiscent, with numerous seeds, and the embryo undivided, with or without albumen."

RAFFLESIA, *R. Brown.*

Of this, the most wonderful plant ever yet discovered, the following account may prove interesting:—

It was discovered by Sir Stamford Raffles and Dr. Arnold in or about the year 1818, in the island of Sumatra (of which island and of Java it is the native), where the former was Governor of Bencoolen. While travelling in the Province, they lighted upon a plant which consisted simply of one huge expanded flower, more than a yard across! Descriptions and drawings of this vegetable prodigy were sent to England, and the plant was named by the celebrated Dr. Brown, in honour of its discoverers, *Rafflesia Arnoldii*.

The unexpanded flower buds of *R. Arnoldii* are roundish, and resemble a close cabbage in shape. The flowers appear to be diœcious, and have a perianth which is tubular below, but whose limb is divided into 5 entire fleshy lobes, which partially overlap one another in the bud, but afterwards spread widely. The perianth is flesh-coloured and mottled, and has a foul odour of tainted meat, by which insects are attracted. Within is a thick fleshy rim or corona, lining the upper part of the tube, and within the corona, in the male flowers, and occupying the centre, is a thick fleshy column, adherent to the perianth tube, having one or more projecting rims surrounding its base, and at the top a wide flat plate, the overhanging margin of which is rolled round like the capital of an Ionic column. On the revolute margin is placed a ring of sessile anthers, each one opening by a single pore.

In the female flowers, the central column is similar, but without anthers. The ovary is adherent to the base of the tube of the perianth, has a single compartment containing numerous ovules, and is surrounded by several styles which are blended with the central column.

Three or four species are known differing greatly in size, but little in essential character. . . . Dr. Arnold describes the first flower seen by him as being more than a yard across, the petals or lobes of the perianth as being a foot long, and varying in thickness from $\frac{3}{4}$ to $\frac{1}{2}$ of an inch, and the cup of the flower is calculated to hold twelve pints. The weight of the whole flower was estimated at fifteen pounds.—*Treasury of Botany, Rafflesia.*

I should not have ventured to introduce this long account of a plant, however remarkable, but that I believe the Tenasserim Provinces can claim to possess one species of this extraordinary genus. Many years ago, while crossing the range of mountains which lies to the east of Maulmain, and is visible thence in clear weather, by the Ta-ok Pass, at about an altitude of 3000 feet, I came upon a plant of the kind described. At the foot of a large forest tree—though whether growing on one of its roots or on that of some smaller plant I cannot say—sessile on the ground, was seen one fully expanded flower, and near it two or three unexpanded. Having described the class of plant, it should be needless to say that it consisted absolutely of this flower and nothing else. The expanded flower was campanulate in form,

divided at the edge into 5 segments, which were revolute or turned outwards. The whole interior was a beautiful deep crimson, which made it a striking object, seated as it was close upon the ground. It was about 6 inches in diameter, and of a very thick leathery consistence. I cannot recollect that it had any offensive smell. I gathered it as I would gather a fungus, and though I was most anxious to carry it home, I was quite puzzled what to do with it. I had no spirit, or vessel large enough to put it in, if I had had. To press it was out of the question—for it would have behaved under the process, as many fleshy fungi do, that is to say, it would have deliquesced, or become an offensive putrid mass. Nor was I, unfortunately, provided with drawing materials, beyond a scrap of paper and a bit of pencil, with which I made a hasty and rude outline of it. This sketch, rude though it was, I possessed for several years, and believing that I still possessed it, I have recently searched diligently for it, but in vain. It was the fact of my having it in my possession so long, and seeing it from time to time, that has enabled me to remember it as well as I do. Having, then, made this rude sketch, I put the flower into my vasculum to take its chance, but in two or three days it was a black shapeless mass, and had to be flung away. As far as my memory serves, without the slight additional help the drawing would have furnished, the interior, when looked down upon, was occupied by the large tabular summit of a central fleshy column, in form very like an Agaric, and on the inner and under surface, or where the gills of an Agaric are, were a number of sessile anthers; but as to their number and arrangement I cannot speak farther. It was, I imagine, a male flower of a diœcious species of *Rafflesia*.

The buds were globose, and looked like puff-balls, but what their exterior colour was I forget.

I am sorry to be able to give but such a meagre account of this remarkable flower, but it may suffice to draw the attention of some future botanist towards it.

Order ARISTOLOCHIEÆ.

Flowers hermaphrodite. *Perianth* regular or not, valvate. *Leaves* alternate, exstipulate.

ARISTOLOCHIEÆ.

Ovary sexangular. *Ovules* numerous, biseriæte.

ARISTOLOCHIA,¹ *Linnæus*.

A. ACUMINATA, Lam. (M.).

No other species is mentioned by Mason, but the common Indian species, *A. Indica*, probably occurs as well. Most *Aristolochiæ* contain in their root a volatile oil, a bitter resin, and an acrid extractable substance. Several species were once highly valued in medicine, and are so by natives still, being regarded as excellent in diseases of the womb and kidneys, and as emetic, anthelmintic, and anti-hysterie in their action. Several species have also been held in high esteem as antidotes to snake poison—a fallacious idea, from the extreme rapidity with which that poison acts, and its marvellous subtlety when once introduced into the system; but doubtless the idea of the plant proving of service originated in the fancied resemblance of the leaves to the variegated skin of a snake, or, as it is termed, the 'doctrine of signatures,' another instance of which may be quoted in one of the ingredients in a celebrated snake antidote, which came under my observation in Rangoon, which was the woody skeleton of a fruit (*Martynia diandra*) common in hedgerows in Bengal (though indigenous to tropical America), whose oval framework terminates in two bony recurved hooks, bearing a strong resemblance to the divergent fangs of a viperine snake. The ripe fruit is clothed with a green skin

¹ ἀριστος, best; λοχείος, pertaining to labour. From the supposed efficacy of the plant in regulating the functions of the womb.

and looks like a sort of plum; but, as the flesh decays, the strong recurved hooks become exposed, and no doubt aid efficaciously in the dispersion of the plant by fixing in any passing animal, or causing them at all events to be torn away if brushed against.

BRAGANTIEÆ.

Ovary quadrangular. Ovules numerous, uniscriate.

BRAGANTIA, *Loureiro.*

B. TOMENTOSA, R. Br.

Katchall. Trice Track and Great Nicobar.

Sub-division B. OVARY SUPERIOR.¹ PERIANTH USUALLY DISTINCT.

NEPENTHALES.

Scandent shrubs. *Leaves* alternate, terminated by pilchers.

No species of the order *Nepenthea*, or Pilcher plants, is recorded by Mason, but Mr. Parish met with a species near Mergui.

PIPERALES.

Flowers hermaphrodite or diclinous, usually in spikes or catkins. *Perianth* rudimentary or none. *Ovary* superior, of 1, single-celled, single-ovuled carpel; or of several, free, 2 or many-celled.

Order CHLORANTHACEÆ.

Flowers hermaphrodite or diclinous, males spicate, females cymose or paniced. *Ovary* 1-celled, ovule 1, pendulous, orthotropous. *Embryo* small, albuminous. *Leaves* opposite, stipulate. Shrubs.

CHLORANTHUS, *Swartz.*

C. INSIGNIS, Kz.

Martaban.

Described in J.A.S.B. ii. 1873, p. 108.

Many *Chlorantha* are possessed of aromatic and febrifuge properties, and Blune found the root of *C. officinalis*, which has a smell of camphor and a bitterish aromatic taste, very efficacious in the treatment of the severe intermittent fever of Java.

Order SAURUREÆ.

Flowers crowded on a spadix, hermaphrodite. *Ovary* superior or inferior, 1-celled, with parietal placentas, or 3 to 5-celled with axile placentas. *Ovules* ascending, 2 or many in each cell. *Embryo* antitropous, included on the top of the albumen in the embryonic sac. *Radicle* superior. Herbs. *Leaves* alternate, exstipulate.

HOUTTUYNIA, *Thunberg.*

Spikes surrounded by coloured petal-like bracts. *Stamens* 3. *Ovary* 1-celled, with 3 parietal placentas.

H. CORDATA, Thunb.

India. Siam. S. China.

Order PIPERACEÆ.

Flowers crowded on a spadix, very minute, hermaphrodite or diœious. *Ovary* 1-celled. *Ovule* 1, basilar, orthotropous. *Embryo* albuminous. *Leaves* opposite, alternate, or whorled, exstipulate. Herbs or shrubs.

¹ Inferior in *Cynocrambeæ* and *Gyrocarpetæ*.

CHAVICA, *Miquel*.

Flowers dioecious. *Bracts* stipitate, peltate. *Stamens* 2 or 4. *Ovary* sessile, with 3 to 6 sessile stigmas. *Berries* closely packed, often uniting with, or half immersed in the more or less succulent rachis. Shrubs or woody climbers. *Leaves* alternate. *Spikes* solitary, pedunculate, leaf-opposed.

C. MACROSTACHYA, Miq.

Katchall (K.).

**C. (PIPER) BETLE*, L.

India and Burma. Katchall.

Kwōn-ywet. Betel vine.

This plant is cultivated all over India and Burma. It is planted in rows and trained on a lattice work, or on poles, within an inclosure fenced on all sides and at top, by a screen of grass or thatch, or a framework of bamboo, with the double effect of promoting a moist atmosphere within and bleaching the leaves by the exclusion of direct light. The plants are well watered, and a small door admits the proprietor for the purpose of gathering the leaves, which are made up in bundles for the market. The leaf is warm and aromatic in flavour, and the 'pān,' so universally chewed by all classes in India, is a little conical mouthful of an outer wrapper of betel leaf, within which are folded a few chips of areca nut and cardamoms or some spice. Previously to wrapping up these ingredients, the leaf is smeared over with a paste made of fine shell lime, without which alkaline addition the fine red colour imparted to the saliva by chewing would not be developed. The areca nut, even when cut into small chips, is of course hard, and taxes the teeth to chew properly, so old Burmans, who have lost their teeth, carry about a little mortar, in which they bruise the ingredients of their 'betel' before putting it into their mouths. Chewing pān, when not extravagantly indulged in, is a harmless and probably beneficial luxury, and the preparation of the ingredients gives the Burman as much pleasure as the preparation of his favourite pipe does the European smoker.

C. RIBESIOIDES, Wall. (M.).

Burma.

Tor-kwōn.

As Kurz does not include this plant, he probably regards it as identical with the last.

**C. (PIPER) LONGUM*, L. (M.).

C. Roxburghii, Miq.

Peik-khyen.

Long pepper is a creeper easily cultivated, and should be trained like hops on poles. It is propagated by cuttings, and as the unripe fruit is the most powerful, it is gathered when the berries are still green and before they ripen and turn red. The root is used as a drug as well as the berries, but its properties are milder.

PIPER, *Linnaeus*.

**P. NIGRUM*, L. (M.). Occasionally cultivated.

Ngā-yōk-koung.

As in the case of *P. longum*, the berries dried before being perfectly ripe constitute the black pepper of commerce. The white pepper is the same berry allowed to ripen, and then decorticated by maceration in water, the flavour consequently being rendered milder than that of black pepper.

The qualities for which different peppers are valued depend on the presence of an aromatic volatile oil, a resin, and a crystallizable principle, *Piperine*, which is present in all parts of the plant, but more abundantly in the root and fruit. Pepper seems to possess some merit as a febrifuge, and in mild forms of the disease, or in malarious localities, is no doubt of considerable value, from its powerfully stimulant and carminative properties.

EUPHORBIALES.

Flowers hermaphrodite or diclinous. *Perianth* various or none. *Ovary* superior 2 or many-celled. *Ovules* 1 or many in each cell, pendulous, anatropous. *Fruit* usually capsular, 1 or many-celled. *Cells* 1 or many-seeded.

Order EUPHORBIACEÆ.

Flowers unisexual. *Calyx* free, various, usually 5- or 3-lobed or toothed, or wanting, the lobes imbricate or valvate. *Corolla* consisting of several petals, and usually isomerous with the calyx-lobes and alternating with them, or very rarely gamopetalous, hypogynous, or more or less perigynous, or wanting altogether. *Disk* variously shaped, or none. *Stamens* numerous, few or solitary, in the male flowers central or inserted at the bottom or at the middle of the calyx. *Filaments* free or united into 1 or more bundles, erect or variously incurved. *Anthers* free or cohering, variously opening by 1 or 2 slits, rarely by pores. *Ovary-rudiment* in males various or wanting. *Ovary* superior, usually 3 or 1, rarely many-celled, the carpels whorled round a central column, persisting after ripening of the fruit, with 1 or 2 ovules in each, suspended from the summit of the inner angle. *Style* various, usually short and divided into as many entire or repeatedly branched stigmatic lobes as cells to the ovary. *Fruit* various, usually a 3- to many-celled capsule, opening elastically into as many valves, or drupaceous and indehiscent. *Seeds* with or without arillus or strophiole. *Embryo* straight in a fleshy albumen, with flat cotyledons and a superior radicle, or rarely the cotyledons fleshy, and little or no albumen. Trees, shrubs, or herbs erect or climbing, very various in habit, with watery or milky juice. *Leaves* usually alternate, rarely opposite or whorled, simple or divided. *Stipules* usually present. *Flowers* usually minute, forming various inflorescences.

A very large order, more closely allied to *Tiliaceæ* than to any other of apetalous plants. An acrid milky juice is a prevailing character. The seeds of some are purgative and the roots of others emetic. The manchincee (*Hippomane mancinella*) is a famous arrow poison. Euphorbium, a gum resin, is produced by several cactus-like *Euphorbias*. Some of the African species of this genus yield deadly arrow-poison. The Brazilian caoutchouk (*Siphonia elastica*), a tree indigenous in Guayana and Brazil, yields the bottle india-rubber. The seeds of many species yield oil like castor-oil (*Ricinus*). The sweet and bitter 'cassava' is derived from the roots of *Manihot utilisissima*, often cultivated by Burmans. 'Turnsole,' a well-known purple and blue dye, comes from *Crotophora tinctoria*. A few yield edible but inferior fruits, like *Cicca disticha*, *Emblica officinalis*, etc. Box-wood (*Luxus sempervirens*) is a very hard and compact wood used in engraving. Several of the Burmese euphorbiaceous trees yield good timber, especially those grown in deciduous forests, while the timber of those peculiar to the tropical forests seems to be of inferior quality or valueless (Kurz).

* *Ovules* 2 in each cell.

× *Calyx* imbricate in bud.

‡ *Fruit* capsular-dehiscing, dry, or with a sappy epicarp.

† *Capsule* dry.

+ *Stamens* round an ovary-rudiment.

ACTEPHILA, Blume.

Styles free. *Seeds* naked. *Capsule* woody or dry, coriaceous. *Disk* outside the stamens. *Stamens* inserted on a flat 5-lobed receptacle round the base of the ovary-rudiment. *Ovary* 3-celled, the cells 2-ovuled. *Styles* 3, united at the base, the branches 2-cleft. *Capsule* tri-cocous, each coccus bi-valved. Neither arillus nor albumen.

A. JAVANICA, Miq. E.S.

Tree forests of South Andaman and Katchall.

All parts quite glabrous. Leaves acute to cuneate at the base. Capsules smooth.

A. PUBERTLA, Kz. *E.S.* The Andamans. Katchall and Tallangchong.
Younger branchlets and petioles puberulous. Leaves rounded or cordate at the base. Capsules granular-wrinkled.

+ + *Stamens central. No ovary rudiment.*

GLOUDBION, Forster.

Ta-ma-sök (*generic*, Kurz).

Flowers monœcious. *Calyx* 5-6-parted. *Glands* none. *Stamens* 3-5, rarely more. *Anthers* sessile on a central column, tipped by the projecting connective. *Ovary* 3-15-celled, each cell 2-ovuled. *Capsules* globular, 3-15-celled. *Cocci* 2-valved, the epicarp usually separating elastically. *Seeds* paired, with a usually crimson spurious arillus.¹

* *Stamens 5, rarely 8-4.*

‡ *Ovary (and often the capsule) pubescent. Female flowers sessile or nearly so.*

G. COCCINEUM, Muell. *E.T.* Pegu. Martaban, and Tenasserim.

Young branchlets, calyx and pedicles puberulous or pubescent. Style-column conical. Capsules 8-12-celled, fleshy coriaceous, white or scarlet.

G. LANCEOLARIUM, Dalz. *E.T.* Chittagong and eastern slopes of the Pegu Range.

Calyx, pedicles, and all parts quite glabrous. Style-column cylindrically-conical, at top 6-8-toothed. Capsules glabrous, 6-8-celled.

‡‡ *Ovary and capsule glabrous. Female flowers pedicelled.*

G. CALOCARPUM, Kz. *E.T.* Beach forests of the Andamans. Kamorta, Katchall. Car and Great Nicobar.

Style-column conical, 4-5-stigmatic at the apex. Capsule 5-4-coccous.

G. MULTIOCLARE, Muell. *E.T.* Bhamo.

Style-column minute, deplanate-conical, with a broad base. Capsule 10-15-celled, fleshy-coriaceous.

G. SUBSCANDENS, Zell. *E.S.* Tenasserim.

Style long, funnel-shaped, clavate. Capsules 4-3 coccous.

** *Stamens 3.*

× *Styles funnel-shaped or tapering at base, the stigmas short or tubercle-like.*

G. DALTONI, Kz. Prome and Upper Tenasserim.

Calyx, capsules, and all parts quite glabrous. Flowers, male and female, sessile.

G. NEPALENSE, Kz. Ava (probably).

Young parts, flowers, capsules, and leaves beneath puberulous. Flowers pedicelled.

×× *Styles equal. Stigmas linear, spreading. Capsules 3-6-coccous.*

G. DASYSTYLUM, Kz. *E.T.* Hills East of Toung-ngoo up to 3500 feet.

Flowers, stigmas and young shoots pubescent. Capsules or capillary peduncles up to $\frac{1}{2}$ inch long, pubescent.

G. LEIOSTYLUM, Kz. *E.S.* Eastern Slope of the Pegu Range and Tenasserim up to 4000 feet.

Like the last, but styles glabrous and capsule barely peduncled.

¹ Kurz remarks, "Genus distinctissimum a cl Muell. Arg. cum *Phyllanthi* genere inapte conjunctum, structurâ florum femininorum et etiam (uti jam beat Roxburghius docuit) arillo spurio facile distinguitur. In siccis hic arillus spurius vel potius tegumentum exterius seminis, ut plurimum pulchre miniatus vel cocœneus, siccus, more Euphorbiacearum aliarum (e.g. *Coccyton*) membraniformis, indeque ab auctoribus plurimis omnino prætervisis erat."—J.A.S.B. ii. 1873, p. 237.

× × × *Style thick, conical, sometimes minute, or hemispherical.*

‡ ‡ *Ovary and capsule glabrous.*

G. GLAUCIFOLIUM, Muell. *E.T.* Upper Tenasserim.

All parts glabrous. Capsules flat, depressed at top, 3-4-coecous, smooth, almost pruinous, shortly peduncled. Style-column minute.

G. FUGIFOLIUM, Kz. *E.T.* Tree forests of Chittagong, Martaban and Eastern Slopes of the Pegu Range.

All parts glabrous. Capsules sessile, 6-4-coecous, depressed, but not flattened at the top.

G. SPHEROGYNUM, Kz. *E.T.* Tree forests of Eastern Slopes of the Pegu Range and Tenasserim up to 2000 feet.

All parts quite glabrous. Style-column minute, almost spherical and constricted at base. Capsules very shortly peduncled.

‡ ‡ ‡ *Ovary and capsule puberulous or tomentose.*

G. (PHYLLANTHUS) ANDAMANICUM, Kz. *E.T.* Tree Forests of South Andaman.

All parts quite glabrous. Leaves glaucous beneath. Capsules almost sessile, velvety, 6-4-coecous.

G. BANCANUM, Miq. Bamboo Jungles of Middle Andaman.

All softer parts and leaves beneath, shortly tomentose. Capsules peduncled, puberulous, 5-4-coecous.

PHYLLANTHUS, *Linnaeus.*

Flowers monœcious, rarely dicecious. *Calyx* 4-6-parted, the latter in 1 or 2 series, imbricate. *Capsules* usually 3-coecous. *Styles* 2-cleft. *Disk* or hypogynous glands present. *Testa* of seeds dry.

* *Trees. Capsules more or less woody.*

P. COLUMNARIS, Muell. All over Burma.

Kalong-lek-thai (Kurz).

Young shoots shortly rusty pubescent. Flowers in axillary clusters.

** *Shrubs. Capsules small, crustaceous.*

P. BLEBOTRYOIDES, Muell. Tenasserim.

Kurz adds from the Nicobars:

P. NIRURI, L. Katchall.

A weed round native huts.

† † *Capsules fleshy coriaceous, or crustaceous with a sappy epicarp.*

+ + *Stamens central, no ovary-rudiment.*

° *Seeds with arillus.*

MELANTHESOPSIS, *Mueller Arg.*

Flowers monœcious. *Male calyx* high up, gamosepalous, the lobes in two series, and inflexed, imbricate. *Female calyx* usually enlarged under the fruit. *Petals, ovary rudiment, and disk* none. *Stamens* central, united in a column, the cells longitudinally adnate. *Ovary* 3-celled, each cell 2-ovuled. *Style* 2-cleft. *Fruit* a capsular 3-coecous berry, hardly dehiscent.

M. PATENS, Muell. Arg. Pegu and Tenasserim.

Leaves membranous, without mucro.

M. FRUTICOSA, Muell. Arg. Martaban from 2500 to 4000 feet.

Leaves rigidly coriaceous, mucronate.

°° *Seeds without arillus.*

SAUROPS, *Blume.*

Flowers monœcious. *Male calyx* deeply 6-cleft, minute. *Petals* none. *Disk* none, or outside the stamens, 6-lobed. *Stamens* in a short column. *Anthers* opening by 2 slits, the cells adnate, lengthwise. *Ovary-rudiment* none. *Ovary* 3-celled, each cell 2-ovuled. *Styles* 3, very short, 2-cleft. *Capsule* fleshy-coriaceous or crustaceous, 6-valved.

S. ALBICANS, Bl. All over Burma.

Yo-ma-hin-yo (Kurz).

Leaves 2-3 inches long, ovate. Capsules the size of a cherry; pure white.

S. QUADRANGULARIS, Muell. Arg. All over Burma.

Leaves $\frac{1}{2}$ to 1 inch long, more or less orbicular. Capsule the size of a large pea. Flowers only $\frac{1}{2}$ a line across. Branchlets compressed, 4-angular.

var. β *puberulus*. All young parts minutely pubescent.

BREYNIA, *Forster.*

Flowers unisexual. *Male calyx* turbinate, high up, gamosepalous, 6-lobed, the lobes inflexed and imbricate in 2 rows, almost appendaged on the back. *Petals* and disk none. *Stamens* central, in a column, the anthers longitudinally adnate. *Ovary* 3-celled, each cell 2-ovuled. *Capsules* berry-like, 3-cocecons.

B. RHAMNOIDES, Muell. Arg. Beach forests of Arakan. The Andamans and Nankowry.
Gong-nyin-ya.

All parts glabrous, leaves elliptical, $\frac{1}{2}$ to 1 inch long, on a slender 1-1 $\frac{1}{2}$ line long petioles. Capsules the size of a pea, fleshy, red, then purplish-black.

B. RACEMOSA, Muell. Arg. Katchall and Great Nicobar.

B. OBLONGIFOLIA, Muell. Arg. Katchall.

var. *foliis majoribus*.

CICCA, *Linnaeus.*

Flowers unisexual. *Calyx* 5-6- (rarely 4-partite). *Disk* developed in either sex, gland-like, or in females united and urceolate and annular. *Stamens* 3-5. *Ovary* 3-12-celled, each cell 2-ovuled. *Styles* 3-1, bifid. *Capsule* drupaceous and delhiscent, or berry-like and fleshy. The cocci woody or crustaceous.

* *Capsules drupaceous, sappy-fleshy, large, cocci woody.*

× *Flowers usually 6-merous. Stamens in a column. Ovary and capsule 3-celled; glands in females urceolate-connate. Drupes white.*

C. ALBIZZOIDES, Kz. Western slopes of the Pegu Range up to 2000 feet.
Shā-mā or Thit-shā (Kurz).

Leaves up to 1 inch long by $\frac{1}{2}$ an inch broad. Drupes about an inch in diameter.

C. MACROCARPA, Kz. Prome and other parts of the Irrawaddy Valley.
Zi-hpyu (Kurz).

Leaves narrow, linear, bark wrinkled and fissured; styles simply 2-cleft, the lobes broad and short, 3-crenate; capsules about an inch in diameter.

C. (PHYLLANTHUS) EMBLICA, L. All over Burma up to 3000 feet.

Ta-shā-pen (Kurz). Zi-hpyu (Mason).

As the last, but bark smooth, peeling off conchoidally. Styles twice 2-cleft, the end lobes subulate. Drupes only $\frac{1}{2}$ an inch in diameter.

Wood brown, rather heavy, close-grained, takes a fine polish, weight 45 lbs.¹ Bark

¹ Kurz follows Braudis in giving 35 lbs. as the weight, but this is clearly an error.

and fruits used for tanning (Kurz). I think Kurz mistakes the native name, as in Pegu at least it is known as 'Shā-hpyu' or white Shah. The fruits are eagerly eaten by the Burmese though very anstere, and the wood is reckoned durable especially in water.

× × Flowers 4-merous, stamens free, 4, glands in males and hermaphrodites free and distinct, ovary and drupes usually 4-celled.

C. (PHYLLANTHUS) DISTICHA, L. Cultivated in Chittagong, Pegu and the Andamans.
Then-bor-zi-hpyu.

Quite glabrous. Flowers red, drupes yellow.

** Capsules berry-like, small, the cocci crustaceous.

+ Stamens 5, all free. Disk annular, 5-gonous. Capsule 3-2-coccous, succulent white.

C. (SECRINEGA) LEUCOPYRUS, Muell. Arg. Ava (probably).

Armed with spiny abortive branchlets. Flowering branchlets terete.

C. (SECRINEGA) OBOVATA, Muell. Arg. All over Burma. Kamorta. Katchall and Car Nicobar.
Yē-chyn-yā.

Unarmed, flowering branchlets compressed, 4-cornered.

+ + Stamens 2-adelphous the 3 inner ones wholly, the outer only basally united. Glands in females distinct, capsules 12-6-coccous, succulent, purple or purplish-black.

C. (PHYLLANTHUS) RETICULATA, Poir. Arakan. Pegu and Tenasserim.

Leaves $\frac{1}{2}$ to 1 inch long. Capsules depressed-globular. Adult branches smooth.

var. *a reticulata*. Young shoots and leaves beneath puberulous.

var. *β glabra*, Thw. All parts glabrous.

C. MICROCARPA, Bth.

Tree forests all over Chittagong, Burma, and the Andamans.

Leaves 1-2 inches long. Capsules globular. Adult branches lenticellate-rough.

var. *a microcarpa*. All parts glabrous.

var. *β pubescens*. Young shoots and often beneath the leaves puberulous.

Flowers racemose-panicled.

BISCHOFFIA, Blume.

Flowers dioecious. *Calyx* deeply 5-partite, the lobes of the male cucullate and imbricate. *Petals* and *disk* none. *Stamens* 5, free, inserted round an *Ovary-rudiment*. *Anthers* opening by 2 slits. *Ovary* (occasionally surrounded by 5 staminodes) 3- or rarely 4-celled, each cell 2-ovuled. *Styles* basally connate, simple linear. *Capsule* drupaceous, sappy, with a 3-4-coccous crustaceous putamen.

B. JAVANICA, Bl.

All over Burma up to 2500 feet.

Flowers greenish in axillary, glabrous panicles. Drupes the size of a pea, sappy, bluish-black, smooth.

Wood red, takes a fine polish. Weight 47 lbs. (Gamble).

‡ ‡ *Fruit indehiscent, drupaceous or berry-like.*

× × × *Flowers in racemes or spikes, the males often amentaceous. Stamens free, round an ovary-rudiment.*

◦ *Seeds with an arillus.*

BACCAUREA, Loureiro.

Flowers dioecious or monoecious. *Calyx* 4-5-cleft, imbricate. *Petals* none. *Stamens* 4-10. *Ovary* 3- (rarely 2-5-) celled, each cell 2-ovuled. *Fruit* a spurious berry, covered with an irregularly bursting epicarp. *Seeds* enveloped in a white sappy and edible arillus.

- B. SAPIDA, Muell. Arg. *E.T.* Tree forests all over Burma and the Andamans.
Ka-nā-zo (Kurz).
Male calyx lobes, and bracts of either sex a line long. Female calyx nearly
3 lines long. The fruit is much esteemed by the Burmese.
- B. PARVIFLORA, Muell. Arg. Tenasserim.
Ka-nā-zo (Kurz).
All the above parts only half the size, the female calyx lobes only a line long.
- B. JAVANICA, Muell. Nankowry.

SECURINEGA, *Jussieu*.

- S. OBOVATA, Muell. Arg. Kar Nicobar.

°° *Seeds without arillus.*

ANIDESMA, *Burmah*.

Flowers dioecious. *Calyx-lobes* 3-8. *Petals* none. *Stamens* often as many as the calyx-lobes or more or fewer, and opposite to them round an ovary-rudiment. *Anthers* opening by 2 slits. *Ovary* 1-celled by suppression with 2 ovules. *Style* terminal, or nearly so, 3-parted, the stigmatic lobes rigid and partly 2-lobed. *Fruit* a sappy drupe, indehiscent, containing a long grooved putamen usually 1-seeded. *Seeds* without arillus.

* *Flowers sessile or nearly so. Stigmas terminal.*

+ *Spike quite glabrous.*

- A. BUNIAS, Sprengl. *E.T.* Upper Tenasserim.
All parts quite glabrous. The rachis of spike rather strong. Leaves glossy.

+ + *Spike more or less pubescent.*

‡ *Leaves rounded or retuse.*

- A. GHESEMBILLA, Gaertn. Pegu and Martaban. Kamorta.
Pyi-sin (Kurz).

More or less puberulous. Spikes robust, tomentose.

‡‡ *Leaves more or less acuminate.*

+ *Calyx 3-lobed.*

- A. MARTABANICUM, Presl. Upper Tenasserim.
Young shrubs, and leaves along the nerves pubescent.

+ + *Calyx 4-parted.*

- A. FRUTICULOSUM, Kz. Tidal forests of Pegu.
Leaves small, 1-2½ inches long, hirsute above, densely pubescent beneath.
- A. VELUTINUM, Tul. *E.T.* Tree forests, Eastern Slopes of Pegu
Kin-pa-lin (Kurz). Range and Tenasserim.
Leaves 4-5 inches long, like all the softer parts shortly and softly pubescent.

** *Flowers pedicelled.*

× *Stigmas lateral, all parts pubescent, bracts linear-lanceolate.*

- A. VELUTINOSUM, Bl. *E.T.* Tenasserim.
Flowers minute in densely-bracted pubescent catkins.

× × *Stigmas terminal.*

- A. MENAST, Muell. Arg. Eastern Slopes of the Pegu Range, Martaban
Kin-pa-lin. the Andamans and Car Nicobar.
Young parts slightly pubescent. Racemes puberulous. Stamens usually 4.

A. DIANDRUM, Roth. All over Burma.

Kin-pa-lin (Kurz).

Young parts slightly pilose. Racemes glabrous. Stamens usually 2. Wood heavy, red-brown, close-grained, adapted for cabinet work (Kurz).

Kurz adds from the Nicobars :

A. PENTICULATUM, Miq. Tree forests of Kamorta.

A. PERSIMILIS, Kz. Tree forests of Kamorta.

AFOROSA, Blume.

Flowers dioecious, in catkins. Calyx 3-6-parted. Petals and disk none. Stamens 2 (or rarely 3-5), free, inserted round a minute ovary-rudiment. Anthers opening by 2 slits. Ovary 2- (rarely 3-) celled, each cell 2-ovuled. Styles as many as cells, bifid. Capsule fleshy coriaceous, usually 1-seeded, by abortion. Albumen copious.

* Ovary villous, tomentose or pubescent.

× Leaves shortly and softly pubescent beneath.

A. VILLOSA, Baill. Pegu and Tenasserim.

Ye-mein (Kurz).

Berries densely velvety-tomentose.

Exudes a red resin, and the bark is used for dyeing red (Kurz).

× × Adult leaves quite glabrous.

A. MACROPHYLLA, Muell. Arg. Pegu and Tenasserim.

In-jin or In-kyin (Kurz).

Leaves 1-2 feet long by $\frac{1}{2}$ to 1 foot broad, deeply cordate at base. Fruits velvety-tomentose.

A. VILLOSULA, Kz. E.T. Tree forests of the Eastern slopes of the Pegu Range. Tenasserim and the Andamans.

Leaves 3-5 inches long, not cordate at the base. Style-lobes 2-lobulate.

A. ROXBURGHII, Baill. E.T. Tree forests of Chittagong. Pegu and Tenasserim. Style-lobes simple, short.

** Ovary and leaves quite glabrous.

A. LANCEOLATA, Thw. Tenasserim.

Styles minute, tooth-like. Leaves small.

A. MICROSTACHYA, Muell. Arg. Ava. Chittagong. Tenasserim. Kamorta. Great Nicobar.

Styles long, lacerate-fimbriate. Leaves large, drying yellow.

Kurz adds from the Nicobars :

A. GLABRIFOLIA, Kz. Kamorta.

Flowers solitary or clustered in the axils of the leaves.

CYCLOSTEMON, Blume.

Flowers dioecious. Calyx deeply 4-5-partite, imbricate, the 2 outer sepals larger. Petals none. Stamens 4-10, free, surrounding the disk. Anthers opening by 2 slits, the connective not produced. Ovary 4-2-celled, each cell 2-ovuled. Styles entire, united at the base. Drupes fleshy, indehiscent, containing a 4-2-coecous, almost crustaceous, 4-1-seeded capsule.

* Flowers on $\frac{1}{2}$ inch long petioles. Stigmas sessile, large, obversely broad-triangular.

C. MACROPHYLLUM, Bl. E.T. Tree forests of South Andaman.

Female flowers arising from the stem and branches. Leaves large, laxly veined.

C. (HOPEA) EGLANDULOSUM, Roxb. *E.T.* Tree forests of Arakan.

Female flowers in the axils of the leaves. Leaves small, elegantly net-veined.

** *Flowers on pedicels hardly ½ a line long. Stigma sessile, minute, 3-angular.*

C. SUBSESSILE, Kz. *E.T.* Tree forests of Arakan, Martaban and Khasya Hills.

Flowers greyish, pubescent. Drupes obsolete 4-lobed, puberulose.

Kurz adds from the Nieobars :

C. LEIOCARPUM, Kz. Tree forests of Kamorta.

HEMICYCLIA, *Wight et Arnott.*

Flower diœcious. *Calyx* deeply 4-5-lobed, imbricate. *Petals* none. *Stamens* 8-25, free, inserted round the disk.

Anthers opening in 2 slits. *Ovary* 1-celled, 2-ovuled. *Stigmas* sessile or nearly so, almost discoid and turning reniform, 2-lobed, deciduous. *Drupes* glabrous, fleshy, 1-celled and 1-seeded.

H. SUMATRANA, Muell. Arg. *E.T.* Irrawaddy Valley and Martaban.

Putamen of drupe irregular, obliquely truncate on both sides at the apex, slightly keeled.

Wood heavy, close-grained. A fine wood (Kurz).

H. ANDAMANICA, Kz. *E.T.* The Andamans.

Putamen regular, half terete.

PETTRANJIVA, *Wallich.*

Flowers diœcious, apetalous. *Disk* none. *Calyx* in males 2-3 parted, in females 4-6 parted. *Stamens* 3-2 free, or 1-2adelphous. *Ovary rudiment* none. *Ovary* 3-2-celled, each cell 2-ovuled. *Fruit* an indehiscent drupe containing a bony 1-celled and 1-seeded putamen. *Seeds* albuminous.

P. ROXBURGHII, Wall. *E.T.* Pegu.

Touk-yat (Kurz).

Leaves oblong, somewhat oblique on one side, 2-3 inches long on a slender 2 lines long petiole.

× × *Calyx* valvate in bud. *Fruit* capsular. *Flowers* in axillary clusters.

BRIEDELIA, *Willdenow.*

Flowers monœcious, rarely diœcious. *Calyx* deeply 5 partite, the lobes valvate, in females often deciduous. *Petals* 5, alternating with and shorter than the calyx-lobes. *Ducts* developed, in the male simple and adnate to the calyx, in the female double, the outer similar to the male disk, the inner sheathing the ovary. *Ovary* 2 (rarely 3)-celled, each cell 2-ovuled. *Seeds* albuminous.¹

* *Erect trees. Ripe fruits globular.*

† *Young branchlets and shoots pubescent or tomentose.*

+ *Flowers sessile.*

B. TOMENTOSA, Bl. *E.T.* All over Burma up to 2000 feet.
Kamorta and Katchall.

Leaves small, glaucous, sparingly pubescent beneath. Flowers glaucous.

+ + *Flowers pedicelled.*

B. PUBESCENS, Kz. *E.T.* Tree forests of the Pegu range on its Eastern slopes.

¹ Kurz remarks: "Genus *Briedelia* a *Lebdiopsis* differt cœcis inter se non connatis, et seminum testa membranacea siccâ. Drupa in *Lebdiopsis* epicarpio carnosâ gaudet, cocci lignosi connati, et semina tegumento exteriori succoso-carnoso circumdata sunt.—"J.A.S.B. ii. 1873, p. 241.

Kyet-ta-yor (Kurz).

Leaves thin-chartaceous, one-coloured, pubescent beneath. Flowers axillary, greyish-tomentose.

B. RETUSA, Spreng.

Ava and Pegu up to 2000 feet.

Tseik-khye. 'Goat's dung.'

Leaves thin-coriaceous, glaucescent, and puberulous beneath, strongly-veined. Flowers glabrous. Drupes purplish-black, the size of a pea, containing a dehiscent 2-coecous putamen. Wood grey, prized for house posts. So named from its drupes, as Sapindus is so called from the dark marks in its wood.

‡‡ *All parts glabrous.*

B. ALENA, Wall.

Ava.

Leaves blunt or rounded. The female flowers crimson, shortly pedicelled.

B. OVATA, Dene. *E.T.*

Tenasserim and the Andamans.

Leaves abruptly acuminate. Bracts of flower-clusters pubescent. Female flowers almost sessile.

** *Shrubs. Ripe fruits elliptical.*

B. STIPULARIS, S.S.

All over Burma.

Sin-ma-no-pyin (Kurz).

Leaves bluntish. Calyx glabrescent, enlarging under the fruit. Female flowers shortly pedicelled, disk smooth.

B. DASYCALYX, Kz.

Ava and Pegu.

Leaves shortly acuminate. Calyx densely pubescent. Flowers sessile. Disk round the fruit, pilose.

Kurz adds from the Nicobars:

B. GLAUCA, Bl.

Kamorta and Katchall.

CLEISTANTHUS, *Hooker, f.*

Flower monœcious or diœcious. *Calyx* 5-parted. *Petals* 5, small, alternating with the calyx-lobes. *Disk* explanate, almost entire to 5-parted. *Ovary* 3-celled, each 2-ovuled. *Styles* 3-, more or less 2-cleft. *Seeds* without arillus. Trees with alternate simple leaves.

C. MYRIANTHUS, Kz. *E.T.*

Pegu. Tenasserim and the Andamans.

Capsules stalked. Young parts and leaves beneath tawny, pubescent.

C. STENOPHYLLUS, Kz.

Tenasserim (or the Andamans).

Capsules sessile. All parts glabrous.

** *Ovules solitary in each cell.*

× *Calyx valvate in bud (tips of sepals rarely imbricate).*

+ *Petals present, or if suppressed the hypogynous glands opposite the calyx-segments.*

‡ *Stamens in bud, inflexed or incurved.*

CROTON, *Linnaeus.*

Flowers usually monœcious. *Calyx* 5- (rarely 4-6- or in females up to 12-) partite. *Petals* as many as sepals, in males developed, in females rudimentary. *Glands* of the disk alternating with the petals. *Stamens* usually 10-20. but may be less or more, the filaments inflexed in bud. *Ovary* 3- (rarely 2-4-) celled.

* *Style simply 2-cleft to the middle or to near the base.*

× *Indument of young shoots silvery or coppery scaly.*

‡ *Pedicels of female flowers very short and thick, sulcate.*

C. ARGYRATUS, Bl. *E.T.* Tree forests of Martaban and Tenasserim. Kamorta.

Leaves chartaceous acuminate, densely silvery or coppery-scaly beneath.

C. ROBUSTUS, Kz. *E.T.* Pegu Range and Tenasserim.

Leaves coriaceous, bluntish or retuse, adult almost glabrous, lateral nerves faint.

†† *Pedicels terete and often slender.*

C. OBLONGIFOLIUS, Roxb. Ava, Arakan, Pegu up to 2000 feet and
Thyt-yin (Kurz). often cultivated by the Burmese.

Adult leaves glabrous, coarsely repand-serrate. Capsule the size of a cherry-stone, smooth, seeds 3 lines long.

C. JOUFFRA, Roxb. Pegu and Martaban.

Adult leaves glabrous. Capsule the size of a pigeon's egg. Scaly stellate-puberulose. Seeds $\frac{3}{8}$ of an inch long.

×× *Indument of young shoots, of sessile and tubercle-stalked stellate hairs.*

† *Leaves penninerved or indistinctly 3-nerved at base.*

C. WALLICHII, Muell. Arg. Tree forests of Eastern Slopes of the
Pegu Range and Tenasserim.

Young leaves all over pubescent and adult ones, beneath. Capsules the size of a pea, minutely puberulous. Seeds 2 lines long.

†† *Leaves 5-6 nerved at the base.*

+ *Capsule obsolete 3-lobed, or almost terete. Leaves 5-nerved at base.*

† *Inflorescences glabrous or nearly so.*

**C. TIGLIUM*, L. All over Burma.

Ku-na-kho (Kurz).

Adult parts glabrous. Female pedicels thick, silvery-scaly. Male pedicels slender, glabrous. Capsules almost oblong. Used as a hedge plant, it may be seen in all large towns. Cattle and goats eat its leaves, which render the milk violently purgative to infants fed on it. All the plant possesses medicinal properties. The root is a drastic purgative. The wood is a sudorific or in large doses purgative, the dried leaves the same, whilst the seeds are powerfully poisonous and purgative. Waring, however, give the following directions for preparing a cheap and safe purgative from them: Boil the seeds thrice in milk, drying them after each operation. Then carefully remove the outer shell and the embryo (the last if allowed to remain causing violent tormina and vomiting). To 5j of the seeds thus prepared add 5ij of catechu, adding a few drops of Ol. Menth. Pip. and divide into two grain pills. This formula is recommended by Dr. White, and one recommendation of this safe and efficacious medicine is that 500 doses may be contained in a small box, and purchased for half a rupee. The undue operation of these pills may be checked by a draught of lemon-juice.

†† *Inflorescences stellately-pubescent. Leaves often with a stalked gland on the crenatures along the margin.*

Δ *Capsule the size of a pea or larger.*

C. SUBLYRATUS, Kz. Coast forests of the Andamans.

Young shoots rusty-scurfy. Basal glands of leaves stalked. Capsule sparingly appressed-stellate-hairy.

C. FLOCCULOSUS, Kz. Irrawaddy Valley.

Young shoots softly floccose-stellate. Basal glands of leaves sessile. Capsules densely and softly stellate-tomentose.

Δ Δ *Capsules the size of a bullet or pigeon's egg.*

C. CAUDATUS, Geisel. *S.S.* Prome and Pegu.

Young shoots minutely tubercled-stellate hispid. Basal glands of leaves stalked. Capsules minutely tubercled, stellate-rough.

++ *Capsules deeply 3-lobed.*

C. CALOCOCCUS, Kz. S.

Rangoon.

Leaves 3-nerved at the base, pubescent. Capsule the size of a pea, densely tubercled, stellate-hispid.

‡‡ *Stamens in bud erect.*

† *Petals in males as many as calyx segments. Ovary-rudiment none. Stamens central.*

SUMBAVIA, Baillon.

Flowers monœcious. Calyx in males 5-partite and valvate, in females 6-partite and slightly imbricate. Petals in the males conspicuous, in the females minute, gland-like or obsolete. Stamens central, numerous. Anthers erect, basifixed, 2-rimose, the cells adnate. Ovary 3-celled, each 1-ovuled. Capsule 3-coccous. Seeds arillate.

S. MACROPHYLLA, Muell. Arg. E.T.

Pegu Range and Tenasserim.

Leaves 2-glanded at base, acuminate, 6-9 inches long, thickened at the apex, on a silvery petiole 1-2 inches long.

‡‡ *Calyx regularly valvate in bud. Male flowers with twice as many petals as sepals in females.*

AGROSTISTACHYS, Dulz.

Flowers dioecious. Stamens 8-12 in two whorls, the upper whorl 4-6-androus, the lower with as many anthers as petals. Anther-cells unequally 2-valved. Ovary-rudiment none. Ovary 3-celled, each cell 1-ovuled. Capsule 3-coccous, dry.

A. LONGIFOLIA, Muell. Arg.

Tenasserim (or the Andamans).

All parts glabrous. Flowers in 6-3 or 2-stichously-bracted axillary spikes.

‡‡‡ *Calyx irregularly bursting in 2 or 3 lobes. Petals (at least in the males) more than calyx-segments. Ovary-rudiment none. Stamens central.*

ALEURITES, Forster.

Flowers monœcious. Petals in both sexes 5. Disk present in both sexes, in males urceolate, or reduced to 5 glands. Stamens numerous, on a conical naked torus. Anther bi-rimose, the connective not produced. Ovary-rudiment none. Ovary 2-5-celled, cells 1-ovuled. Styles as many as cells, deeply 2-cleft. Fruits large, 2-5-coccous. Cocci bony. Seeds spuriously white-arilled. Albumen oily.

* A. MOLUCCANA, Willd. E.T.

Cultivated in Pegu and Tenasserim.

Drapes up to 2½ inches in diameter, fleshy, containing 1 or 2 hard irregularly furrowed nuts. Seeds very oily. The fruits exude gum, and the seeds yield half their weight of oil, which is excellent for culinary uses or for burning. The nuts are pleasant and edible, either raw or roasted. The tree is a native of the Moluccas, but introduced into India, Australia and elsewhere.

++ *No petals.*

‡ *Stamens round an ovary-rudiment.*

SYMPHYLLIA, Baillon.

Flowers monœcious. Calyx 3-5-parted, the males valvate, the females imbricate in bud. Disk none. Stamens free, alternating with the sepals round a columnar Ovary-rudiment. Ovary 3- (rarely 2)-celled, cells 1-ovuled. Shrubs with simple penninerved leaves.

S. SILHETANA, Bail. E.S.

Tenasserim.

‡‡ *Ovary-rudiment none. Stamens central and polyadelphous.*

† *Flowers dioecious.*

§ *Capsule drupaceous.*

TREWIA, Linnaeus.

Calyx 3-4-parted, in bud valvate in males, imbricate in females. Disk none.

Stamens very numerous, free, on a central depressed receptacle. *Ovary* 3-4-celled, or confluent into 2, 1-ovuled. *Seeds* with arillus.

T. NUDIFLORA, L.

Tree forests all over Burma.

Yē-hmyōt (Kurz).

Drupes depressed, globular, the size of a wood-apple (*orange*), almost glabrous, corky-fleshy, containing a 4-2-celled, and seeded bony putamen.

§§ *Capsule* dry.

|| *Seeds* without arillus or spermaphore.

MALLOTUS, *Loureiro*.

Flowers dioecious, rarely monoecious. *Calyx* 3-5- (rarely 2-)parted, in bud valvate in the males, in the females tubular or flask-like, rupturing longitudinally, or free. *Stamens* numerous, free or cohering at the base, on a central dilated receptacle. *Anthers* 2-rimose. *Ovary* 3- (rarely 5-2-)celled, cells 1-ovuled. *Albumen* copious.

* *Capsules* unarmed, but variously tomentose.

† *Capsules* 2-coccous, velvety-tomentose.

M. REPANDUS, Muell. Arg. *S.S.*

All over Burma.

Nā-lyin-bō (Kurz).

Softer parts stellate-pubescent.

†† *Capsule* 3-coccous.

M. DECIPiens, Muell. Arg.

Ovary silky-pubescent.

* * *Capsules* armed with lax or crowded prickles.

† *Racemes* or *spikes* collected in terminal panicles.

+ *Leaves* peltate, orbicular-ovate.

M. BARBATUS, Muell. Arg. *S.*

Upper Tenasserim.

Leaves broad, 3-lobed. *Capsules* short-peduncled, globular, covered with a dense coat of soft short bristles.

M. RICINOIDES, Muell. Arg. *E.S.*

Upper Tenasserim.

Leaves narrow, not lobed. *Capsules* sessile, densely covered with soft pubescent bristles as long as the capsular diameter.

++ *Leaves* not or indistinctly peltate, shortly tomentose beneath. *Capsule* shortly and laxly muricate.

M. TETRACOCcus, Kz. *E.T.*

Chittagong.

Capsules sessile or nearly so, 4-5-coccous, almost globular, scurfy-whitish tomentose.

M. PANICULATUS, Muell. Arg. *E.T.* Pegu Range, Eastern Slopes, and Tenasserim.

Capsules 3-coccous and 3-lobed, tawny tomentose.

†† *Racemes* terminal or axillary, not paniced. *Capsule* lobed, 3-coccous, shortly and laxly muricate.

+ *Capsules* with hairy indument.

M. ROXBURGHIANUS, Muell. Arg. *E.T.*

Tree forests of Chittagong and hills East of Toung-ngoo.

Leaves broadly peltate, densely pubescent. *Capsules* peduncled, tomentose and glandular.

++ *Capsules* densely yellowish glandular, otherwise glabrous. *Leaves* narrowed towards the base.

† *Leaves peltate.*

M. ACUMINATA, Muell. Arg. S.E. Tree forests of the Andamans, Katchall and Great Nicobar.
Young parts and leaves beneath puberulous.

†† *Leaves not peltate.*

M. HELPERI, Muell. Arg. E.T. Tree forests all over Burma, the Andamans, Trice and Track.

Young parts and leaves beneath puberulous. Petioles long and slender.

M. MURICATUS, Muell. Arg. E.S. Tree forests of the Andamans, Katchall and Kamorta.

All parts glabrous. Petioles proportionally short.

ROTLERA, Roxburgh.

(*Mallotus* in part.)

R. TINCTORIA, Roxb. All over Burma and the Andamans.
Mallotus Philippinensis, Muell. Arg.

Tor-thi-ben.

Leaves beneath glaucescent and crimson-resinous. Capsules densely covered with crimson resinous powder.

The bark is used for tanning, the root as a red dye, and the powder on the capsules as a scarlet dye for silk.

The following remarks on this valuable dye are from a paper by Daniel Hanbury in the *Pharmaceutical Journal* for February, 1858:—"Its application as a remedial agent having recently attracted attention in this country, in consequence of the favourable reports made by several practitioners in India, who have found it eminently successful in the treatment of *tania*, I think it may be not uninteresting if I briefly recapitulate its history, and quote some of the statements that have appeared regarding its medicinal properties and mode of administration.

"The genus *Rottlera*, so named in honour of the Rev. Dr. Rottler, an eminent Danish missionary and naturalist, was, as at present restricted, founded by Roxburgh in 1798.

"*Rottlera tinctoria*, Roxb., is a tree of from 15 to 20 feet in height; it is common in the hilly districts of India from Burma to the Punjab, and from Ceylon to the hot valleys of the whole of the Himalaya, where it ascends to an elevation of 5000 feet; it is found in the Philippine Islands, in China, and in North-Eastern Australia; it appears also to occur in the South of Arabia and in the Somali country, from which regions the dye obtained from it is carried to Aden for sale.

"The fruit of the tree is tricocous and of the size of a pea, covered on the outer surface with minute, sessile, roundish, semi-transparent glands of a bright red colour. According to Roxburgh the fruit ripens in February and March, at which period it is gathered, and the red, glandular powder is carefully brushed off and preserved for use.

"Before further describing this substance, I may properly advert to the names by which it and the tree affording it, are known to the natives of India; for some information on which part of the subject I am indebted to the kindness of Professor H. H. Wilson, of Oxford.

"The Sanskrit name of *Rottlera tinctoria* is *Punnaga*, a word having several synonyms, among which are *Tunga* and *Kesora*;—hence in Bengali we have *Punnág*, *Kesor* and *Tung*, and in Hindustani *Punnág*.

"The red powder from the capsules is called in Bengali *Kāmalá*, abbreviated to *Kāmal*. The Sanskrit word *Kapila*, signifying *tawny* or *dusky red*, would appear to be also applied to it. In the Tamil language the substance in question is termed *Kāpilapodi*, a name compounded of the Sanskrit *Kapila* and the Tamil *Podi*, the latter word meaning the *pollen of a flower*, or *dust in general*.

"*Vasantagandha*, a Sanskrit word meaning *spring-fragrance*, is, according to Roxburgh, a designation in the Telinga or Telugu language of the same red powder.

"The Hindustani name *Kāmala* has, with slight variations in spelling, been adopted by the Europeans in India, and I shall therefore employ it (omitting the accents indicating the long quantity of the vowels) as the most convenient term by which to designate the red powder derived from the capsules of *Rottlera tinctoria*.

"Kamala, as found in the Indian bazaars, has the aspect of a brick-red powder, possessing from its structure that peculiar mobile character which we notice in Lycopodium and Lupuline. It also agrees with Lycopodium in the difficulty with which it is mixed with water, and in the manner in which it ignites when thrown into the air over the flame of a candle. Examined with a lens, or still better with the compound microscope, it is seen to consist of garnet-red, semi-transparent, roundish granules, of from $\frac{1}{100}$ to $\frac{1}{250}$ of an inch in diameter, more or less mixed with minute stellate hairs and the remains of stalks, leaves, etc.: the latter substances however are easily removed by careful sifting, the drug thereby acquiring a brighter red colour and more uniform appearance.

"Kamala has but little smell or taste. It is insoluble in cold water, and nearly so in boiling water. It is soluble in a solution of an alkaline carbonate, and still more so in one of caustic alkali, a deep-red solution being in either case produced. The addition of an acid to these solutions occasions a precipitate of resinous matter.

"Treated with alcohol or ether, Kamala affords a large proportion of soluble matter and a solution of a beautiful deep-red colour. The alcoholic solution upon the addition of water becomes turbid from the precipitation of resin. By repeated digestions in hot alcohol, the whole of the resinous colouring matter of Kamala may be removed, a pale-whitish substance being the only residuum.

"Dr. Thomas Anderson, Regius Professor of Chemistry in the University of Glasgow, who has made Kamala the subject of special investigation, finds that if a concentrated ethereal solution of Kamala be allowed to stand for a couple of days, it solidifies into a mass of granular crystals. If these be drained, pressed in bibulous paper, and purified from adhering resin by repeated solution and crystallization in ether, the crystalline substance is obtained in a state of purity. It then consists of yellow crystals having the form of minute plates and a fine satiny lustre. This substance has been named by Dr. Anderson *Rottlerine*.

"Dr. Anderson states that Rottlerine is insoluble in water, sparingly soluble in cold alcohol, more so in boiling. In ether, it is readily soluble. It dissolves in an alkaline solution with a dark-red colour. Its alcoholic solution is not precipitated by acetate of lead.

"A concentrated alcoholic solution of Kamala deposits upon cooling a pale flocculent matter, sometimes in such abundance as completely to fill the fluid. This substance is soluble in boiling alcohol, but sparingly in cold; hardly soluble in ether, and insoluble in water. It appears to have no crystalline structure. It gives no precipitate with the salts of lead or silver, and does not appear to form a compound with any other substance. In drying it shrinks much, resembling hydrate of alumina coloured with oxide of iron. The quantity obtained was, however, too minute for a full investigation of its properties.

"Kamala is used throughout India as a dye for silk, its colour being extracted by boiling it in a solution of carbonate of soda. I have a specimen of silk dyed with it, which is of a rich orange-brown. The root of the tree is said to be also used in dyeing.

"It is however in its character of an anthelmintic that Kamala appears most to deserve the attention of the medical man and pharmacist.

"Dr. C. Mackinnon, Superintending Surgeon, Bengal Medical Establishment, in introducing to notice the new remedy, states:—

"My attention was first called to it by a gunner of the brigade, affected with tapeworm, in whom both turpentine and kousso had failed to expel the worm. He stated that a companion of his affected with tapeworm, had taken the remedy with success. I immediately sent for some, and, without any previous preparation of the patient, gave him 3 drachms. He was a large powerful man, and this producing no effect, in 4 hours afterwards the same dose was repeated. It now operated very freely and frequently, and with the fourth stool a large tapeworm, 6 yards long, was passed.

‘The result was so satisfactory, that I have continued to employ the remedy whenever a case presented itself; and I have now given it in 16 different cases, and in all without a failure. As far as my experience goes, I have found it a better and more certain remedy than either turpentine or koussou, and much less disagreeable to take than either of these remedies.

‘In none of my cases subsequent to the first, did I ever exceed for a single dose 3 drachms. This usually purges from five to seven times, and the worm is usually expelled dead in the fourth or fifth stool.

‘In two of the latter cases in which I administered it in Hospital, both patients recently recovered from fever, and still weak, the dose of 3 drachms purged very violently – from a dozen to 14 times. In three subsequent cases I reduced the dose to $1\frac{1}{2}$ drachms, and no action on the bowels succeeding it, I gave in six hours afterwards half an ounce of castor-oil. This acted four or five times, and in each case the worm was passed dead.

‘In almost every case the long slender neck of the worm appeared in the motion.

‘To a native child of five years of age, I gave a dose of 40 grains, and a tapeworm was duly expelled. The drug usually purges speedily. In about half the cases, some degree of nausea and slight griping were experienced; in the remaining half, no inconvenience whatever was sustained, some of the patients declaring it to be the easiest purge they had ever taken in their lives.’

“Dr. Mackinnon gives the following summary as the result of his experience :

1. That *Kamala* is a safe and efficient remedy for tapeworm, and more certain than either turpentine or koussou.
2. That to a strong European 3 drachms may be safely given as a dose.
3. That to a person of feeble habit or to a female, $1\frac{1}{2}$ drachms, followed, if necessary, by half an ounce of castor-oil, is a sufficient dose.

“Since the paper from which the foregoing are extracts, was published, Dr. Mackinnon has stated that in subsequent more extensive trials of *Kamala*, during which he has administered it to nearly 50 patients, in two instances only was no worm expelled.

“Dr. Anderson, Assistant Surgeon, 43rd Regt. Light Infantry, states that the occurrence of tapeworm is very common among the Europeans serving in the Punjab, and that it is also prevalent among the Mussulman population of that province.

“‘The vermifuge properties of *Kamala*,’ writes Dr. Anderson,

‘are as well marked as those of any of the best reputed anthelmintics, not excepting the Abyssinian remedy *Koussou*. The only objection to it is, that when the powder is used, considerable nausea occasionally follows, but certainly not more than what is produced by the sickening preparation of pomegranate root and other anthelmintics.

‘After three drachms of the powder have been administered, the worm is usually expelled in the third or fourth stool. It is generally passed entire, and almost always dead, and in all the cases I have examined (about 15), I was able to detect the head. In only two cases do I know of the worm being passed alive. The advantage of the tincture over the powder consists in its action being more certain and milder, and in its being rarely accompanied by nausea and griping. In two or three cases, only two or three stools followed the dose usually given, and the worm was expelled in the second stool; in one patient, only one stool was caused by the medicine, and in it, the worm came away dead.’

“Dr. Anderson alludes to 95 cases of tapeworm in which *Kamala* was prescribed, and of this number he was aware of only two in which no worm was expelled. Of these 95 cases, 86 were European soldiers, 8 were Mussulman natives, and one was a Hindu of the lowest class. All these persons were in the habit of indulging freely and constantly in animal food, and among this class tapeworm is common; those, on the other hand, whose animal diet is less copious are less liable to tænia, while among several native regiments, Hindu Sepoys and servants, says Dr. Anderson, whose food is entirely vegetable, the parasite is unknown.

“Dr. C. A. Gordon’s experience of the efficacy of *Kamala* corresponds entirely with that of Drs. Mackinnon and Anderson. He observes,

‘With *Kamala* there is no unpleasant effect. It is not even necessary to take a dose of purging medicine as a preparative; and beyond a trifling amount of nausea and griping in some instances, no unpleasant effects are experienced; while by far the greater number of persons to whom it is administered suffer no inconvenience whatever beyond what they would from a dose of ordinary purging medicine.’

“The observations of Dr. Gordon relative to the occurrence of tænia are confirmatory of those of Dr. Anderson, and are to the effect that the free use of animal food of very indifferant quality among the British troops in the N.W. Provinces, must be regarded as the cause of the prevalence of the malady. In the case of soldiers

stationed at Peshawur, tapeworm is so common, that it is believed that every third man suffers from it during the two years that the regiment usually remains there. To give Dr. Gordon's own words :

'Those who have escaped the misfortune of having had to pass some years in India, can form no idea of the vast herds of lean, half-starved pigs that roam over the fields and waste grounds in the vicinity of villages; neither can they have any conception of the nature of the food on which these pigs subsist.'

'After some revolting details as to the habits of swine in India, Dr. Gordon continues;

'Pigs, however, are not the only animals that live in this filthy manner in India. Cattle and sheep, that are so particular in their food in Britain, acquire degenerate¹ tastes in India; and it is needless to enter into similar particulars regarding ducks, fowls, turkeys, and pigeons, all of which are more or less used as food by our countrymen there.'

'The dose of Kamala may be stated as from $\frac{1}{2}$ a drachm to 3 drachms suspended in water: a single dose is frequently found sufficient, and in general it is not necessary to give any other medicine before or after. In some cases, however, where but a small dose of Kamala has been administered, castor-oil has been afterwards given with good effect. Dr. Gordon has prescribed Kamala in the dose of 1 drachm, repeated at intervals of three hours.

'Kamala may also be given in the form of Tincture: the formula for which, recommended by Dr. Anderson, is as follows:

℞ Kamalæ, ʒvj.
Spiritus rectificati, fʒxvj.
Maceræ per bidnum et cola.

'An ethereal tincture may be prepared of the same strength, but it is said to offer no particular advantage over the alcoholic.

'The dose of *Tinctura Kamalæ* is from ʒj to ʒiv, diluted with some aromatic water.'

ALCHORNEA, *Sw.*

Flowers usually dioecious. *Calyx* in males 4- (rarely 3-2-)parted valvate in bud, in females imbricate, and 6-5- (rarely 4-)parted. *Disk* in males none, in females sometimes developed. *Stamens* numerous, or 8-4, usually in 2 alternate rows, the filaments only basally connate. *Anthens* 2-rimose, the cells free from the base to the middle. *Ovary-rudiment* none. *Ovary* 3- (rarely 2-)celled, cells 1-ovuled. *Capsule* 3-1-coccous, dry.

A. RUGOSA, Muell. Arg. *E.S.*

Upper Tenasserim and tree forests of the Andamans.

Leaves short-petioled, capsules glabrous.

A. TILLEFOLIA, Muell. Arg. *E.S.*

Tenasserim (or the Andamans).

Leaves long-petioled. Capsule lenticellate-muriccate, shortly tomentose.

A. JAVENSIS, Muell.

Katchall and Car Nicobar.

MACARANGA, *Thouars.*

Flowers dioecious. *Calyx* in males, valvate, in females, imbricate in bud. *Disk* none. *Stamens* usually fewer than 15 (rarely 1-3 only), inserted on a central receptacle. *Anthens* almost peltately dorsifixed, 3-1-celled, connective incomplete, shorter than the cells. *Ovary-rudiment* none. *Ovary* 6-2-celled, each cell 1-ovuled. *Capsule* dry, 6-2-coccous. *Seeds* albuminous.

* *Leaves ample, broadly peltate at base. Capsules unarmed.*

× *Female flowers and capsules pedicelled. Inflorescence a panicle.*

M. DENTICULATA, Muell. Arg. *E.T.*

Tree forests of Arakan,

Toung-hpet-wun (Kurz).

Pegu and Tenasserim.

Bracts minute, broad, acute, shorter than the flower capsules. Capsules usually 2-coccous.

¹ *i.e.* Onthophagous.

Wood red-brown, adapted for cabinet work. Exudes a red resin (Kurz).

M. INDICA, Wight. *E.T.* Tree forests of the Andamans.

Bracts linear in males, with a gland, terminating in a subulate appendage; in females the gland is often wanting. Capsules 1-coccous. Exudes a red resin.

× × *Male flowers in panicles. Females in simple spikes, sessile.*

M. TANARIUS, Muell. Arg. Tree forests of the Andamans. Kamorta.
M. molliuscula, Kz. Katchall and Nankowry.

Bracts leafy, toothed, acuminate, 2-4 lines long, without glands, larger in females. Capsules 2-3-coccous, subulate, prickly. Exudes a reddish resin.

** *Leaves not peltate.*

× *Male flowers in bractless panicles, females in a long-peduncled bracted head.*

M. MEMBRANACEA, Kz. Ava and Martaban, at 4000 to 6000 feet.

Branchlets glabrous, leaves minutely pubescent. Bracts lacerate-toothed. Styles $\frac{1}{2}$ an inch long. Capsules 2-coccous, red glandular, and laxly subulate-muricate.

M. ANDAMANICA, Kz. *E.T.* Tree forests of the Andamans.

Leaves glabrous. Bracts entire. Styles an inch long. Ovary almost glabrous.

× × *Male flowers in leafy but small-bracted panicles. Females unknown.*

M. MINUTIFLORA, Muell. Arg. *S.* Tenasserim.

Branchlets and leaves densely puberulous. Flowers diandrous. Panicles lax and slender, large.

M. POPULIFOLIA, Muell. Arg. *E.T.* Tree forests of the Andamans.

Leaves glabrous, opaquely glaucescent beneath. Flowers monandrous. Panicles dense, crowded, small.

Kurz also gives *M. GIGANTEA*, Muell. Arg., from Kamorta.

CLEIDION, *Blume.*

Flowers diœcious. *Calyx* 3-5-partite, valvate in males, imbricate in females. *Disk* none, or only in the females. *Stamens* numerous, free, clustered on the central receptacle. *Anthers* peltately attached, 4-celled, the connective usually produced. *Ovary-rudiment* none. *Ovary* 2-3-celled, each cell 1-ovuled. *Styles* as many as ovary-cells, filiform, 2-cleft, minutely papillose on the inner face. *Capsule* 2-3-coccous.

C. JAVANICUM, Bl. *E.T.* Tree forests of Chittagong, Tenasserim, and the Andamans.

Male flowers slenderly pedicelled. Petiole 2-3 inches long.

C. NITIDUM, Thw. *E.T.* Tree forests of South Andaman.

Male flowers sessile. Petiole 2-4 lines long.

BLUMEODENDRON, *Kurz.*

Flowers diœcious. *Calyx* of males valvate, 3-partite. *Disk* in males gland-like. *Stamens* numerous, free, on an elevated receptacle. *Ovary-rudiment* none. *Ovary* 3-celled, cells 1-ovuled. *Capsule* large, fibrous-woody, 3-2-coccous. *Seeds* large, enveloped in a spurious thick arillus. *Albumen* soapy.

B. (MALLOTUS) TOKBRAI, Muell. Arg. *E.T.* Tree forests of the Andamans.

Leaves 3-nerved at base, 4-6 inches long, glabrous, entire, shortly acuminate. Seeds purple.

CELODISCUS, *Buillon.*

Flowers diœcious. *Calyx* valvate, 4-5-partite in males, in females 3-5-cleft. *Stamens* numerous, on a concave receptacle or round a central disk, free or variously polyadelphous. *Anthers* 2-rimose, the connective not produced. *Ovary-rudiment*

none. *Ovary* 5-3-celled, cells 1-ovuled. *Styles* as many as ovary-cells, simple papillose. *Capsule* dry, 5-2-coccous.

* *Flowers in elongate racemes or spikes.*

C. ERIOCARPOIDES, Kz. *E.S.* Upper Tenasserim.

Flowers sessile, in elongate spikes.

C. LONGIPES, Kz. Ava and Pegu.

Flowers on long pedicels, in racemes.

** *Flowers sessile in clusters, or dense short spikes.*

‡ *Leaves pubescent on both sides.*

C. LAPPACEUS, Kz. *E.S.* Ava.

Capsules the size of a cherry, densely and softly muciculate, the soft prickles 3 lines long.

‡‡ *Leaves almost glabrous.*

C. GLABRIFOLIUS, Kz. Pegu Range and Martaban.

Petiole 1-3 inches long.

C. HIRSCUTUS, Kz. The Pegu Range.

Petioles 4-12 inches long.

Kurz remarks: "*Calodiscus melius species omnes Malloti includit, quæ alabastro apiculato et seminibus carunculatis gaudent.*"—J.A.S.B. ii. 1873, p. 244.

HYMENOCARDIA, *Endlicher.*

Flowers diœcious, the males in catkin-like spikes. *Calyx* 5-parted, rarely 5-7-toothed, persistent, valvate in bud. *Disk* none. *Stamens* numerous, or 5, filaments basally united round an ovary-rudiment. *Anthers* ovoid, 2-rimose. *Ovary* 2-celled, compressed, cells 1-ovuled. *Styles* 2, long, simple, papillose. *Capsule* samaroid, compressed, reniform-cordate, 2-celled. *Seeds* compressed, without arillus, testa thin. *Albumen* scanty.

H. WALLICHI, Tul. Swamp forests of Pegu and Tenasserim.

Ye-chin (Kurz).

Leaves 1-2½ inches long. Male spikes up to ½ inch long. Ovary much compressed, the long styles crimson, papillose.

H. Plicata, Kz. Swamp forests of Pegu and Tenasserim.

Ye-chin (Kurz).

Leaves 3-5 inches long. Male racemes up to 6 inches long. Ovary 2-merous, compressed, densely gland-dotted, transversely wrinkled. The 2 styles short and large.

CLAYOXYLON, *A. Jussieu.*

Flowers usually diœcious. *Calyx* valvate in bud, in males 3- (rarely 4-)parted, in the females 3-2-parted. *Disk glands* free, or united in a disk. *Stamens* 6 to very numerous, free, on a central receptacle. *Anthers* erect, 2-rimose. *Ovary-rudiment* none. *Ovary* 3-2 or 4-celled, cells 1-ovuled. *Styles* as many as ovary-cells, simple, short, papillose-stigmatic, rarely almost smooth. *Capsule* 3- (rarely 2-4-)coccous. *Seed* with arillus. Arillus white or scarlet.

C. LONGIFOLIUM, Baill. *E.S.* Tree forests of eastern slopes of the Pegu Range, the Andamans, Kamorta and Katchall.

Capsules greyish, puberulous, contracted on a short stalk. Peduncle 1-2 lines long.

C. LONGIPETIOLATUM, Kz. *E.S.* Tree forests of Pegu and Martaban.

Capsule densely covered with soft hirsute prickles. Leaves penninerved, scabrous, but not hairy.

C. LEUCOCARPUM, Kz.

Tree forests of the Pegu Range.

Capsules white, the size of a small cherry, 3- (rarely 2-4-)cocccous, crowned with thick papillose-fringed styles. Leaves ample, 3, (almost 5-)nerved at base, strongly veined, hispid above, pubescent beneath.

C. MOLLE, Endl.

Kamorta, Katchall and Nankowry.

ACALYPHA, *Linnaeus*.

Flowers monœcious or polygamous. *Calyx* in males 4-parted and valvate in bud, in the females 3-5-parted, slightly imbricate. *Disk* none. *Stamens* 8, free, on a cushion-like receptacle. *Anthers* 2-rimose, the cells almost serpentine, free, suspended from the apex. *Ovary-rudiment* none. *Ovary* 3 celled, cells 1-ovuled. *Styles* 3, free, or shortly connate at the base. *Capsule* dry, 3-celled and 3-cocccous. *Seeds* albuminous.

A. FRUTICOSA, Forsk.

Khakyen Hills and Pegu up to 2000 feet.

A branched shrub 4-8 feet high. All softer parts greyish-puberulous. Flowers minute, greenish, sessile.

TRAGIA, *Plumier*.

Flowers usually monœcious. *Calyx* in males 5-3-parted, valvate, in females 6-5- (rarely 8-3-)parted, and imbricate in bud, usually enlarged in fruit, involuere-like, and stingingly hispid. *Stamens* 1-40 free, or the inner ones connate round a minute ovary-rudiment. *Anthers* 2-rimose, dorsifixed, the connective not produced. *Ovary* 3- (rarely 5-)celled, cells 1-ovuled. *Styles* 2-5, connate below, papillose on the inner face. *Capsules* dry, 1-3- (rarely 5-)celled. *Seeds* without spermaphore, or arillus.

T. INVOLUCRATA, Jacq. E.S.

Margins of forests in lower Pegu.

Bet-yā.

Leaves pubescent. Calyx lobes pinnatifid. Seeds glabrous.

T. BURMANICA, Kz. C.S.

Tree forests East of Toung-ngoo.

Leaves large, almost glabrous. Female calyx lobes entire. Seeds tomentose.

CNESMONE, *Blume*.

Flowers monœcious. *Calyx* 3-cleft, males valvate, females imbricate in bud. *Disk* none. *Stamens* 3, free round an ovary-rudiment, alternating with the calyx-segments. *Anthers* 2-rimose, the connective long exserted. *Ovary* 3-celled, cells 1-ovuled. *Styles* thick, connate below, simple, trigonous, erect, forming a head larger than the ovary. *Capsule* dry, 3-cocccous. *Seeds* almost globular, with a jagged arillus.

C. JAVANICA, Bl. E.S.

Tree forests of Rangoon.

All parts stingingly pubescent. The cocci the size of a small pea, covered with stiff fragile hairs.

DALECHAMPIA, *Plumier*.

Flowers of both sexes included in a 2-leaved compressed involuere. *Disk* none, or rudimentary in females. *Stamens* numerous, the filaments united in a column. *Anthers* 2-rimose, longitudinally adnate. *Ovary-rudiment* none. *Ovary* 3-4-celled, cells 1-ovuled. *Capsule* 3-4-cocccous, dry.

D. SCANDENS, L. E.S.

Southern portion of the Pegu Range.

Douk-yā mā.

Leaves 3-lobed and 5-nerved at the deeply-cordate base.

††† *Ovary-rudiment* none. *Stamens* central, polyadelphous.RICINUS, *Linnaeus*.

Flower monœcious. *Calyx* 5-parted, both sexes valvate in bud. *Disk* wanting. *Stamens* very numerous, united into many botryomorph bundles. *Ovary* 3-celled, cells 1-ovuled. *Capsules* dry, 3-cocccous. *Albumen* copious.

*R. COMMUNIS, L. E.S.

Cultivated and half wild all over Burma.
Kamorta, Katchall and Great Nicobar.

Kyet hsu.

Palma-Christi or Castor-oil Plant.

Capsules echinate, rarely unarmed. 3- rarely 4-coceous. Berries variegated, in shape resembling a dog tick after a full meal, whence the generic name. The seeds are acrid and, according to Waring, 20 have caused death. The oil simply expressed without heat is most esteemed for medicine, being one of the best and safest purgatives known, and is the only fixed oil soluble in alcohol. The nauseous flavour may be disguised by an equal bulk of syrup of lemon, or the juice of a lemon in mucilage and ʒss. T. cardom. co. Balfour says the native Hakeems prepare a tasteless oil as follows: The berries are boiled for two hours in water, then dried for three days in the sun, and deprived of their shells, then pounded and boiled again in fresh water, till the whole of the oil has risen to the surface. By this plan 13 lbs. of seeds should yield one quart of tasteless oil. It is a method deserving attention, considering the hateful odour of the oil usually given to children, and the difficulties which therefore attend its administration.

Dr. Mason says that prior to the advent of the missionaries the Karens were ignorant of the medicinal properties of the plant, but cultivated it "to obtain the seeds to mix with their dyes and fix their colours." No particulars of the process are given, nor are the dyes mentioned which are so fixed by castor-oil seeds, nor am I aware that the plant is put to such a use in any part of India.

HOMONOYA, *Loureiro*.

Flowers dioecious. *Calyx* of males 3-parted and valvate, of females 5-parted and imbricate in bud. *Disk* none. *Stamens* central, very numerous, and united into many botryomorph bundles. *Anthers* 1-celled, adnate, almost globular. *Ovary* 3- (rarely 4-)celled, cells 1-ovuled. *Capsule* dry, 3-4 coccous. *Seeds* smooth, with a spurious arillus.

H. RIPARIA, Lour. E.S.

Ava, Chittagong, and all over Burma.

¹ Mo-ma-kha (Kurz).

Leaves linear. Flowers sessile in axillary pubescent spikes.

× × *Calyx imbricate in bud or wanting.*+++ *Petals present, or if suppressed, the hypogynous glands opposite the calyx-segments.*† *Fruit dry, capsular.*§ *Flowers in panicles.*MANIHOT, *Plumier*.

Flowers dioecious. *Calyx* imbricate in both sexes, in females deciduous. *Petals* none. *Disk* urceolate. *Stamens* 10, free, in 2 series. *Ovary* usually surrounded by 10 staminodes, 3-celled, cells 1-ovuled. *Capsules* 3-coceous. *Cocci* 2-valved.

*M. UTILISSIMA, Pohl. E.S.

Generally cultivated in Burma and Nicobars.

Pooloo-pinnan-myauk (Kurz).

Root tuberous up to 3 feet in length.

This plant is the Manihot, or Cassava, the roots of which are poisonous eaten raw, but when grated, and deprived of the acrid sap by pressure, furnish a wholesome food. The expressed juice throws down a deposit, which when washed and dried constitutes Tapioca.

JATROPHA, *Linnaus*.

Flowers usually monoecious. *Calyx* 5-parted in both sexes, imbricate in bud. *Stamens* 30-10 in 6-2 whorls, central, filaments connate at the base. *Anthers*

¹ This name is undoubtedly applied to the Willow in Pegu.—W.T.

2-rimose, the cells free below. *Ovary-rudiment* none. *Ovary* surrounded by 8 or 10 stamiuodes, usually 3-celled, cells 1-ovuled. *Capsule* dry, 2-4 coccous.

**J. CURCAS*, L.

Cultivated as a hedge plant.

Thyi-bor kyet-hsu.

Leaves angular-lobed, the lobes and stipules entire.

J. GLANDULIFERA, Roxb.

Ava. Chittagong and Pegu, round villages, and along rivers.

Leaves palmately lobed, the lobes glandular-toothed. Stipules glandular-bristly.

**J. MULTIFIDA*, L.

Cultivated round monasteries.

Leaves digitately multifid, the lobes entire or lobed, the stipules long, hair-like, lacerate without glands.

OSTODES, *Blume*.

Flowers dioecious. *Calyx* 5-parted in both sexes, imbricate in bud. *Petals* imbricate. *Hypogynous glands* alternating with the petals. *Petals* numerous, free, on a central convex receptacle. *Anthers* 2-rimose. *Ovary-rudiment* none. *Ovary* usually 3-celled, cells 1-ovuled. *Seeds* without arillus.

O. PANICULATA, Bl. *E.T.*

Tree forests East of Toung-ngoo at 2000 to 3000 feet.

Leaves not distichous. Flowers panieled.

O. HELFERI, Muell. Arg.

Upper Tenasserim.

Leaves distichous. Flowers in axillary clusters.

§ § *Flowers in umbel-like racemes.*

CODLEUM, *Rumphius*.

Flowers monoecious. *Calyx* 5- (rarely 3-)parted, imbricate in bud in both sexes. *Disk* developed outside the stamens. *Petals* alternating with the sepals, rarely absent or rudimentary in the females. *Stamens* free, inserted on the raised central receptacle. *Anthers* 2-rimose. *Ovary-rudiment* none. *Ovary* 3-4-celled, cells 1-ovuled. *Styles* 3-4-terete, basally connate, simple or 2-cleft. *Capsules* dry, 3-4-coccous.

**C. VARIEGATUM*, Bl. *E.S.*

Cultivated all over Burma.

Flowers in elongate racemes. *Ovary* glabrous. *Style* simple.

C. ANDAMANICUM, Kz. *E.S.*

Tree forests of the Andamans.

Racemes corymbose, glabrous. *Ovary* hirsute. *Styles* 2-cleft.

C. LUTESCENS, Kz.

Bamboo Jungles of Middle Andamans.

Umbels from a pubescent-bracted head, on a pubescent axillary peduncle.

TRIGONSTEMON, *Blume*.

Flowers monoecious. *Calyx* 5-toothed or parted, imbricate in bud. *Stamens* in 1 or more whorls on a central receptacle, not elevated. *Anthers* 2-rimose. *Ovary-rudiment* none. *Ovary* 3-celled, cells 1-ovuled. *Styles* 3, basally connate, or twice dichotomously branched. *Capsules* dry, 3-coccous. *Arillus* none.

* *Leaves very shortly and thickly-petioled.*

T. LONGIFOLIUM, Baill. *E.T.*

Tenasserim.

Flowers small on short hirsute pedicels, forming a raceme in the axils of the leaves.

** *Leaves on long and slender petioles.*

T. HETERANTHUM, Wight.

Tenasserim.

Female calyx-lobes deeply glandular-fringed. *Ovary* glabrous.

T. LETUM, Baill. *E.S.*

Upper Tenasserim.

Female calyx-lobes minutely ciliate, not glandular. Ovary appressed-pubescent.

†† *Fruit a drupe, indehiscent.*§ *Flowers in racemes.*

GALEARIA, Zollinger and Morison.

Flowers dioecious. *Calyx* 5-parted, the lobes imbricate in bud. *Petals* induplicate or cochleate. *Disk* none in male flowers. *Stamens* 10, in 2 series, surrounding the ovary-rudiment. *Ovary* 2-3-celled, cells 1-ovuled. *Styles* 2-3, 2-parted. *Drupe* indehiscent, containing a single 1-seeded stone. *Albumen* copious.

G. WALLICHII, Kz. *E.T.*

Tree forests of Tenasserim.

Leaves 4-6 inches long, oblong, acute at the base, entire, on a rusty puberulous petiole 2-3 lines long. *Calyx* net-veined on both sides. *Drupe*s the size of a prune, blue and pruinous, broader than long, the stone unequally wrinkled.

§§ *Flowers clustered.*

MICRODESMS, Planch.

Flowers dioecious. *Calyx* 5-parted and imbricate in bud in both sexes. *Petals* present. *Disk* none. *Stamens* 5, or if 10, inserted in 2 series round an ovary-rudiment. *Anthers* 2-rimose. *Ovary* 2-3-celled, cells 1-ovuled. *Styles* 2-3, 2-parted, lacerate-papillose.

M. CASEARLEFOLIA, Planch. *E.T.*

Upper Tenasserim.

Flowers minute, on slender pubescent pedicels, forming clusters in the axils of the leaves.

†† *Petals none.*+ *Flowers not inclosed in an involucre.*§ *Flowers clustered, or the clusters arranged in racemes.*

CRETOCARPUS, Thwaites.

Flowers dioecious. *Calyx* in both sexes decussately 4-parted, imbricate in bud. *Hypogynous glands* opposite the sepals. *Stamens* 8-10, the filaments basally connate in a column, pilose. *Anthers* 2-rimose, basifixed. *Ovary-rudiment* 2-3-cleft. *Ovary* 3-celled, cells 1-ovuled. *Styles* 3, deeply 2-cleft, basally connate, papillose. *Capsule* dry, 3-coccous.

C. CASTANEOCARPUS, Thw.

All over Burma and the Andamans.

Seeds glossy black, with a fleshy 2-lobed crimson spermaphore.

Kurz also records :

CNELOSA MONTANA, Bl.

Nankowry.

GELONIUM, Roxburgh.

Flowers usually dioecious. *Calyx* imbricate in bud. *Disk* in males sometimes wanting, in females ureolate. *Stamens* from 6-60, free, occupying the central elevated disk. *Anthers* 2-rimose, longitudinally adnate. *Ovary-rudiment* none. *Ovary* 3-2- (rarely 4-) celled, cells 1-ovuled. *Stigmas* as many as ovary-cells, sessile, 3-2-cleft. *Capsule* fleshy, coriaceous, 3-2- (rarely 4-) coccous. *Seeds* enveloped in a white arillus.

G. MULTIFLORUM, A. Juss. *E.T.*

Tree forests all over Burma.

Se-than-pya (Kurz).

Stigmas large, 2-cleft. Capsules the size of a cherry.

G. BIFARIUM, Roxb. *E.T.*

Bamboo jungles of Middle Andaman and Car Nicobar.

Stigmas minute, sessile. Capsules usually didymous, the size of a pea.

G. CANCEROLATUM, Willd.

Katchall and Car Nicobar.

BALIOSPERMUM, *Blume.*

Flowers monœcious. *Calyx* 5-parted, imbricate in bud. *Petals* none. *Disk* in females urceolate, in the males gland-like and usually free. *Stamens* 15 or more, free or connate by pairs, on an elevated central receptacle. *Anthers* 2-rimose, longitudinally adnate. *Ovary-rudiment* none. *Ovary* 3-4-celled, cells 1-ovuled. *Styles* 3-4, half 2-cleft.

× *Calyx* not accrescent in fruit.

B. MONTANUM, Muell. Arg. All over Burma up to 3000 feet.

Disk in both sexes annular. Ovary densely hirsute. Leaves sinuately lobed, glabrous, at least above.

B. REIDIROIDES, Kz. Siam.

Ovary densely hirsute. Leaves entire, pubescent.

§§ *Flowers* in racemes or spikes, sometimes amentaceous.

CORUMBUM, *Reinwardt.*

Flowers usually diœcious. *Calyx* 2-3-parted, imbricate. *Petals* or disk none. *Stamens* 2-3, free, or shortly connate. *Anthers* 2-rimose, longitudinally adnate. *Ovary-rudiment* none. *Ovary* 2-3- (rarely 4-)celled, cells 1-ovuled. *Styles* as many as ovary-cells, simple or shortly connate. *Capsule* drupaceous or berry-like, 2-4-coccos. *Seeds* with a spurious arillus.

+ *Petioles* bearing a gland on each side of the apex.

* C. (EXCECARIA) SETIFERA, Muell. Arg. Occasionally cultivated.

Chinese Tallow-tree.

Leaves entire. Capsules 3-4-coccos. Seeds enveloped in a white soapy substance.

C. (EXCECARIA) INSIGNE, Muell. Arg. Tree forests of Chittagong and the Pegu range.

Leaves serrulate. Drupes berry-like, sessile.

× × *Petioles* without glands.

C. (EXCECARIA) BACCATUM, Muell. Arg. Tree forests all over Burma.

Le-lun-pen (Kurz).

Leaves entire, more or less glaucescent beneath.

EXCECARIA, *Linnaeus*.¹

Flowers usually monœcious. *Calyx* 3-2-merous, lobes connate or free, or much reduced in the males, imbricate in bud. *Petals* or disk none. *Stamens* 3-2, central. *Anthers* 2-rimose, cells longitudinally adnate. *Ovary-rudiment* none. *Ovary* 3-2- (rarely 4-)celled, cells 1-ovuled. *Styles* 2-4, simple, basally connate, stigmatic on their inner face. *Capsule* fleshy or almost dry, 3-2-coccos. *Seeds* without spermatophore or arillus.

* *Male flowers* pedicelled. *Capsules* woody, large.

E. INDICA, Muell. Arg. *E.T.* Tidal forests of Upper Tenasserim.

All parts glabrous. Leaves crenate-serrate.

** *Male flowers* sessile or nearly so. *Capsules* crustaceous. *Valves* opening elastically, and twisting; all parts glabrous.

× *Leaves* repand-toothed or serrate.

E. AGALLOCHA, L. Tidal forests of Burma, the Andamans, and Kamorta.

Ta-yan or Ka-yan.

Leaves alternate. Capsules as large as a pea. The juice of the whole tree is very poisonous.

¹ From excecō "to blind"; from its acrid juice, if introduced into the eye.

E. OPPOSITIFOLIA, Jack. *E.T.* Upper Tenasserim. Great Nicobar.
Leaves opposite. Capsules the size of a cherry.

× × *Leaves entire.*

E. HOLOPHYLLA, Kz. *E.T.* Tree forests of Martaban and Upper Tenasserim.
Leaves quite entire, alternate. Females and fruit unknown.

E. (ACTEPHILA) RECTINERVIS, Kz. Katchall and Tillangchong.

++ *Flowers clustered, inclosed in a calyx-like bell-shaped or slipper-shaped involucre.*

EUPHORBIA, Linnæus.

Flowers monœcious, several together in cup-shaped involucre, which are 4-5-toothed, with alternating horizontal glands, sometimes expanded into a leafy coloured appendage. *Male flowers* pedicelled, without calyx, supported by ciliate-jagged bractlets, or surrounding the solitary central female flower. *Female calyx* 3-6-lobed or wanting. *Ovary* 3-celled, cells 1-ovuled. *Capsules* 3-coecous, dry.

Herbs, shrubs or trees, often cactus-like, abounding in milky juice.

* *Flowers in dichotomous cymes (rarely solitary) above the scars of the fallen leaves or supra-axillary. Floral leaves absent.*

‡ *Unarmed.*

E. SESSIFLORA. Pegu.

A fleshy undershrub a foot high, with a tuberculous root and terete stem, all parts glabrous. Leaves at the end of stem, sessile, 1½-3 inches long. Stipules minute, gland-like. Flower-heads sessile. Styles simple, very short, crimson.

E. EPIPHYLLOIDES, Kz. Car and Great Nicobar. Escape Bay, South Andaman.

A leaf-shedding tree, fleshy, unarmed, all parts glabrous. Branches thick-winged, terete, narrowed at the joints. Flower-heads in dichotomous cymes from the sinuses of the crenatures on which the leaf-scars rest. Capsules deeply 3-lobed, glabrous.

‡ ‡ *Armed with paired, short, stipulary thorns.*

† *Styles 2-cleft.*

* *E. ANTIQUORUM*, L. *T.* All over Burma and the Andamans
Sha-soung-pya-that (Kurz) up to 2000 feet.

Branches angular, 3- (occasionally 4-5-)winged, wings fleshy, sinuately-repand. Cultivated for hedges.

‡ ‡ *Styles simply thickened at base.*

* *E. NERIFOLIA*, L. *T.* All about Burmese villages, and
Shā-soung (Kurz) probably wild also.

Fleshy, thorns solitary or paired, rising from thick saw-like protuberances, placed in sinuate-repand longitudinal rows.

E. NIVCLIA, Ham. *T.* The Pegu range, along streams.

Shā-soung (Kurz).

Branches terete, short, fleshy-tubercled.

× *Cymes sessile, clustered, terminal, or in the forks of the branch-whorls. Floral leaves none.*

* *E. TIRUCALLI*, L. *E.T.* Cultivated round monasteries in France.
Shā-soung-lek-hnyo (Kurz).

Branches terete, elongate. Leaves very small, linear.

× × *Cymes several, terminal, with white or crimson floral leaves.*

E. PUCHERRIMA, Willd. *S.* Cultivated round villages and monasteries.
Unarmed. Leaves herbaceous, long-petioled.

Kurz adds from the Nicobars :

E. PARVIFLORA, L.	Kamorta.
var. <i>linearifolia</i> .	
E. ATOTA, Forst.	Katchall. Great and Car Nicobar.
E. PILULIFERA, L.	Katchall and Kamorta.

Many *Euphorbias* (e.g. *antiquorum*, *neriifolia*, *nirulia*, *tiruwalli*, etc.) yield a milky juice of a very acrid quality, termed on drying, *Euphorbium*. As a purgative it is uncertain or violent in its action, but Waring suggests that it may be usefully employed as a substitute in India for *Savine*, which soon spoils in a hot climate. The strength recommended is gr. xx. to ʒj of lard, or goat's fat mixed with oil if for Hindu or Mahomedan patients. Great caution must be employed in reducing the *Euphorbium* to powder, as the smallest particle entering the eye or mucous passages would cause violent inflammation. The *Euphorbia* make good hedges, as they are not eaten by cattle and are easily propagated.

PEDILANTHES, Necker.

Involute either oblique and slipper-shaped, the inner side produced into a lip-like appendage, or urceolate, and on the back furnished with a peltate concave appendage.

* P. TITHYMALOIDES, Poit. *E.S.* Cultivated in villages and hedges in Prome. Flower-heads crimson, slipper-shaped.

AMENTALES.

Flowers diclinous in catkins, cones or heads. *Perianth* none, or calyciform or of 1 or more bristles, bracts, bractioles or scales. *Ovary* superior, 1- or 2-celled. *Seeds* exalbuminous. *Leaves* alternate, simple.

Order SALICINEÆ.

Flowers diœcious in catkins, sessile or shortly pedicelled, supported by a membranous persistent or deciduous bract. *Perianth* none, the torus swelling to become a gland or obliquely truncate ring or cup. *Males*: *Stamens* 2 or more, exerted from the centre of the torus. *Filaments* filiform, free, or monadelphous. *Anthers* 2-celled, basifixid, the cells opening by longitudinal slits. *Ovary-rudiment* none. *Females*: *Ovary* free, sessile, or shortly stalked, consisting of 2 connate carpels, 1-celled, with numerous ascending ovules along the short linear parietal placentas. *Styles* 2, usually connate, with an entire or 2-cleft stigma. *Capsule* 1-celled, many-seeded, 2-valved, the valves opening at the apex, and turning more or less revolute at the ripening of the fruit. *Seeds* erect, minute, the funicle dissolved into a woolly tuft surrounding the whole membranous testa. *Albumen* none. *Embryo* straight, the cotyledons elliptical, plano-convex. *Stipules* scale-like and deciduous or leafy, and often persistent.

SALIX, Linnæus.

S. TETRASPERMA, Roxb. *E.T.* Streams all over Burma.
Mo-ma-klhâ.

There is only one species of willow in Burma, but that is widely spread. The wood is soft, light, and porous. The bark is used for tanning according to Kurz, but little use seems to be made of the tree, probably because for basket work bamboos are handier.

* S. BABYLONICA, L. (M.). Cultivated.

De Gubernatis has the following remarks on the willow : " Une légende chrétienne nous apprend que le saule pleureur replie ses branches vers la terre depuis qu'il a servi à cacher la Vierge et l'enfant Jésus dans leur fuite en Égypte. Dans une autre légende, ce saule pleure depuis le jour que les verges ont frappé Jésus."—*Mythologie des Plantes*, ii. p. 341.

One is not, of course, under the necessity of believing such a legend as the above or any similar legend, Christian or Pagan, to appreciate the sweetness and beauty of the idea often enshrined therein. The lines of Juvenal on this subject are worth considering—

“Esse aliquid Manes et subterranea regna,
Et contum et Stygio ranas in gurgite nigras,
Atque unâ transire vadum tot millia cymbâ,
Nec pueri credunt, nisi qui nondum ære lavantur.
Sed tu vera puta.”—*Satire* ii. l. 149.

Now are we to suppose that Juvenal wished his readers to retrograde in intelligence and believe such fables as that of Chiron and his boat, or the black frogs swimming in the rivers of hell (prototypes of the worm which dieth not), which even children had ceased to believe in, and with which may be classed such legends as that of the weeping willow and innumerable others of the same sort? Hardly; but rather the intention is to argue that our emancipation from the fetters of a more superstitious and credulous age should not be followed by a laxity of life, which would have been condemned by our less gifted ancestors, and that, from self-respect, we should not allow it to be possible for the lives of us, who do not believe these fables, to be unfavourably contrasted with theirs who did; else, where, indeed, is our boasted enlightenment, and what is the advantage of our mental superiority, if its only result to ourselves is moral degradation!

Order CASUARINEÆ.

Flowers monœcious in catkins. *Male catkins* terete, elongate or short, the flowers 2-bracteoid, sessile, in the axil of the toothed sheaths. *Perianth* 2-partite, the segments decussate with the bractlets, and cohering at their tips, deciduous. *Stamen* 1. *Filament* exerted and thickened at the base. *Anthers* 2-celled, the cells opening longitudinally. *Female catkins* usually axillary, globular or ellipsoid, the flowers arranged in several longitudinal rows, 1-bracted, and supported by 2 lateral bractlets, both (bracts and bractlets) persistent. *Perianth* none. *Ovary* with a single ovule suspended from the summit of the cell. *Style* terminal, with 2 filiform stigmas. Ripe cones woody, indurated. *Achene* inclosed by the enlarged bractlets, which at length open valvately, compressed membranous winged at the apex, containing a solitary pendulous seed. *Testa* connate with the endocarp. *Albumen* none. *Embryo* straight, with large flat cotyledons, the radicle minute, superior. Trees, rarely shrubs, with numerous horse-tail-like jointed branchlets, toothed at their joints, but without leaves. *Flowers* in terminal and lateral catkins, monœcious, but the males and females not appearing at the same time on the same tree.

A family consisting only of a single genus, of which most of the species are Australian. The timber is hard and heavy, and of the colour of raw beef, whence it is called beef-wood in Australia.

CASUARINA, *Linnaeus*.

Characters those of this order.

C. EQUSETIFOLIA, Forst.

Sandy shores of Arakan and Tenasserim,

Pallen (Theobald). (Pin-yu, Kurz.)

Kamorta, Katchall, and Car Nicobar.

There is but one species in Burma, and this is seldom or never felled, though the wood is hard and durable. Weight 6½ lbs. Kurz says its “texture” is like ‘toon’ (Thit-kado 3½ lbs.), which is true to the extent to which chalk resembles cheese in texture, but no farther. Kurz is also, in my opinion, in error regarding its vernacular name, as I have commonly found it called ‘Pallen.’ In appearance the wood is more comparable with ‘pyngado’ or ‘jio,’ though coarser than either. It is a wood highly deserving of trial as a sleeper wood. Dr. Mason recommends it as an ornamental tree for a park, and it certainly makes a handsome avenue tree, but it is an unpleasant neighbour near a house, from the melancholy ‘soughing’ the wind makes through

its branches. The *Casuarina muricata*, Mason says, was the wood of which the Tahitians in former times made their carved war-clubs, and fishing hooks from its roots. 'Pallen' is the name I have always heard it called by, 'Tin yu' being the name of the Pine.

Order AMENTACELE.

Flowers small, unisexual, in cylindrical oblong or globular catkins, usually covered with densely packed scale-like bracts, rarely with loose or with minute deciduous scales. *Stamens* 2 or more (rarely united into 1), under each scale usually accompanied by 2 or more smaller scales, either distinct or forming sometimes an irregular or oblique perianth of 5 or 6 segments, or rarely entirely deficient. *Female catkins* either like the males with 1, 2, or 3 flowers under each scale, or reduced to a sessile bud, with 2 or 3 flowers in the centre surrounded by the lower empty scales of the catkin. Under each scale are usually 2 or 3 inner scales. *Perianth* none or closely combined with the ovary, with a minute free border entire or toothed. *Ovary* 1- or many-celled, with 2 or more styles always resulting in a 1-celled fruit, either drupaceous or dry, and if dry, free and exserted, or in various ways inclosed in the involucre. The catkin-scales, or the inner-scales, or both, usually persisting and sometimes enlarged in an involucre, either more or less inclosing the fruit or forming a cup under the fruit. *Albumen* none. Trees or shrubs with simple alternate leaves. *Stipules* more or less persistent.

Not a very large order, but very important to the forester. It includes the oak, hazel-nut, alder, birch, beech, and chestnut. The timber of many is valuable, and the European and American oak-timber is too well known to require special reference. Several Indian oaks yield timber probably not much inferior to the European. The bark is often astringent and bitter, and that of oaks is good for tanning, while that of the birches contains a balsamic oil and a peculiar resinous substance called betuline or birch-camphor. Cork comes from *Q. suber*. Galls are found chiefly on *Quercus infectoria*, but inferior ones are found also on some Indian oaks. Wax is obtained from the berries of *Myrica cerifera* and some other American species. The fruit of *Myrica nagi* is edible.

* *Ovary* 1-celled with a solitary erect ovule.

MYRICA, Linnaus.

Catkins axillary. *Male flowers* with 2-16 stamens under each scale. *Filaments* basally connate. *Anthers* 2-celled. *Female flowers* with 2-4 bractlets. *Ovary* terminated by 2 lateral, filiform, sessile, stigmas, 1-celled. *Fruit* drupaceous, resinous, with a papillose or wrinkled pericarp, inclosing a bony 1-seeded nut. *Albumen* none.

M. NAGI, Thbg. E.T.

Martaban at 4000 to 6000 feet.

M. sapida, Wall.

Drupes the size of a small cherry, papillose, crimson, fleshy, resinous, with occasionally short brown hairs intermixed.

** *Ovary* 2-celled, each cell 1-ovuled. *Nuts* small, often winged, 1-celled, combined with the scales in a sort of cone.

BEULA, Tournef.

Scales of the male catkins stalked, those of the female deciduous. *Female catkins* cylindrical, compact. *Nuts* not connate with the involucre. *Anther* cells distinct.

B. ACUMINATA, Wall.

Martaban at 5000 and 6000 feet.

B. cylindrostachya, Wall.

Female and male catkins elongate, 1-2 inches long, the former on a short pubescent peduncle. Flowers hairy. Wings broader than the nut, and broader than the membranous bract.

ALNUS, Tournef.

Anther cells connate. *Scales* of female catkin persistent.

A. NEPALENSIS, Don.

Khakyen Hills.

Leaves oblong, 3-4 inches long, minutely serrate, glabrous, slightly glaucescent beneath. Catkins sessile, in short racemes, the males slender, 1-2½ inches long, the females very short and small.

CARPINUS, *Tournef.*

Scales of the catkins sessile. *Female catkins* loose, spike-like, bracts solitary, each in a 3-lobed leafy involucre.

C. VIMINEA, Wall.

Hills east of Toung-ngoo at 5000 to 6000 feet.

Male flowers 6-12, stamens in the axil of ovate, acute bracts. Filaments slender, not exerted. Female flowers by pairs in the axil of caducous bracts. Ovary many-nerved, unequally lobed at the apex, 2-celled, with 2 placentas and 2 pendulous ovules from one of them, the other being sterile. Nuts woody, 1-celled and 1-seeded, 2 lines long, acute, 7-8 nerved, resinous dotted. Albumen none.

*** *Ovary 3-9-celled, with 2 suspended ovules in each cell; most of the ovules abortive. Nuts solitary or several, rather large, inclosed in the enlarged wingless, dry, spiny, scaly, or smooth involucre, or the thin involucre reduced to a cup.*

CASTANEA, *Tournef.*

Male flowers clustered and surrounded by bracts forming catkins. Perianth 5-6-lobed. Stamens 10-15, usually twice as many as perianth lobes. Filaments slender. Anthers minute, 2-celled. Female flowers by 3-1 within a scaly involucre. Perianth 6-parted, the lobes blunt, in 2 rows. Ovary 3-6-celled. Styles 3 (rarely more), linear. Nuts 3-1, inclosed in a globular, echinate involucre. Trees quite of the habit of oaks.

* *Fruits armed with simple or compound sharp spines.*

† *Leaves sharply serrate.*

C. INDICA, Roxb.

Chittagong.

All softer parts and leaves beneath tawny tomentose.

†† *Leaves entire, or remotely serrate towards the apex.*

‡ *Fruits more than an inch in diameter; spines long and crowded.*

× *Young shoots pubescent.*

C. DIVERSIFOLIA, Kz.

Hills East of Toung-ngoo at 3500 to 5000 feet.

Spines of involucre straight and slender, glabrous. Spikes robust, tomentose.

C. ROXBURGHII, Ldl. *E.T.*

Chittagong.

Spines of involucre curved and strong, tawny pubescent.

×× *Quite glabrous.*

C. ARGENTEA, Bl. *E.T.*

Tree forests of Rangoon and Tenasserim. var. β Hills East of Toung-ngoo at 6000 to 7000 feet.

Leaves beneath silvery. Male spikes robust and densely tomentose. Spines of fruit simple and free.

var. *α argentea.*

var. β *tungurru*, Bl. Lower and stunted. Spines longer and more slender.

C. JAVANICA, Bl. *E.T.*

Tree forests of Pegu and Tenasserim. var. β Upper Tenasserim.

Leaves beneath, tawny, somewhat metallic. Male spikes very slender, greyish-pubescent. Spines of fruit clustered or basally connate.

var. *α Javanica*, Bl.

var. β *Falconeri*, Hance. Spines of less pubescent involucre less crowded, higher up, connate, and somewhat compressed.

Wood brown, heavy, close-grained, strong.

‡‡ *Fruit less than an inch thick, usually the size of a cherry, the spines often recurved and distant.*

C. TRIBULOIDES, Sm. *E.T.*

var. *a* Khakyen Hills and Upper
Tenasserim at 2500 to 4000 feet.

Kyan-za (Kurz), *i.e.* Rhinoceros food.

Wet-thit-khyā (Mason).

Leaves entire or remotely serrate towards apex, glabrous, or minutely brownish-tomentose beneath.

var. *a ferox*, Roxb. (*Quercus*). Leaves larger, entire, glabrous.

var. *β armata*, Roxb. (*Quercus*). Leaves smaller, serrate towards apex, often thinly tomentose beneath.

** *Fruits armed with very short pointed or blunt cones, or deciduous tubercles, and becoming unarmed and zonate.*

† *Fruiting involucre of a very thick coriaceous texture.*

C. RHAMNIFOLIA, Kz. *E.T.*

Tree forests of Eastern Slopes of the Pegu
Range and Southern Tenasserim.

Fruits armed with short cones. Leaves uniform green.

C. INERMIS, Ldl. *E.T.*

Hills East of Toung-ngoo at 4000 to 5000 feet.

Adult fruits unarmed, zonate, grey. Leaves silvery or coppery beneath.

†† *Fruiting involucre of a thin texture.*

C. (QUERCUS) LANCEFOLIA, Roxb. *E.T.* Chittagong.

Fruits blackish, smooth, with 4 or 5 scarred annular rings. Leaves silvery or coppery beneath.

Wood light-coloured, durable (Kurz).

Mason also gives *C. Martabanica*, Wall., which is probably one of the above species.

QUERCUS, *Linnaeus*.

Nuts solitary, resting on a scaled or lamellate-annular cup, exserted, or at least with the apex exposed.

* *The cup beset with more or less crowded imbricate scales, the scales sometimes becoming obsolete as the fruit ripens, and showing as concentric zones.*

× *Scales linear or subulate, spreading. Cup velvety.*

Q. FENESTRATA, Roxb. *E.T.*

Hills of Upper Tenasserim.

Thit-kyā (Kurz). (Generic.)

Leaves almost glabrous, cup almost wholly inclosing the nut.

Q. ACUMINATA, Roxb.

Chittagong.

As the last, but the nut far exserted.

Q. LAPPACEA, Roxb. *E.T.*

Tenasserim.

Leaves pubescent beneath. Nut exserted.

×× *Scales broad and short, appressed to the cup.*

‡ *Fruiting peduncle several inches long. Fruits numerous, and more or less spicate. Cups velvety. Nut exserted.*

Q. AMBERSTIANA, Wall. *E.T.*

Upper Tenasserim.

Cup an inch in diameter, the borders often reflexed, greyish velvety, indistinctly scaly. Leaves acuminate at the base, slenderly petioled, the nerves prominent.

Q. FALCONERI, Kz. *E.T.*

Upper Tenasserim.

Similar to the last, but the cup rusty velvety, distinctly appressed-scaly. Leaves rounded at the base, very thick-petioled, the nerves immersed above, resembling the leaves of *Goniothalamus sesquipedalis*.

Q. POLYSTACHYA, Wall. Ava Hills.

Cup about $\frac{1}{2}$ an inch in diameter. Leaves opaque and glaucous.

Q. BANCANA, Scheff. Hills East of Toung-ngoo at 3000 to 5000 feet.

As the last, but the leaves not reticulated and veined.

Q. THOMSONI, Miq. *E.T.* Chittagong.

Cup 5-8 lines in diameter. Leaves glaucous beneath.

Q. SPICATA, Sm. *E.T.* Chittagong and Tenasserim.

Leaves glossy, one-coloured. Cup as the last. Flowers in densely whitish tomentose appressed oblong clusters.

†† *Leaves pubescent beneath.*

Q. LINDEYANA, Wall. *E.T.* Ava Hills.

Cups usually connate, thickened zonate, about $\frac{1}{2}$ an inch in diameter or less. Leaves coarsely and obsolete repand towards the apex.

†† *Fruiting peduncle short, 1 or rarely up to 2 inches long. Cup wrinkled-rough, but glabrous, brown.*

Q. EUMORPHA, Kz. *E.T.* Nat-toung in Martaban at over 6000 feet.

Cup obsolete scaly-zonate, 7-8 lines in diameter, almost resinous. Leaves smooth, repand-serrate at apex.

** *The cup consisting of lamellate, entire, crenate, concentric rings. Fruiting peduncle 1-2 inches long, usually few-fruited. Leaves repand-serrate towards the apex.*

‡ *Nuts depressed, hardly exserted.*

Q. VELUTINA, Ldl Eastern Slopes of the Pegu Range and Tenasserim.

Cup an inch in diameter, softly tawny or fulvous villous. Petioles usually tawny or fulvous pubescent, or villous, the nerves curved.

†† *Nuts ovoid, exserted.*

Q. SEMISERRATA, Roxb. *E.T.* Eng forests of Ava, Pegu and Tenasserim.

Cup about an inch in diameter, softly tawny-villous, petioles smooth. Leaves somewhat glaucous beneath, the nerves rather straight.

Q. BRANDISIANA, Kz. *E.T.* Eng forests of Martaban at 1000 to 4000 feet.

Cup $\frac{1}{2}$ an inch across, greyish velvety. Petioles slender, glabrous. Leaves somewhat rugate, glaucous beneath.

Q. MESPILIFOLIA, Wall. *E.T.* Ava, Promo, and the Arakan Range at 4000 to 5000 feet.

Cup more than an inch wide and deep, greyish velvety. Leaves smooth, one-coloured.

I distrust the vernacular name of *Quercus* given by Kurz, as I have always found *Gyrdi* to be the term used in Pegu. Mason gives the following names for oaks in Sgau-karen, Thae-ghau, Thae-wā, Thae-ti, Thae-lae-nau, and Thae-lae-ka-sen.

Of the oak, as a tree regarded mythologically, De Gubernatis thus writes: "Le chêne mériterait à lui seul tout un livre explicatif, tellement son rôle mythologique, et légendaire est important dans la tradition Européenne. Il résume en effet, tous les attributs mythologiques qui appartiennent, dans les légendes orientales, à l'*agaththa*, au *cédre*, au *palmier*, au *cyprés*, au *pin*. Le plus vaste, le plus fort, et, comme on l'a dit, le plus utile des arbres, est devenu en Europe le roi de la végétation. La place d'honneur que Païge et le lion ont occupée parmi les animaux revient, parmi les végétaux, au chêne."—*Mythologie des Plantes*, vol. ii. p. 61.

The interesting mass of legends, however, connected with the oak have rather a European than Asiatic interest, and those who would know more thereof can

consult the above work, and I allude to them mainly to suggest the inquiry, whether or not in parts of the East where the oak flourishes, similar legends are associated with it as in Europe. Such is not improbably the case, but I am unable to quote any—and, indeed, with the exception of any myths they may come across regarding the Deluge, which may help to steady on its legs that somewhat, historically speaking, discredited story, our missionaries, who should be best qualified to contribute to our knowledge of the Folk-lore of the peoples among whom they labour, are certainly not generally very keen in investigating in a scientific and philosophic spirit the legends and tales which are all too probably fast vanishing from the memory of man.

Bunyan's immortal parable of the man raking for trash, has a wider application than to the mere miser, or the spiritually indifferent, and should touch all who waste the opportunities they enjoy of adding something to the sum of human knowledge.

URTICALES.

Flowers diclinous (in *Ulmaceæ* hermaphrodite). *Perianth* usually regular, rarely none. *Stamens* opposite the perianth lobes or sepals. *Ovary* superior, 1-celled (in *Ulmaceæ* 2-celled). *Stigmas* 1 or 2. *Ovule* solitary, the micropyle always superior. *Fruit* an achene or samara.

Order CANNABINEÆ.¹

Flowers diclinous. *Perianth* male, sepals 5, free, imbricate; female various. *Stamens* 4, opposite the sepals. *Filaments* short. *Styles* 2. *Ovule* pendulous, campylotropous. *Embryo* hooked or coiled. *Albumen* none. *Leaves* stipulate. Herbs with watery juice.

This small order embraces two genera only, *Cannabis* and *Humulus*, both possessed of narcotic properties. The latter has been lately introduced into Kashmir for use in brewing, with good prospect of success, whilst the latter is in universal demand for its fibre, which is the strongest of any in general use, though the native country of the plant is not known.

CANNABIS, *Linnaeus*.

* C. SATIVA, L.

Ben (Mason).

This is a hardy plant growing in profusion over the whole of India and a large portion of Europe, Asia and Africa, and seeming to thrive best where the seasons are extreme. The plant yields various products, fibre, seed and charas. According to experiments made by Dr. Royle, *Cannabis* fibre from Kangra was the strongest out of seven Indian fibres, the Rheca grass of Assam coming second and breaking with from 320 to 340 pounds, whilst *Cannabis* fibre supported over 400 pounds. How much depends, however, on the quality as regards preparation and probable freshness, may be judged from Petersburg Hemp (*Cannabis*) also breaking with only 160 pounds; other Hemp from the Deyrah Dun stood fourth in strength and twelfth in elasticity, and considering that this plant flourishes as an actual weed in Burma, it seems likely some day to become of importance as a fibre producer, of no small value. Next to the fibre the seeds are of value, as they are oily and albuminous and quite devoid of narcotic properties, as is the case likewise with the Poppy, whose seeds yield a bland oil fit for culinary purposes. In warm countries, as along the Nepal Hills, and no doubt Burma also, the *Cannabis* develops strong narcotic properties and exudes from its leaves a viscid resin called charas (charrus), which is collected by men clad in leather breeches (or in Nipal without any breeches), brushing through and against the standing plants, whereby the resin becomes transferred to their clothes or skin and is thence scraped off with a knife, and this constitutes the charas or waxy

¹ The arrangement of the species of *Urticales* is that of Kurz, but the orders are those adopted by Sir J. Hooker, in appendix in Maout and Decaisne's work.

charas of the bazaar and the basis of the native confection known as 'Majun.' As a narcotic Hemp is consumed in three different forms. The most expensive and most harmful form is the confection prepared with 'charas,' sugar, and other ingredients, forming a sort of 'charas' toffy. The dried leaves are also rubbed up with water and made into a beverage called 'Subzi' from its greenish colour, but the commonest form used is that of 'Bang,' the dried stalk and leaves of the plant which has flowered, which is smoked just as tobacco is. The narcotic effects of this herb are very pleasant but if largely indulged in, the results are deleterious in the extreme, and the sufferer lapses into a condition analogous to delirium tremens, not unfrequently accompanied by symptoms of homicidal desire or mania, often productive of serious consequences. A blister on the nape of the neck, with salines and antimonials, are, however, all that are required to restore the patient to his right mind. As a medicine the preparations of hemp are of great value, especially in the treatment of that terrible disease Tetanus, over which it possesses a greater power than any other drug, and even when it fails to cure, never fails to give relief.

Order URTICEÆ.

Flowers diclinous or polygamous. *Perianth* various, imbricate or valvate, rarely none. *Stamens* usually equal to the perianth-lobes. *Filaments* uncoiling elastically. *Style* simple or multifid. *Ovule* erect, orthotropous. *Embryo* straight, albuminous. Herbs, rarely trees. *Juice* limpid. *Leaves* stipulate.

* *Style* 1, simple. *Ovule* solitary, erect. *Seeds* albuminous, save in *Elatostemma*.

‡ *Perianth* free, the female 4, rarely 2-parted. Often stinging.

URTICEÆ.

LAPORTEA, Gaudichaud.

(*Juice* limpid.)

Flowers diœcious or monoœcious. *Male perianth* 4-5-partite. *Stamens* 5. *Ovary-rudiment* present. *Female perianth* 4-partite, in fruit herbaceous. *Stigma* sessile, linear, elongate (rarely short), villous, persistent. *Achene* discoid, smooth. Stinging herbs, shrubs or trees.

L. CRENULATA, Gaud. E.S.

Hpet-yā-gyī (Kurz).

Bark smooth, with stinging hairs. T. F. of Chittagong, Pegu and Tenasserim.

Flowers minute, green.

This plant at some seasons, says Sir J. Hooker, emits when bruised so irritating a vapour as to cause a running from the nose and eyes for some hours, and its sting is said to produce fever.

ELATOSTEMMA, Forster.

Albumen none.

E. NOVARÆ, Kz. †¹

Nankowry.

Near *E. lineolatum*, but differs by its nigrescent leaves, different nervation, and smaller flowers and flower-clusters.

E. INTEGRIFOLIUM, Wedd. ‡

Katchall.

E. MEMBRANIFOLIUM, Kz.

Tenasserim.

"*E. lineolata*, Wight, arcte affine, absentia striolarum autem tute distinguendum," Kurz.—J.A.S.B. ii. 1873, p. 104.

¹ The species marked ‡ are intercalated in the present list from Kurz's list of Nicobar plants by the Editor, and are not therefore assigned to the same place in the series that Kurz would probably have placed them in.

E. BULBIFERUM, Kz.

Arakan. Tenasserim.

E. (PROCRIS) GIBBOSUM, Wall.

“In vicinitate *E. cernuti* ponendum an potius generi *Pellionia* adscribendum?”
Kurz (*l.c. suprâ*).

PELLIONIA, *Gaudichaud.*

Flowers diœcious in axillary cymes or clusters, without any dilated or succulent receptacle. *Male flowers*: *Perianth-segments* 5, or sometimes 4, broad, imbricate in bud. *Stamens* as many, the filaments inflected in the bud. *Female flowers*: *Perianth-segments* 4 or 5, narrow and unequal. *Sterile stamens* usually as many. *Ovary* 1-celled, with 1 erect ovule. *Stigma* sessile, small, tufted. *Nut* seed-like, surrounded by the persistent perianth. *Albumen* little or none. *Herbs*. *Leaves* distichous, alternate or unequally opposite, usually very oblique.

PELLIONIA PROCRIDIFOLIA, Kz. ‡

Katchall.

Very near *P. frutescens*, which has, however, serrate leaves.

‡‡ *Female perianth tubular, very short, or wanting. Leaves opposite or alternate, not stinging.*

BOEHMERIA, *Jacq.*

Male perianth 4- (rarely 3-5-)parted, valvate in bud. *Stamens* as many as perianth-segments. *Female perianth* tubular, free, or nearly adhering to the ovary. *Ovule* single, erect. *Stigma* filiform, continuous with the ovary, usually one side papillose, persistent. *Achene* conform with the ovary, pericarp crustaceous, thin, or nut-like. *Albumen* present.

× *Flowers in sessile heads, axillary or above the leaf-scars.*

|| *Leaves glabrous above.*

B. MALABARICA, Wedd.

Tree forests all over Burma up to 2000 feet.

MONœCIOUS. *Leaves* 4-8 inches long, on a variable (2 lines to 3 inches) petiole, membranous, crenulate-serrate. *Flowers* minute, greenish-white, in dense clusters.

||| *Leaves sparingly hairy.*

B. HELFERI, Bl.

Tenasserim.

MONœCIOUS. *Leaves* cordate-ovate. *Flower-bracts* numerous, large, scarious, brown. *Perianth* 2-toothed. *Ovary* and style solitary.

B. DIDYMOGYNE, Wedd.

Maulmain.

As the last, but usually ovary and styles 2.

B. DIFFUSA, Wedd.

All over Burma to 3000 feet.

Leaves oblong, lanceolate, flower-bracts minute. *Perianth* 2-4-toothed at the somewhat hairy apex. *Stigmas* twice as long as the perianth.

×× *Flower heads globular, sessile, forming spikes in the axils of the leaves, the spikes sometimes collected in a raceme or panicle.*

B. MACROPHYLLA, Don.

Ava Hills.

Leaves lanceolate, pustulate-rugose above, the pustules terminating in a perforated gland.

B. CORDATA, Poir. (not Lour.).

Ava and Chittagong.

Leaves broadly ovate, smooth or rugate, without glands, coarsely serrate, hairy on both sides.

B. HAMILTONIANA.

Tree forest of Eastern Slopes of the Pegu Range and hills East of Toung-ngoo.

All adult parts glabrous. *Leaves* glabrous, serrate or entire, usually 2-glanded at the base of the mid-rib.

The “*liber*” of many species of *Boehmeria* yield strong cordage.

Mason enumerates also *Urtica heterophylla*, Rox., which he calls Bet-ya, and *Boehmeria interrupta*, Willd., Kyd-bet-ya, both common nettles, and *Boehmeria nivea*, L., the nettle hemp or celebrated China or Rhee grass, with the vernacular name Gwōn.

To raise the *Boehmeria nivea* (the celebrated Rhee grass of Assam) from seed, a sandy soil is chosen, which is carefully dug up, raked, and smoothed, and watered, and divided into plots a foot wide and four feet long. Over six of such beds, a pint of seed mixed with four pints of earth is sown broad-cast, and the ground sown is kept covered with a neat screen till the plants are an inch or two high. The young plants are now transplanted to a stiffer soil and well manured, and kept free from weeds by hoe dressing. As a rule, however, the plant is best grown and propagated from shoots or layers. To cut and prepare the Rhee the following plan is adopted, a modification of which will serve for all similar fibre plants:—The Rhee plant is known to be fit for cutting when the stems assume a brown colour for about six inches from the root. Grasping the top of the stalk with the left hand, the leaves are to be stripped off with the right, and the stalk cut through just above the hairy reticulate root, which being earthed up with manure will yield another crop. To strip the fibre, grasp the stem with both hands near the middle, and then with the forefinger and thumb of both hands give a wrench to break the central stem, and then pass down the fingers of each hand in opposite directions, thereby stripping the fibre as they go. If this can be done on the field, the refuse stems, burnt and mixed with dry cow-dung, make a capital manure for the following crop. The strips of fibre are now to be tied up by their smaller ends into convenient bundles and steeped in *clear water* for a few hours, and when dried are then fit for cleaning and hackling. Fibre thus prepared would command, according to quality, from £60 to £120 a ton in England.

VILLEBRUNNEA SYLVATICA, Bl. †

Tree forests of Kamorta.

PIPTURUS VELUTINUS, Wedd. †

Trice, Track and Nankowry.

GONOSTEGIA HIRTA, Miq. †

Kamorta.

POZZOLZIA, Gaudichaud.

Flowers usually monocious. *Male perianth* 4-5- (rarely 3-)lobed. *Stamens* as many as perianth lobes. *Ovary-rudiment* present. *Female perianth* tubular, 2-4-toothed at the contracted mouth. *Achene* almost conform with the ovary, and surrounded by the almost unchanged perianth, or its enlarged wings.

P. VIMINEA, Wedd. *E.S.*

Chittagong.

The leaves serrate, chartaceous.

P. INDICA, Gaud.

Kamorta.

† † *Female perianth free, in fruit fleshy or succulent.*

SARCOCHLAMYS, Gaudichaud.

Fruiting perianth ventricose, laterally contracted at the mouth. *Stigma* capitate, persistent in fruit. *Stamens* 5. *Flowers* spicate, dioecious, small, subtended by short-toothed bractlets, clustered, the male in lax, the female in close spikes, solitary or by twos in the leaf axils.

S. PULCHERRIMA, Gaud. *E.T.*

Chittagong. Pegu and Upper Tenasserim.

Sap-shā-pen (Kurz).

The 'liber' yields a good cordage (Kurz).

OREOCNIDE, Miquel.

Flowers dioecious. *Male perianth* 4-partite, valvate in bud. *Stamens* 4. *Ovary-rudiment* present. *Female perianth* adnate to the ovary. The limb minute, toothed, or almost entire. *Fruit* dry, on a fleshy cup. *Stigma* almost peltate with long-fringed borders, persistent in fruit.

O. (URTICA) ACUMINATA, Roxb.

Chittagong. Ava Hills.

Leaves penninerved, entire.

This, observes Kurz, is the ban-rheea of the Assamese, which yields the fibre of China-grass-cloth.

O. SYLVATICA, Miq.

Martaban at 2000 feet.

Leaves penninerved, crenate-serrate.

MOROCARPUS, Siebold and Zuccarini.

Flowers monœcious and diœcious. Male perianth 4-partite, rarely 2-partite. Stamens as many as perianth lobes. Ovary-rudiment present. Female perianth ventricose-tubular, 4-toothed at the contracted mouth, adnate to the ovary. Fruit berry-like. Stigma penicellate-capitate, persistent in fruit.

M. (DEBREGEASIA) LONGIFOLIA, Wedd. var. α Ava and Pegu. var. β Chittagong.

Pwôt-shor-pen (Kurz).

Branchlets pubescent. Leaves lanceolate. var. β latifolius. Leaves ovate.

M. WALLICHIANUS, Miq.

The Pegn Range at 1000 to 2000 feet.

Branchlets robust and smooth. Leaves ovate.

The 'liber' of both species yields good cordage.

MAOUTIA, Wedd.

Flowers monœcious or diœcious. Perianth in males 5-parted, in females none. Stamens 5. Ovary with a solitary, nearly erect ovule. Achene ovate, compressed and sometimes bluntly 3-gonous. Albumen thin. Shrubs with alternate serrulate leaves.

M. PUTA, Wedd.

Martaban at 2500 to 5000 feet.

Leaves 4-6 inches long, ovate, acuminate, coarsely serrate, membranous, very rough above, beneath white-tomentose. Kurz describes this shrub as yielding a strong fibre resembling the rheca.

CONOCEPHALUS, Blume.

Flowers diœcious. Male perianth turbinate, tubular, 4- (rarely 2-)cleft. Stamens as many as perianth lobes, filaments complanate. Anthers short, 2-celled, cells opening longitudinally. Ovary-rudiment present. Female perianth tubular, 4-cleft. Ovary free, with a solitary ovule. Style terminal, very short. Stigmas 1-sided or capitate, oblique. Fruit covered by the persistent perianth, chartaceous, dehiscent longitudinally into 2 valves. Scandent shrubs, with alternate, long-petioled, simple leaves.

C. SUAVEOLENS, Bl. E.S.S. Tree forests of Chittagong, Pegu and Tenasserim.

Flowers small, yellow, fragrant, in dense globular heads.

The last thirteen genera form the sub-order of *Urticeæ*, or nettle tribe, some of which are remarkable for their stinging powers, and others for the excellence and tenacity of their fibre. Foremost among the stinging nettles is *Laportea crenulata*, of Northern India and Burma, which at certain seasons is so acrid that the effluvium from its bruised leaves and stalks will cause a copious discharge of water and mucus from the mouth, nose, and eyes, the effect lasting some hours, whilst the pain caused by its stinging hairs induces fever. In spite, however, of the stinging powers of the full-grown plant, many nettles when young make a wholesome vegetable when boiled like spinach, and an infusion of nettles is considered a wholesome drink in early spring. The great value, however, of plants of this tribe lies in the strength of their fibre, and the word itself is derived¹ from the root 'ne' (Nere, *reca*, to spin), as the Germanic nations, and the Scotch down to the seventeenth century, used its fibres for weaving cloth from, till its use became superseded by flax and hemp.

Order MOREÆ.

Flowers declinous, minute, often on an open or closed receptacle. Perianth tubular or 3- or 4-partite, or none. Stamens as in *Urticeæ*, but filaments sometimes

¹ Popular Names of British Plants, by R. C. A. Prior, p. 167.

straight. *Styles* 1 or 2. *Ovule* various. *Embryo* straight or curved, albuminous or not. *Trees* or shrubs. *Juice* milky (generally). *Leaves* alternate. *Stipules* large, fugacious.

** *Style usually simple. Pericarp inclosed in the fleshy or dry perianth, indehiscent or rarely 2 valved. Leaves alternate or distichous.*

† *Filaments straight in bud, never inflected.*

× *Female flowers numerous in heads or on a fleshy receptacle, the males in separate inflorescences.*

ARTOCARPUS, *Linnaeus.*

Flowers monœcious, the sexes crowded on separate receptacles. *Stamen* 1, exerted, filament complanate. *Female perianth* tubular, entire, the perianths of the surrounding flowers more or less connate. *Ovary* free, 1- rarely 2-3-celled, the cells 1-ovuled. *Style* terminal or excentric, simple. *Fruit* a compound fleshy syncarp, made up of enlarged perianths, each inclosing a solitary pendulous seed with a chartaceous indehiscent pericarp. *Albumen* none. *Trees* abounding in milky juice, with alternating, entire or lobed leaves.

* *Syncarp prickly-echinate.*

× *Prickles of syncarp bristly-setose.*

A. CALOPHYLLA, Kz. *E.T.* Upper Tenasserim.

Leaves bristly-scarbrous above, softly pubescent beneath.

A. RIGIDA, Bl. *E.T.* Tenasserim.

A. echinata, Roxb.

Leaves glabrous above, pubescent along the nerves beneath.

×× *Prickles of syncarp smooth.*

A. RUFESCENS, Miq. *E.T.* Tenasserim (probably).

Leaves minutely pubescent above, tomentose beneath.

** *Syncarp tubercled.*

A. CHAPLASHA, Roxb. Tree forests all over Burma, the Andamans
Toung-peing-nai (Kurz). Toung-ben (W.T.). and Nankowry.

Leaves scarbrous, pubescent, especially beneath. Syncarp as large as the fist, globular, pendulous on a slender peduncle. This tree, says Kurz, yields a tenacious milky caoutchouk, and he describes the wood as heavy, 30 lbs. (!), and soon attacked by insects. Now a wood of 30 lbs. cannot be called heavy. The wood, though rather coarse in grain, is excellent for furniture. It weighs 34 lbs. (selected sample), and is *not* particularly attacked by insects, certainly not so much as some woods in constant use. It works well, and looks well, and, though probably not lasting if exposed to the weather, is excellent for indoor work, and obtainable of very large scantling. For boats and wheels it is of course inferior.

* A. INTEGRIFOLIA, Willd. *E.T.* Cultivated all over Burma and wild
Peing-nai. The Jack tree. in Kamorta.

All parts quite glabrous. Syncarp clavate to oblong, 1-1½ feet long.

A tree, which, when in full fruit, is a fine object, and yielding a pleasant shade with its dense foliage. The fruit is said, in favourable situations, to attain to 60 lbs. weight, and those which, in old trees, grow from a part of the stem covered by the earth (which cracks over them), are esteemed the finest. The odour of the fully ripe fruit can only be designated as a stench; but before becoming ripe the fruit is not unpleasant, and the odour of the tree in blossom is very pleasant, and resembles fresh apples. The kernels, when roasted, are equal to chestnuts. Birdlime is manufactured from the juice which flows from incisions, and a yellow but fugitive dye is manufactured by boiling the wood. The timber is excellent for furniture, though brittle.

Freshly cut it is yellow, but seasons to brown, and ranges between 42-52lbs. It is too valuable a fruit tree, however, to be cut for timber, and it is hardly superior to selected plants of the last.

*** *Syncarp smooth, usually velvety or tomentose.*

A. GOMEZIANA, Wall. *E.T.* Tenasserim.

All parts quite glabrous.

*A. LAKOCHIA, Roxb. Tree forests of Pegu, and cultivated all over Burma.
Myouk-lök.

Shoots densely rusty-pubescent. Leaves shortly scabrously pubescent. Syncarp of an irregular globular shape, the size of the fist, smooth, velvety, puberulous, when fully ripe yellow, edible.

Kurz adds from the Nicobars:

*A. INCISA, L. Cultivated on Car Nicobar.
A. POMIFORMIS, T. et B. Kamorta and Katchall.
A. PEDUNCULARIS, Kz. Kamorta.

CUDRANIA, *Trécul.*

Flowers diœcious, packed into globular heads, subtended by 2-4 bracts alternating with the perianth lobes. *Perianth* 4-parted. *Stamens* 4. *Ovary* free, with a single pendulous ovule. *Style* simple, with a rudimentary tooth-like branch at the base. *Stigma* filiform, puberulous. *Fruit* a syncarp, enveloping crustaceous nuts.

× *Leaves* 1½-3 inches long, glabrous.

C. AMBOINENSIS, Rumph. *S.S.* Chittagong.
Cudranus Rumphii, Thw.

Young branches pubescent. Leaves blunt, the nerves thin but prominent. Syncarp the size of a small cherry. Perianth fleshy, connate, glaucous green.

×× *Leaves* 4-6 inches long, acuminate, the nerves prominent.

C. FRUTICOSA, Wight. *S.S.* Ava. Chittagong. Upper Tenasserim.

A scandent shrub armed with curved sharp spines. All parts quite glabrous. Syncarp as the last, but larger. Seeds as big as a small pea.

C. PUBESCENS, Trécul. Eastern Slopes of the Pegu Range
Doung-kyet-tek (Kurz). and Martaban up to 3000 feet.

Leaves pubescent. Syncarp as the last, but larger, wrinkled.

×× *Female flowers* numerous along with the males, arranged within a hollow, or on an explanate fleshy receptacle.

FIGUS, *Linnaeus.*

(NIOUNG, *generic.*)

Receptacle closed or perforated at the bracted apex. *Achenes* minute, somewhat crustaceous. Trees or shrubs often scandent and epiphytical. *Juice* milky. The receptacles are what are commonly understood as figs.

A. *Receptacles* by pairs, or solitary from the axils of the leaves, or from above the leaf-scars, never from the stem or root-shoots.

* *Leaves* thick-coriaceous to almost chartaceous, glabrous, or rarely puberulous beneath. *Receptacles* usually smooth, not hispid within, the mouth closed by 3-4 closely appressed bracts. *Male flowers* monandrous. *Stigma* filiform-elongate, rarely 2-cleft. Trees or arborescent stem-climbing.

§ *Petioles* usually thick and short, not jointed and thickened at the insertion of the blade.

† Leaves firmly coriaceous, 4-10 inches long, rarely shorter, the petiole strong and thick, and usually short in comparison with the blade. Receptacle sessile, the size of a cherry.

× Leaves 3-5-pinnerved, shortly pubescent or while young villous beneath or on both sides. Receptacles puberulous or tomentose, more or less glabrescent.

* F. BENGALENSIS, L.

Cultivated in Chittagong and Pegu.

F. indica, Roxb.

Pyu-moung (Kurz).

Leaves shortly pubescent beneath; blunt or apiculate. Young shoots and stipules puberulous.

F. MYSCRENSIS, Roth. *E.T.*

Ava and forests East of Toung-ngoo.

Leaves glabrous, shortly acuminate. Young receptacles floccose. Stipules rusty villous-pubescent.

F. PILOSA, Rwdt. *E.T.*

Upper Tenasserim.

Young leaves and receptacles covered with a floccose rusty-coloured down. Stipules rusty villous-pubescent.

× × Leaves quite glabrous.

F. ONTSTA, Wall.

Tenasserim.

Branchlets roughish, from rusty-coloured asperities. Leaves penninerved, shortly acuminate. Bracts deciduous.

F. LACCIFERA, Roxb.

Eastern Slope of the Pegu Range, Tenasserim and the Andamans.

Leaves triplinerved, blunt-apiculate. Bracts glaucous, persistent.

Yields a good caoutchouk, equal to that of *F. elastica* (Kurz).

F. ALTISSIMA, Bl. *E.T.*

Upper Tenasserim.

Differs from the last in the young shoots, stipules and bracts being puberulous and the last falling off in bud.

F. INDICA, L. *E.T.*

All over Burma. Kamorta and Katchall.

Leaves triplinerved, acuminate. Bracts glabrous, persistent.

F. OBTUSIFOLIA, Roxb. *E.T.*

Chittagong. Ava. Tenasserim.

Nyoung-kyap.

Leaves very thick-coriaceous, rounded at base, the lateral nerves very thin and inconspicuous; petiole short.

Yields a good quantity of caoutchouk (Kurz).

†† Leaves as in former, but receptacles on a peduncle from the size of a cherry to that of a plum.

F. ANNULATA, Bl. *E.T.*

Tree forests of Eastern Slopes of the Pegu Range and Tenasserim.

Leaves penninerved, pale beneath, peduncles very short and thick, villous-pubescent.

F. THOMSONI, Miq.

Upper Tenasserim.

Leaves penninerved, acuminate, peduncles 3-5 lines long, glabrous.

††† Leaves large coriaceous, the lateral nerves all thin and parallel, very closely set.

F. ELASTICA, Bl. *E.T.*

Upper Burma, especially the Hookhoom Valley.

Petiole short and thick. Stipules red, up to 6 inches long.

This yields the caoutchouk of commerce.

†††† Leaves rather small, 2-3 inches long, thin coriaceous, nerves thin, crowded, and parallel, with net-venation between.

× Receptacles sessile or shortly peduncled, the size of a pea or less.

- F. RETUSA, L. *E.T.* All over Burma, the Andamans, and Nicobars.
 Nyoung-op (Kurz).
 Leaves surrounded at the base, blunt.
 var. *a retusa*. Receptacles the size of a pea, greenish-yellow.
 var. *β macrocarpa*. Receptacles twice the usual size, orange-coloured.
- F. AFFINIS, Wall. *E.T.* The Pegu Range and Andamans.
 Leaves long, but bluntish-acuminate. Nerves and net-venation prominent on both sides. Receptacles wholly peduncled, the size of a pepper-kernel.
- F. RHODODENDRIFOLIA, Miq. *E.T.* Tree forests of the Pegu Range and the Andamans.
 As the last, but receptacles sessile, as large as a pea.
- F. EUPHYLLA, Kz. *E.T.* Khakyen Hills.
 Very close to the last, but has smaller and more acute bracts.
 × × Receptacles the size of a cherry or plum, all parts glabrous.
- F. NUDA, Miq. *E.T.* var. *β* in the Eastern Slopes of the Pegu Range, and Tenasserim.
 Receptacles contracted on a slender stalk.
 Nerves distant, inconspicuous, almost immersed.
 var. *a nuda*. Receptacles the size of a pea, subsessile.
 var. *β macrocarpa*. Receptacles the size of a cherry, peduncled.
- F. BENJAMINA, L. *E.T.* var. *a* the Andamans. var. *β* all over Burma.
 Receptacles sessile, or tapering on a very thick base. Nerves crowded and with the transverse venation prominent on both sides.
 var. *a Benjamina*. Receptacles globular, $\frac{1}{3}$ inch in diameter.
 var. *β comosa*, Roxb. Receptacles $\frac{1}{2}$ inch or more in diameter.
- § § Petioles slender, jointed, and thickened at the insertion of the blade. Leaves chartaceous or thin coriaceous.
 × Receptacle sessile or nearly so, the size and shape of a pea. Leaves elliptical.
 † Receptacle glabrous.
- F. INFECTORIA, Willd. Hills East of Toung-ngoo up to 3000 feet. Katchall.
 Nyoung-chin.
 Leaves penninerved, the nerves and venation prominent on both sides. Petiole 1-2 inches long.
- F. GENICULATA, Kz. Pegu and Tenasserim.
 Nyoung-tha-bye (Kurz), meaning the '*Eugenia-fig*.'
 Leaves coriaceous, often rigid, penninerved. Nerves rather obsolete. Petiole as long as the blade or longer.
 var. *a geniculata*. Leaves obsolete, veined. Receptacles sessile.
 var. *β abnormalis*. Leaves prominently net-veined. Receptacles peduncled.
 † † Receptacles villous-tomentose.
- F. INSIGNIS, Kz. Prome.
 Foliage as in the last.
 × × Receptacles glabrous, the size of a small cherry. Leaves cordate. Petiole very long and slender.
- F. RUMPHII, Bl. Chittagong, Ava, Tenasserim, Katchall, and Great Nicobar.
F. cordifolia, Roxb.
 Nioung-hpyu (Kurz). Nioung-gyat (Mason).
 Leaves opaque, white-dotted on the upper side.

F. CALONEURA, Kz. Burma.

Like the last, but leaves not white-dotted.

F. RELIGIOSA, L. Pegu Range, along streams, and cultivated.
Nioung-ben (Nioung-bor-di, Mason).

Leaves glossy, not white-dotted, abruptly and long-caudate-acuminate.

** *Leaves membranous to chartaceous, rarely rigidly coriaceous, glabrous, or usually somewhat hairy. Receptacle various, usually furnished round the mouth with more than 3 scales. Male flowers with 2-6 (rarely 1) stamens.*

△ *Receptacles not stalked and not tapering at base.*

† *Receptacles globular to turbinate, sessile, pubescent.*

F. TRILOBA, Ham. E.T. Martaban at 3000 to 5000 feet.

Tawny-hispid. Leaves at base 5-7-nerved, usually lobed. Receptacle bracts 3-4 lines long.

F. URTA, Vhl. E.T. Martaban at 3000 to 4000 feet.

Tawny-hispid. Leaves at base usually 3-nerved, often lobed. Receptacle bracts about a line long.

F. CHRYSOCARPA, Rwdt. E.T. Hills East of Toung-ngoo at 4000 feet. Kamorta.

Tawny-tomentose and pubescent. Leaves simple, entire, and 3-nerved at base.

†† *Receptacles globular to turbinate, shortly, or very shortly peduncled. Young shoots pubescent, adult leaves glabrescent.*

× *Receptacles the size of a cherry, pubescent.*

F. FRUTIGERA, Wall. Martaban at 4000 feet.

Leaves glabrous. Petioles $\frac{1}{4}$ to $\frac{1}{2}$ inch long. Peduncles less than a line long.

F. LEPIDOSA, Wall. E.T. Southern spurs of Pegu Range.

Leaves slightly pubescent beneath. Petioles 1-1 $\frac{1}{2}$ inch long. Peduncles 2-3 lines long.¹

× × *Receptacles the size of a pea, glabrous.*

F. LAMPONGA, Miq. S. Upper Tenasserim.

Leaves thin membranous, glabrous, or pubescent on the nerves beneath.

var. *α lamponga*. Petiole and nervation pubescent.

var. *β chartacea*. Petioles and leaves glabrous.

△ △ *Receptacles stipitate, i.e. contracted at base or tapering on a stalk.*

† *Stipitate receptacles sessile. Leaves glabrous.*

× *Leaves rigid and thin-coriaceous, yellow and brown variegated beneath.*

F. EXCELSA, Vhl. E.T. Chittagong. Eastern Slopes of the
Nyong-tha-bye (Kurz). Pegu Range and the Andamans.

Receptacles glabrous or somewhat scabrous, leaves apiculate.

× × *Leaves thin, rigid-chartaceous, prominently net-veined on both sides.*

F. RADICANS, Roxb. Upper Tenasserim.

Receptacles hispid scabrous. Leaves long-caudate-acuminate.

× × × *Leaves long-acuminate, thick membranous, venation not prominent above.*

F. SCREBLATA, Bl. E.S.S. Martaban and Eastern Slopes of the Pegu Range.

Leaves entire; receptacles with a few peripheral scales. Peduncles scaled.

¹ "F. chrysoearpa Rwdt. affinis, errore quoddam el Miquel in Annalis suis me hanc speciem cum F. diversifolia identicam declarasse putavit."—Kurz, J.A.S.B. ii. 1873, p. 107.

F. UNIGLANDULOSA, Wall. *E.S.* Along streams in the Pegu Range.
 Leaves crenate-serrate towards the apex. Receptacles and peduncles not scaled.
 †† *Receptacles abruptly stalked. Leaves not tessellate-net-veined beneath. Glabrous trees.*

§ *Receptacles the size of a pea, smooth. Petiole $\frac{1}{4}$ – $\frac{1}{2}$ inch long.*

E. VASCULOSA, Wall. *E.T.* Tenasserim.

Leaves rigidly chartaceous, blunt-acuminate, vividly green.

F. NERVOSA, Heyne. *E.T.* All over Burma.

Nyoung-peing-nai (Kurz), *i.e.* The 'Jack-tree fig.'

Leaves thin, but rigidly chartaceous, sharply acuminate, brownish beneath.

§§ *Receptacles the size of a prune, long peduncled, puberulous.*

F. CALLOSA, Willd. *E.T.* Eastern Slopes of the Pegu Range.
 Tenasserim. The Andamans.

Leaves large, glaucous-green, apex rounded. Petiole 1–2 inches long.

×× *Glabrous climbers. Receptacles shortly and abruptly peduncled. Leaves rigidly coriaceous.*

F. RAMENTACEA, Roxb. *E.S.* Chittagong and Eastern Slopes of
 the Pegu Range.

Leaves not tessellate-net-veined beneath. Receptacles smooth, the size of a cherry.

§ *Leaves tessellate-net-veined beneath. Flowers not mixed with bristles.*

|| *Receptacles as large as a pigeon's egg or larger.*

F. POMIFERA, Kz. *E.S.S.* Upper Tenasserim.

Glabrous. Leaves blunt. Receptacle smooth, apple-shaped.

||| *Receptacles the size of a pea or larger.*

F. SCANDENS, Roxb. *E.S.S.* Pegu Range, Tenasserim, and the
 Receptacles scabrous. Andamans.

××× *Puberulous low shrubs. Receptacle abruptly stalked.*

F. SCABRELLA, Roxb. Chittagong.

Leaves serrate. Receptacle the size of a cherry, white-tubercled.

F. ANASTOMOZANS, Wall. Upper Tenasserim.

Leaves coarse, sinuate, and almost lobed. Receptacles the size of a pepper-kernel, scabrous-pubescent.

×××× *Shrubs. Receptacles pear-shaped. Peduncle long.*

§ *Low creeping shrub. Leaves serrate.*

F. HETEROPHYLLA, L. Along streams all over Burma.

Leaves various. Cordate to palmately lobed or undivided, scabrous, pubescent beneath.

§§ *Erect shrubs. Leaves entire.*

F. ISCHNOPODA, Miq. Rocky streams in the Pegu Range.

Leaves and receptacles glabrous.

F. SUBPYRIFORMIS, Miq. Hills East of Toung-ngoo.

Leaves pubescent beneath. Receptacles pubescent.

B. *Receptacles arising in clusters or by pairs in racemes or spikes from tubercle-like or reduced leafless racemose branchlets, or from bracted shoots from the roots or stems, pyriform or turbinate, often peripherally scaled. Mouth strongly umbilicate by numerous bracts. Male flowers often monandrous. Stigma usually thickened and papillose.*

+ *Leaves entire.*

† *Leaves lanceolate penninerved. Receptacle the size of a pea.*

F. RIBES, Rwdt. *E.T.* Southern Tenasserim.

†† *Leaves lanceolate to linear penninerved. Receptacles the size of a cherry or larger.*

F. PYRRHOCARPA, Kz. *E.S.* Rocky streams in the Pegu Range and Martaban.

Receptacles ribbed, and with peduncle rusty-hirsute. Leaves thinly pubescent beneath.

F. LANCEOLATA, Roxb. *E.S.* Chittagong.

Ye-tha-hpan (Kurz).

Glabrous, receptacles ribbed, smooth pustulate.

††† *Leaves broadly oblong, 3-nerved at base. Receptacles the size of a prune to that of an apple.*

F. GLOMERATA, Willd. *E.T.* All over Burma.

Ye-tha-hpan (Kurz).

Receptacles on long glabrous peduncles.

F. CHITTAGONGA, Miq. *E.T.* Chittagong and Pegu.

Tha-hpan-ben (Kurz).

Receptacles on very short pubescent peduncles.

†††† *As above, but leaves penninerved, glabrous.*

F. FISTULOSA, Rwdt. *E.T.* Eastern Slopes of the Pegu Range and Tenasserim.

Leaves thick-membranous, acute at base. Receptacles long-peduncled, roughish, brown.

F. MACROPODA, Kz. *E.T.* Tree forests of South Andaman. Nankowry, Great and Car Nicobar.

Leaves thin chartaceous, rounded at the narrow base. Receptacles long-peduncled, smooth.

++ *Leaves pubescent beneath only, or glabrous, crenate-serrate, rounded or caudate at base.*

† *Leaves glabrous, 3-5-nerved at base. Receptacle very large.*

F. REGIA, Miq. *E.T.* Tree forests of Upper Tenasserim.

Receptacles shortly and densely pubescent, indistinctly ribbed.

†† *Leaves pubescent beneath, 3-5-nerved at base. Receptacles very large.*

F. ROXBURGHII, Wall. *E.T.* Tree forests of Martaban and Chittagong.

Sin-tha-hpan (Kurz).

Peduncles and receptacles densely hispid-tomentose.

+++ *Leaves on both sides pubescent, serrate. Receptacles usually more scaly round their circumference.*

† *Leaves not oblique. Receptacles pyriform, rising from radical shoots and the leaf axils simultaneously. Bark grey.*

F. HISPIDA, L. f. *E.T.* All over Burma and the Andamans up to 1000 feet.

Ka-dot (Kurz). Katchall. Kanorta and Car Nicobar.

Leaves usually opposite. Peduncles and receptacles greyish-pubescent.

†† *Leaves oblique. Base on one side produced in a half-cordate lobe. Receptacle scaly, pubescent. Bark red-brown.*

F. CUNIA, Buch. *E.T.* var. *a* all over Burma.

Ye-kha-ong (Kurz).

Receptacles pyriform, peduncled.

var. *a cunia*. Receptacles pyriform, stalked.

var. *β conglomerata*, Roxb. Receptacles more globular, sessile.

Kurz adds from the Nicobars :

F. GIBBOSA, Bl.

Tree forests of Kamorta and Car Nicobar.

F. PEDUNCULATA, Rwdt.

Nankowry.

Mason gives the following vernacular names for several species of figs : Yae-kha-ong, Yae-tha-hpan, Pa-nioug, Yuae-tia-thie, Neung-tha-byë, Nioug-peiug-në, Bet-ka-lat, Kha-ung-sung-ku, Lonk-let, Sa-kha-ung, Thab-bu, Thap-pän; and in Sgau-Karen, We-tha-kan-tho, We-tha-kau-hsä, We-tha-ku-pan, We-tha-ku-pan-thö, We-tha-ku-pan-hsä, We-ta-en-na-tho, We-ta-en-na-hsä, We-hti, We-tha-dwi-tho, We-khai-hsä, We-kle-thu-mu.

From the earliest times, down to the present, the fig-tree has ever held a distinguished place among those trees associated with *Phallic symbolism* and the worship of the reproductive force of nature. A familiar example may be quoted in the traditional use of the fig-leaves as a covering for our first parents, and the connection thereby indicated between the fig and the ideas covertly represented by the serpent and the mythical apple or forbidden fruit (call it what you may), for I presume there are few people now-a-days who have enjoyed anything approaching to a liberal education, who are so unenlightened or credulous, as to regard the account of Adam's fall in a literal and material sense, and not as an allegorical and covert presentment of the course and development of human passion and frailty. No greater mistake can be made than when we attribute indelicacy or profanity to certain acts or things, which to the eyes of men in an earlier and ruder stage of society appeared neither indelicate nor profane, however much they may be judged to be so by ourselves. To judge justly of either actions or persons, we must emancipate ourselves as much as possible from our prejudices and present surroundings and view matters as they appeared to those of old time. In our day, for example, if one man wishes to pledge himself to another, he grasps his hand; but in Abraham's time it was not the hand, but quite another part of the person¹ (the 'thigh' as it is euphemistically called), which was grasped when a solemn pact or engagement was made; and yet we may be sure that all notions of indelicacy were as absent in the one case as they are in the other, and this peculiar mode of attestation simply added the sanctity of an oath to the obligation about to be incurred.

This may appear to many too much of a truism to require comment, but so far from this being universally accepted and acted on, there are, I fear, too many among us who would rather the multitude remained in ignorance of the meaning of a good deal they read in their Bibles, or entirely mis-interpreted the same, than unsettle their minds by letting them comprehend the truth; such, for example, as the real meaning of the allegory of the Serpent in Genesis. These few remarks are, however, made simply in explanation of the light wherein I view a subject rather difficult, I confess, to deal with, and need not therefore be prolonged. Speaking of the famous *Ficus ruminalis*² of Rome, beneath which it was believed Romulus and Remus were nurtured, De Gubernatis remarks, "La figue dans le monde végétal, . . . est un symbol de la génération et de la fécondité, et elle préside tout naturellement à la fondation d'une grand ville et d'un grand peuple." And again, "C'est sous un figuier qu'Adam se cache après avoir mangé le fruit défendu; la figue et la pomme d'Adam cachent le même fruit mythologique." And again "Nous avons eu déjà plusieurs fois l'occasion de noter que les animaux et les arbres phalliques sont devenus des arbres sinistres, funéraires, diaboliques; nous avons tâché même de prouver comment l'arbre d'Adam a pu se transformer en arbre de la croix, en arbre maudit, en arbre de Judas."

In connection with this subject it may be remarked that the wood of the fig-tree

¹ Genesis xxiv 2.

² For much curious information touching the extremely ancient symbolical sense attaching to 'figs' and 'fig-leaves,' consult 'Ancient Faiths embodied in Ancient Names,' by Thomas Inman, under the heads 'Apple,' 'Fig,' 'Paranomasias,' 'Rimmon,' and 'Mythologie des Plantes,' ii. p. 137. The subject is a deep one, but inadmissible in a work of general reading, in spite of the laudable proverb 'to the pure all things are.'

was that commonly selected for making the images of Priapus, which the Romans placed in their gardens to frighten birds and thieves, as is so humorously alluded to by Horace when relating the discomfiture of Canidia and her accomplice Sagana—

“Olim truncus eram ficulnus, inutile lignum :
Cum faber, incertus scammum faceretne Priapum,
Maluit esse deum. Deus inde ego furum avinmque
Maxima formido.”—Satires, Lib. I. 8.

A double entendre attaching to the word *ficus* was well known to the Romans, and is embodied in the 66th epigram of Martial, Lib. i. ‘*de genere et declinatione ficus,*’ and Lib. vi. epig. 49, and xii. 33, which I need not more particularly quote. That the fig held a high place among fruits in the estimation of the Greeks in the time of Homer may be inferred from its being one of the fruits which adorned the garden of Alcinoüs, and it was also a favourite in Ithaca, for whilst Laertes only gave his little son 10 apple-trees¹ and 13 pears, he gave him no less than 40 fig-trees and 50 vines.

DORSTENIA, *Plumier.*

Flowers monœcious, numerous, sessile, males and females mixed, on a peltate receptacle. *Perianths* tubular, united, 2-4-toothed. *Stamens* 2, filaments basally confluent with the perianth. *Ovary* immersed in the spongy-fleshy receptacle, sometimes stalked. *Style* lateral 2-cleft, or simple and short. Seeds on ripening, elastically ejected from the pericarp.

D. GRIFFITHIANA, Kz. *E.S.* Tenasserim.

Flowers immersed in the cavities of the fleshy receptacle. Fruit compound, dimorphous, velvety.

××× *Male and female flowers separate, the latter solitary within a many-bracted involucre.*

ANTIARIS, *Leschenault.*

Flowers monœcious. *Males* densely packed within a many-bracted involucre, opening at length into an open convex receptacle. *Perianth* 4- (rarely 3-)cleft. *Female flowers* solitary without perianth. *Fruit* a drupe, the pericarp formed of the enlarged fleshy involucre. *Albumen* none. Trees or shrubs with entire distichous leaves abounding in milky juice.

A. TOXICARIA, Lesch. *E.T.* Eastern Slopes of the Pegu Range. Tenasserim.
A. innocua, Bl.
A. succidora, Dalz.

Hmi-a-sait (Kurz).

Drupes pear-shaped, thick-peduncled, scarlet.

This is the renowned ‘Upas-tree’ of Java. It exudes a poisonous white resin, used to poison arrows with. The inner bark or liber removed entire is used for sacks in some parts of India. For this, a branch is selected of the required diameter and sawn off. It is now steeped in water and the ‘liber’ loosened by beating with clubs, and when quite detached from the wood, it is turned back and stript off like a glove, a thin disk alone being retained and sawn off, to serve as a bottom for the sack, or the end is sewn together. In the Wynaad these sacks are in common use among the Cooroombars to hold rice.

‡‡ *Filaments inflored in bud.*

× *Flowers in dense heads or spikes.*

BROUSSONETIA, *Ventenat.*

Flowers dioecious, males in dense bracted elongate spikes, females in globular

¹ Ὀρχνας μοι δῶκας τρισκαίδεκα καὶ δέκα μηλέας,
σुकίας τεσσαράκοντ'. ὄρχους δέ μοι ᾧδ' ἰνόμηνας
δῶσειν πεντήκοντα."—Od. xxiv. 342.

heads. *Perianth* in males 4-parted, valvate in bud. *Stamens* 4. *Filaments* long, exerted. Female perianth urceolate or bell-shaped, 4-3-toothed, persistent. *Ovary* stalked, with a single pendulous ovule. *Style* lateral, filiform persistent. *Berry* club-shaped, with a sappy pericarp, inclosing the seed at its thickened upper end. Juice milky.

B PAPYRIFERA, Vent.

Ava and Martaban Hills.

Ma-laing (Kurz).

Drupe sappy, glossy-red.

Dr. Mason says this is the tree from which the Burmese make the coarse paper, of which their folding books are composed, called *parra-beike*, and Kurz adds that it is also used in China and Japan in the manufacture of paper.

MORUS, *Linnaeus*.

Flowers monoecious or dioecious, in dense spikes. *Male perianth* 4- (rarely 5-) parted, the segments in 2 series, imbricate in bud. *Stamens* 4 (rarely 5). *Female perianth* 4-parted, the outer segments larger. *Ovary* 2-celled, cells 1-ovuled. *Stigmas* 2, elongate-filiform. *Achenes* usually covered by the fleshy perianth, and hence berry-like.

M. LEVIGATA, Wall.

Tree forests of Martaban and Tenasserim.

Ma-lein-pen (Kurz).

Male and female spikes 4-5 inches long.

M. INDICA.

Cultivated as food for silkworms.

Male spikes about $\frac{1}{2}$ an inch long.

× × *Female flowers solitary or in poor racemes.*

BALANOSTREBLUS, *Kurz*.

Flowers monoecious, females racemose, males in catkins. *Perianth* entire, connate with the ovary, free upwards, but entirely inclosing the ovary, perforate at the apex. *Seed* inclosed in the fleshy perianth, and drupaceous. Milky trees, with alternate spiny-toothed leaves.

B. ILICIFOLIA, Kz.

Ava and Chittagong.

Drupe the size of a pea, red, tubercled-wrinkled, glabrous.

STREBLUS, *Loureiro*.

Flowers monoecious or dioecious, the males in heads, the females solitary. *Perianth* 4-parted, in fruit enlarged, fleshy. *Ovary* with a single ovule attached near the apex. *Style* somewhat excentric. *Stigmas* 2, filiform. *Albumen* none. Milky trees or shrubs, with simple serrulate leaves.

* *Male flowers in spikes or short-peduncled heads, the heads sometimes androgynous. Female flowers solitary, peduncled. Perianth segments broad, enlarging and turning fleshy, entirely inclosing the achene.*

S. ASPERA, Lour. *E.T.*

All over Burma, the Andamans, Katchall, and Car Nicobar.

Op-nai (Kurz).

All parts scabrously pubescent, fruiting perianth fleshy, scabrous. Male flowers in heads.

S. MITIS, Kz. *E.T.*

Khakyen Hills.

All parts glabrous. Male flowers in dense spikes.

** *Male flowers in short-peduncled small racemes, the female in very loose racemes, perianth-segments narrow, embracing only the base of the achene.*

S. (DIPLOCOS) ZEYLANICA, Bur. *E.T.*

Burma.

Taxotrophis Zeylanica, Thw.

All parts glabrous. Fruiting perianth-segments smooth.

*** *Male flowers in sessile bracted-involucered clusters. Female solitary, on slender peduncles. Perianth-segments leafy, much longer than the achene, and involucre-like.*

- S. TAXOIDES, Kz. *E.T.* var. *a* Coasts of the Andamans.
 All parts glabrous. var. *β* Swampy forests in Pegu.
 var. *a taroides*. Leaves 2-4 inches long.
 var. *β microphylla*, Kz. Leaves 1-1½ inch long.

The last nine genera form a very natural Order, *Moracæ*, divisible into two Tribes, *Artocarpiceæ* and *Morieæ*, both of considerable value for the food and other products they yield. The figs, for example, yield not only edible and wholesome fruit, but caoutchouk as well, especially *F. elastica* and *F. lacifera*, and the leaves afford good forage for domestic animals, goats and elephants especially, devouring many species with avidity, especially *F. religiosa*, or the Pipal of India. Several species of *Morus* are also valuable for their fruit and as forage for cattle and for feeding silkworms, for which purpose *M. alba* is chiefly selected.

Order CELTIDEÆ.

Flowers polygamous. Perianth 5-partite, persistent, imbricate. Stamens usually equal to the perianth-lobes. Filaments uncoiling elastically. Styles 2. Ovule basilar, campylotropous. Embryo curved. Albumen scanty or none. Trees. Juice watery. Leaves alternate. Stipules fugacious.

MALACIA, *Loureiro*.

Flowers dioecious. The males in one-sided dense spikes, the females packed in globular receptacles. Male perianth 3-4-cleft. Stamens as many as perianth-segments, incurved in bud. Filaments filiform, elastically reflexed with opening of the flower. Female perianth urceolate, with an apical opening. Ovary sessile. Style short. Stigmas 2, elongate. Achenes berry-like, enveloped by the enlarged perianth. Unarmed scandent shrubs.

- M. TORITOSA, Blanco. Tree forests of the Eastern Slopes of the Pegu Range and Tenasserim.

Stem terete, grey, glabrous. Leaves rounded at base, acuminate, 4-5 inches long, glabrous, or the nerves beneath puberulous, repand-toothed.

*** *Style simple or 2. Ovule solitary, suspended, no albumen. Leaves alternate. Fruit a drupe or samara.*

† *Anthers introrse. Filaments inflexed in bud. Fruit a drupe.*

SEONIA, *Planch.*

(Including *Gironnicra*.)

Flowers dioecious or polygamous. Perianth 4-5-parted, imbricate in bud, persistent. Stamens 4-5, opposite the perianth-segments. Filaments incurved.

* *Female flowers in cymes or spikes.*

- S. ORIENTALIS, *Planch. E.T.* var. *a* Chittagong. var. *β* All over
 Sap-shā-pen (Kurz). Burma.

Leaves oblique, ovate at the base, semicordate, 5 inches long, acute, serrulate, chartaceous, retrorsely-scabrous from stiff appressed bristles. Beneath silvery pubescent, 5-7-nerved at the base, and penninerved upwards. Flowers sessile, forming villous cymes in the leaf-axils.

- var. *a Wightii*, *Planch.* Branchlets pubescent. Leaves less rough.
 var. *β Amboinensis*, *Bl.* Branchlets villous. Leaves very scabrous.

- S. TIMORENSIS, *Bl. E.T.* Tenasserim.

Leaves 2-3 inches long, serrulate, glabrous, 3-nerved at base, upwards penninerved.

S. NERVOSA, Planch. *E.T.*

Leaves pubescent beneath, unequal at the base, rigid-chartaceous, entire, wrinkled above and pubescent along the midrib. Stigmatic styles sessile. Drupes sessile, the size of a pea, ovate, compressed, hispid, pericarp dry, crowned by long sessile stigmatic styles or their bases.

var. *a nervosa*, Planch. Leaves more pubescent. Stigmas united at base into a style.

var. *β subaqualis*, Planch. Leaves less pubescent. Styles almost sessile.

** *Female flowers usually solitary, on an axillary peduncle.*

S. LUCIDA, Kz. *E.T.*

Tree forests of South Andaman.

Leaves 5-8 inches long, almost polished. Drupes the size of a small cherry, glabrous.

S. (GALUMPITA) CUSPIDATA, Bl. *E.T.*

Tree forests of Eastern Slopes of the Pegu Range.

Leaves 3-4 inches long, opaque on both sides, serrulate. Drupes the size of a small cherry, glabrous.

SOLENOSTIGMA, *Endlicher.*

Flowers polygamous. *Perianth* 5-parted, deciduous. *Stamens* 5. *Stigma* 2-lobed at the apex, persistent. *Fruit* a drupe. Evergreen trees, with 3-nerved entire leaves.

S. WIGNII, Planch.

Tree forests of the Andamans.

Glabrous. Leaves oblong to lanceolate, chartaceous, 4-6 inches long, the 2 lateral nerves excurrent to the very point, thinly but prominently net-veined. Flowers yellowish, sub-sessile. Drupes glabrous, the size of a pea, terminated by the dilated short styles.

CELTIS, *Tournef.*

Flowers polygamous, dimorphous, the hermaphrodites only fertile. *Male perianth* 4-5-parted, the segments concave, imbricate in bud. *Stamens* as many as segments, hypogynous. *Filaments* usually spreading elastically. *Ovary* rudimentary, surrounded by the villous disk. *Hermaphrodite perianth* deciduous. *Stamens* as in males. *Ovary* on a villous disk. *Stigmas* 2, sessile, or connate at the base, deciduous, filiform. Trees or shrubs, with 3-nerved leaves.

* *Fruiting peduncles solitary, or by 2-3 from the leaf-axils, simple.*

C. MOLLIS, Wall.

Ava.

Leaves tomentose, entire. Fruiting peduncles solitary.

C. HAMILTONII, Planch.

Tenasserim, along streams.

Leaves glabrous, serrate, green on both sides, fruiting peduncles solitary in the leaf-axils.

C. TETRANDBA, Roxb.

Ava Hills.

As the last, but the leaves larger, brownish beneath, and the crenatures more rounded.

** *Fruiting peduncles branched.*

C. CINNAMOMEA, Ldl. *E.T.*

Chittagong and Eastern Slopes of the Pegu Range.

Leaves glabrous, remote-serrulate. Fruiting peduncles forming a torus.

TREMA, *Loureiro.*

Flowers dioecious or polygamous. *Perianth* 4-5-parted, imbricate in bud, persistent. *Males*: *Stamens* 4-5, opposite perianth-segments. *Filaments* incurved. *Females*: *Ovary* 1-celled, with a single ovule attached to the summit of the wall. *Stigmas* 2, free or basally united. *Drupe* fleshy, containing a hard putamen.

T. ORIENTALIS, Bl.

Kamorta (K.).

var. *T. (Sponia) velutina*, Planch.

GIRONNIERA, *Gaudichaud.*

Flowers small, dioecious, in axillary cymes or branched racemes. *Perianth* of 4 or 5 segments, imbricate in bud. *Stamens* 4 or 5. *Filaments* slightly incurved. *Ovary* with 1 pendulous ovule. *Styles* 2, long and filiform. *Drupe* slightly compressed. *Leaves* alternate.

G. SUBÆQUALIS, Planch.

Kamorta (K.).

Order ULMACEÆ.

Flowers hermaphrodite. *Perianth* campanulate, persistent, quadri- to octofid. *Stamens* opposite the perianth-lobes. *Anthers* extrorse. *Ovary* 1- or 2-celled. *Styles* 2. *Ovules* 1 in each cell, pendulous. *Embryo* straight. *Albumen* none. *Trees*. *Juice* watery. *Leaves* alternate. *Stipules* fugacious.

ULMUS, *Tournef.*

Flowers hermaphrodite, or polygamous, cymose. *Perianth* bell-shaped, 3-8-parted, marcescent or deciduous. *Stamens* as many as, or more than, the perianth-segments. *Filaments* erect. *Anthers* small. *Fruit* a winged samara, 1- or occasionally 2-celled, with the second cell empty, and smaller. *Seed* ovate, anatropous, or nearly so. *Albumen* none.

U. INTEGRIFOLIA, Roxb.

Pegu Range and Hills East of Toung-ngoo.

Myouk-seit (Kurz).

Leaves entire. Perianth-segments deciduous.

U. LANCIFOLIA, Roxb.

The Pegu Range.

Tha-leh.

Leaves serrulate. Perianth bell-shaped, marcescent-persistent.

HELICIA, *Loureiro.*

Flowers hermaphrodite. *Perianth* regular, the segments revolute when separating. *Anthers* on short filaments, inserted a little below the blade, the connective produced into a short appendage. Hypogynous glands equal, distinct, or united in a ring or cup round the ovary. *Ovary* with 2 ascending ovules laterally attached near the base, sessile with a long straight style, slightly thickened at the end, the stigma terminal. *Flowers* by pairs. *Bracts* very deciduous.

* *Inflorescence* axillary or lateral. *Leaves* more or less acuminate, apiculate, or bluntish.

‡ *Racemes* glabrous or nearly so.

H. COCHINCHINENSIS, Lour. *E.T.*

Martaban at 5000 to 7000 feet.

Leaves serrate or entire, acuminate at the base and almost decurrent on the $\frac{1}{2}$ to $\frac{2}{3}$ inch long petiole. Scales distinct, smooth.

H. ROBUSTA, Wall. *E.T.*

Martaban and Tenasserim from 2000 to 4000 feet.

Leaves serrate on 2-3 lines long petioles. Scales united in a 4-toothed cup.

‡‡ *Racemes* rusty-tomentose or villous.

+ *Young branchlets* rusty-villous. *Leaves* serrate.

H. PYRRHOBOTRYA, Kz.

Martaban at 4000 feet.

Ovary smooth, scales not known.

H. EXCELSA, Bl. *E.T.*

Chittagong and Tenasserim.

Ovary rusty-hirsute, scales smooth, distinct.

++ *Young branchlets* glabrous. *Leaves* entire.

H. SALICIFOLIA, Presl.

Tenasserim.

Ovary rusty-hirsute, scales puberulous, distinct.

** *Inflorescence terminal, glabrous.*

H. TERMINALIS, Kz.

Khakyeen Hills.

Leaves entire, retuse.

DAPHNALES.

Flowers usually hermaphrodite. *Perianth* green or coloured, regular or irregular, often tubular. *Ovary* 1- rarely 2-celled, superior. *Stigma* 1. *Ovule* usually solitary, pendulous or sub-erect. *Albumen* none, rarely scanty. *Embryo* straight.

Order ELÆAGNEÆ.

Flowers regular, hermaphrodite, sometimes unisexual by abortion, rarely diœcious. *Perianth* inferior, usually forming a 2-4-lobed bell, narrowed or contracted into a shorter or longer tube. *Disk* filling the perianth-tube, and variously prominent along its margin, rarely consisting of 8 glands. *Stamens* rarely free, usually adnate to the perianth, as many, or twice as many, as perianth-lobes. *Anthers* 2-celled, the cells deliscing longitudinally by a double slit. *Ovary* free, inclosed in the perianth-tube, which enlarges in fruit, 1-celled with a solitary erect ovule. *Style* simple, elongate. *Fruit* inclosed in the dry or more usually fleshy or sappy enlarged perianth-tube, drupaceous, the spurious pericarp horny or chartaceous, smooth or woolly or sealy within. *Embryo* erect, surrounded with a very thin albumen with an inferior radicle, the cotyledons narrow. Shrubs or trees, often scandent, sometimes spiny, all parts more or less covered with minute silvery or coppery scales. *Stipules* none. *Leaves* simple, alternate, or rarely opposite. *Flowers* solitary or clustered, sessile or pedicelled, axillary.

ELÆAGNUS, *Linnaeus.*

Flowers hermaphrodite or male by abortion. *Perianth* 4- rarely 5-8-lobed, the limb valvate, and at the base contracted into a tube. *Disk* glandular. *Stamens* usually 4. *Ovary* 1-celled, with a single erect ovule. *Style* simple, subulate, somewhat recurved and stigmatic along the one side of the apex. *Fruit* a drupe, the putamen bony, and 1-seeded.

E. ARBOREA, Roxb. *E.T.*

Tree forests of Ava. Pegu. Tenasserim.

Mên-gu.

Kamorta and Nankowry.

Drupes $1\frac{1}{2}$ inch long, the putamen sulcate, with rounded ribs.

E. CONFERTA, Roxb. *E.S.S.*

Chittagong.

Drupes 4-6 lines long, the putamen slightly sulcate ribbed.

Mason remarks: "This sour red plum, which grows on a magnificent creeper, makes excellent tarts and jellies, and is a great favourite with the natives. It grows wild in many of our jungles, but is nowhere very abundant. It is often seen in cultivation among the Burmese, and I have met with it in some of the Red Karen villages."

Order THYMELÆACEÆ.

Flowers usually hermaphrodite, rarely unisexual. *Perianth* tubular, funnel- or bell-shaped, naked at the throat, or furnished with scales or glands, 4-5-lobed, imbricate, or rarely valvate. *Hypogynous glands* minute, 4-8, somewhat fleshy, or filiform, inserted around the ovary, either free or united in an entire or toothed ring or cup, rarely wanting. *Fertile stamens* usually as many, or twice as many, as perianth-lobes, rarely only 2, inserted on the throat or tube in a single or double series, and opposite to the lobes, or the lower ones alternating with them. *Anthers* 2-celled, the cells deliscing usually inwardly by 2 longitudinal slits. *Ovary* free, 1- or rarely 2-celled, with 1 (or rarely 2 or 3 pendulous) ovule. *Fruit* indehiscent and nut-like, drupaceous or berry-like, or rarely a 2-valved capsule. *Seed* pendulous, the pericarp thin or crustaceous, rarely fibrous-wooly. *Albumen* none, or rarely

present. *Embryo* straight, with a superior radicle, cotyledons fleshy, plano-convex. Shrubs or trees, rarely herbs. *Leaves* simple, opposite or alternate. *Stipules* none. *Flowers* often in heads, umbels, clusters, racemes or spikes, often silky outside.

An order characterized by the peculiar loose bark of a caustic nature, which acts upon the skin as a vesicatory. The fruits of many are poisonous. Paper is made from the inner bark of several species of *Daphnè*. Eagle-wood, containing a fragrant resin of a dark colour, comes from *Aquilaria agallochum*.

DAPHNÆ, *Linnaeus*.

Flowers hermaphrodite. *Perianth* tubular or funnel-shaped, deciduous, 4-lobed. *Hypogynous disk* obsolete or none. *Anthers* inserted in 2 superposed rows of 4 each, nearly sessile. *Ovary* 1-celled, with a single ovule. *Drupe* fleshy succulent (rarely coriaceous), 1-seeded, with crustaceous testa.

D. PENDULA, Sm. *E.S.* Hills East of Toung-ngoo at 5000 to 6000 feet.

All parts glabrous. Leaves usually acuminate at both ends, membranous, 4-6 inches long, glaucous beneath. Flowers yellow, 6 lines long, tubular, sessile, densely pubescent outside.

LINOSTOMA, *Wallich*.

Flowers hermaphrodite. *Perianth* bell-shaped, 5-lobed, of a thin texture, furnished at the throat with 10 free or 5 bifid glabrous scales. *Stamens* 10, alternating with the perianth scales. *Hypogynous scales* none. *Ovary* sessile, 1-celled, with a solitary pendulous ovule. *Style* capillary with a capitate stigma. *Nut* dry. *Seeds* solitary, with a thin crustaceous pericarp. *Albumen* none.

* *Glabrous shrubs. Perianth-scales 10, free.*

L. PACIFLORUM, Griff. *E.S.* Hills East of Toung-ngoo at 3000 to 4000 feet. Leaves obovate, blunt, or rounded with a mucro.

L. DECANDRUM, Wall. *E.S.* Chittagong. Tenasserim.

Leaves ovate-lanceolate, acuminate.

** *Tomentose shrubs. Perianth-scales 5, bifid.*

L. SCANDENS, Wall. *E.S.* Tenasserim.

Floral leaves coriaceous, petioles inserted with a broad base to a knob on the peduncle and reflexed.

L. SIAMENSIS, Kz. The Eng forests of Prome.

Floral leaves thin chartaceous, the petioles thin, and not thickened at their insertion with the peduncle.

Kurz adds, from the Nicobars:

GONYSTYLES MIQUELIANUS, T. et B. Kamorta.

AQUILARIA, *Lamarck*.

Perianth coriaceous, bell-shaped, 5-cleft, scales at the throat 10, exserted, pilose, forming a 10-lobed crown. *Stamens* 10, adnate to the perianth-tube. *Hypogynous scales* or ring none. *Ovary* sessile, if solitary 2-celled, if not 1-celled. *Capsule* woody, with a thin coriaceous pericarp sessile, 2-valved, with median placentas. *Seeds* 2, or solitary by abortion. *Albumen* none.

A. AGALLOCHA, Roxb. *E.T.* Hills East of Toung-ngoo.

A-kyau (Mason). Lign-aloes.

Capsules wrinkled, softly and densely tomentose.

Wood light, close-grained, and takes a good polish. Furnishes the commercial Eagle-wood, called by the Malays *Kayu-garu*. Lign-aloes is used for burning as a perfume. The finest appears to be resinous portions, only found in old and decayed trees. Mason has some pertinent remarks on this plant: "The fragrant substance

called lign-aloes is offered for sale in all the Bazaars on the coast, and is the produce of a tree that grows on the Mergui Islands. It is imported into Mergui by the Selungs, who, as they profit from the trade, endeavour to keep all in ignorance of the tree from which they obtain it.

"Gesenius says the Hebrew and Greek names are 'derived from the Indian name of the tree, *agil*, Sanskrit *agaru* and *aguru*.' Had he read Pali, he would have been able to approach the word nearer than he has done through the Sanscrit, for there, besides *agaru*, the Sanskrit word, we have *agalu* and *aggalu*, which comes sufficiently near the 'Indian name *agil*,' and the Greek *agallochon*, but it would take a pretty thorough etymologist to get *aloë*, the New Testament word, out of any of them. There is, however, another Sanscrit and Pali word, with which Gesenius does not appear to have met, *lauha*. This is manifestly the parent of *aloë*, and by transposition, not uncommon in Hebrew, of the Hebrew name also. Although rendered '*aloes*' in the English version, no two plants are more dissimilar than this and the common *aloes*''—that is lign-aloes and socotrine, or bitter-aloes.

A. MALACCENSIS, Lamk. *E.T.* Tenassorim.

Capsules smooth and glabrous.

LAURALES.

Flowers usually unisexual. *Perianth* green or coloured usually regular. *Ovary* superior (inferior in *Gyrocarpeæ*) 1-celled. *Stigma* 1. *Ovule* solitary. *Embryo* straight, albuminous or not.

Order LAURINEÆ.

Perianth regular, the tube very short, or none at the time of flowering, sometimes enlarged over or under the fruit, or rarely adnate to the ovary and fruit, segments 6 or rarely fewer, imbricate. *Stamens* nominally twice as many as perianth-segments, but sometimes reduced to 3, or irregularly increased in number, all fertile or a certain number reduced to staminodes, or sessile, or stalked glands. *Anthers* adnate with 2 collateral or superposed pairs of cells, each cell opening in a valve from the base upwards, or (in *Hernandia*) from the inner to the outer side. *Ovary* free or (in *Hernandia*) adnate, 1-celled with a solitary ovule suspended from the apex of the cavity, from a funicle adnate to its side, or rarely with a second abortive ovule. *Style* simple, often very short. *Stigma* capitate or dilated, entire or lobed. *Fruit* a berry or drupe, rarely dry or nearly so, the perianth is entirely deciduous or the tube enlarged and dry, or fleshy, supporting or inclosing the fruit. *Seed* pendulous, without albumen. *Embryo* with thick fleshy cotyledons filling the seed and inclosing the plumule and short superior radicle. *Trees* or shrubs, rarely leafless twiners. *Leaves* usually alternate simple. *Stipules* none. *Flowers* usually small, the inflorescence various.

Sub-order LAURINEÆ vera.

* *Anther-cell opening by upward-turning valves.*

+ *Flowers in naked inflorescences, not surrounded by a proper involucre or imbricate bracts.*

× *Anthers 4-celled, fruit superior, free, not inclosed in the pericarp.*

CINNAMOMUM, Burmann.

Flowers hermaphrodite. *Perianth-segments* breaking off at their middle, leaving a persistent 6-lobed cup or disk under the fruit. *Ovary* inserted in the centre of the funnel-shaped perianth receptacle, 1-celled, with a solitary pendulous ovule. *Trees* or shrubs usually aromatic.

* *Leaves 3-5-nerved.*

× *Perianth-segments deciduous along a horizontal line above their base or at their middle.*

‡ *Nuts dry, glabrous.*

C. ZEYLANICUM, Broyn. *E.T.* Tenasserim.

Loo-leng-kyaw (Kurz).

This tree yields the true cinnamon of commerce, the liber yields the oil of cinnamon, the leaves oil of cloves, the fruit a peculiar terebinthaceous ethereal oil, and the root camphor.

C. INERS, Rwdt. Tree forests of Tenasserim.

Loo-leng-kyaw (Kurz).

Kurz says he does not know wherein this species differs from the last.

‡‡ *Nuts drupaceous, more or less sappy.*

C. OBTUSIFOLIUM, N.E. *E.T.* Tree forests all over Burma, the Andamans, Kamorta and Nankowry.

All parts glabrous. Drupes succulent, oblong, $\frac{1}{2}$ of an inch long. The bark of the roots is a substitute for genuine cinnamon.

C. CASSIA, Bl. *E.T.* Khakyen Hills.

All parts glabrous. Drupes sappy, the size of a pea.

C. SULPHURATUM, N.E. *E.T.* Southern Tenasserim.

Leaves puberulous beneath.

×× *Perianth-segments entirely persistent, glabrous, leaves caudate, fuscous in drying.*

C. CAUDATUM, N.E. *E.T.* Khakyen Hills.

Drupes $\frac{1}{2}$ -1 inch long, glossy, black.

** *Leaves penninerved.*

C. INUNCTUM, Meissn. Southern Tenasserim.

Drupes ovate.

C. PARTHENOXYLON, Meissn. Southern Tenasserim.

Drupes globular.

This tree yields the so-called Martaban camphor-wood (Kurz).

PHŒBE, *Nees von Essenbeck.*

Flowers almost as in *Cinnamomum*, the receptacle shortly funnel-shaped, persistent, along with the often indurated perianth supporting the fruit. Trees or shrubs, with alternating or almost whorled penninerved or triplinerved leaves.

* *Inflorescence and all parts quite glabrous.*

P. LANCEOLATA, N.E. *E.T.* Tenasserim up to 3000 feet.

Flowers small, white or slender glabrous pedicels.

** *Inflorescence and younger parts more or less tomentose.*

P. PUBESCENS, N.E. *E.T.* All over Burma, especially along streams.

Panicle slender. Pedicel as long or longer than the perianth. Fruits oval, the size of a small pea, black, glossy.

P. VILLOSA, Wight. *E.T.* Chittagong.

Panicle stout. Pedicels rather thick, shorter than the perianth. Fruits globular, the size of a pepper kernel, black, smooth.

MACHILUS, *Rumphius*.

Perianth wholly persistent, not indurating; the segments in fruit reflexed or spreading. *Pedicel* usually not thickened. *Stamens* 12, as in *Cinnamomum*.

* *Leaves coriaceous, glaucous beneath.*

‡ *Leaves bluntish, acuminate, with the margins not reflexed.*

M. INDICA, Lour. *E.T.*

Martaban at from 3000 to 7000 feet.

M. odoratissima, N.E.

Perianth-segments about $2\frac{1}{2}$ lines long. Leaves from 4 to 7 inches long.

M. RIMOSA, Bl.

Tenasserim.

Perianth-segments hardly a line long. Leaves $2-3\frac{1}{2}$ inches long.

‡‡ *Leaves blunt, oval, with reflexed margins.*

M. FRUTICOSA, Kz.

Upper Tenasserim at 4000 feet.

Leaves ovate, a little decurrent on the strong, broad, glabrous petiole.

** *Leaves acuminate, hardly chartaceous, one-coloured.*

M. TAVOYANA, Meissn.

Tenasserim.

ALSEODAPHNE, *Nees von Esenbeck*.

Flowers as in *Cinnamomum*. *Perianth* nearly wholly deciduous, the fruit large, resting on the thickened, often fleshy pedicel.

A. GRANDIS, N.E. *E.T.*

Arakan. Pegu and Tenasserim.

Fruits oval, 1-2 inches long, fleshy, smooth, bluish-black and pruinose.

×× *Anthems 2-celled.*

† *Fruit superior, quite free, not adnate.*

BEILSCHMIEDIA, *Nees von Esenbeck*.

Perianth wholly deciduous, the segments nearly equal (or the outer lobes minute). *Ovary* 1- (or imperfectly 2-)celled. *Berry* resting on a thickened, often fleshy pedicel.

B. ROXBURGHIANA, N.E.

Pegu, Martaban up to 2000 feet, and the Andamans.

Shaw-htoo-pen (Kurz).

Petiole $\frac{1}{2}$ to 1 inch long, glabrous. *Perianth*-segments about $1\frac{1}{2}$ lines long. Fruits oblong.

B. GLOBULARIA, Kz.

Hills East of Tonng-ngoo from 3000 to 4000 feet.

As the last, but the fruits spherical.

B. MACROPHYLLA, Meissn.

Southern Tenasserim.

Petiole $1\frac{1}{2}$ to 3 lines long, thick, tomentose. *Perianth*-segments about a line long.

‡‡ *Fruit wholly inclosed in the enlarged perianth, but rarely adnate to it; only the apex sometimes exerted.*

CRYPTOCARYA, *R. Brown*.

Flowers hermaphrodite in racemes or panicles. *Fertile stamens* 9, free. *Fruit* free, not adnate to the perianth. *Fructing perianth-tube* globular, having the appearance of an inferior fruit.

C. FERREA, Bl.

Tenasserim. Kamorta.

Inflorescence and all softer parts minutely ochre-puberulous. Adult leaves glabrous.

C. GRIFFITHIANA, Wight.

Southern Tenasserim.

All parts more or less covered with a rusty velvety tomentum. Leaves pubescent beneath.

EUDIANDRA, R. Brown.

Flowers hermaphrodite. *Fertile stamens* only 3, free, the 6 outer stamens reduced to glands or to a glandular ring. *Fruit* inclosed in the truncate perianth-tube. *Flowers* in panicles.

E. CANDOLLEANA, Meissn.

Tenasserim.

Leaves alternating, penninerved, chartaceous, $3\frac{1}{2}$ to 8 inches long, on a strong 4-10 lines long pedicel. Flowers unknown. Berry naked, ovate-globular, smooth, 9 lines long.

++ *Flowers* either surrounded by a 4-6-leaved involucre, or covered by several rows of imbricate bracts, and white in bud entirely inclosed by them.

‡ *Flowers* in umbels, subtended by a 4-6-leaved involucre.

× *Anthers* 4-locellate.

TETRANTHERA, Jacq.

Perianth 6-cleft or truncate. *Fertile stamens* 9-12, rarely 15-30, the inner 3-6 bearing glands at base. *Fruit* resting on a large and thick cup, or half immersed in the same.

* *Perianth-tube* slightly enlarged under the fruit, flat or slightly concave.

‡ *Limb* of perianth wanting or truncate, or very imperfect, and its lobes transmuted into stamens. *Stamens* 15-30.

T. TOMENTOSA, Roxb.

Ava.

Tomentose-pubescent, umbels solitary in the axils of the leaves.

T. LAURIFOLIA, Jacq. E.T.

Ong-tong (*generic*, Kurz).

Almost glabrous or slightly pubescent. Umbels clustered or in short racemes.

‡‡ *Perianth-limb* developed, 6-cleft. *Stamens* 9-12.

× *Leaves* coriaceous.

+ *Umbels* peduncled.

T. RANGOONENSIS, Meissn.

Pegu.

Leaves oblong-lanceolate, very acuminate, glabrous.

++ *Umbels* sessile, or the peduncles very much reduced.

T. LONGIFOLIA, Nees.

Upper Tenasserim.

Leaves oblong or oval, acute, densely fulvous-pubescent beneath.

T. GRANDIS, Wall. E.T. All over Pegu. Martaban and Upper Tenasserim.

Leaves broadly oval, rounded, or subretuse at apex, puberulous beneath. Wood yellow, with a beautiful lustre. A fine fancy wood (Kurz).

×× *Leaves* chartaceous or membranous.

‡ *Branchlets* tomentose, umbels sessile or fascicled.

T. MONOPETALA, Roxb.

All over Burma.

Leaves oval, blunt, petiole $\frac{1}{2}$ to 1 inch long. Stamens 9-12. Berries ovoid, black, the size of a small cherry.

T. AMARA, N.E. E.T.

The Pegu Range. Tenasserim and the Andamans.

Leaves alternate, lanceolate acute, petiole less than $\frac{1}{2}$ an inch.

var. *T. Andamania*, Kz.

Andamans and Car Nicobar.

Leaves much larger. Umbels numerous, with thin stalks up to 4 lines long.

T. LANCEIFOLIA, Roxb. S.

Tenasserim.

Like the last, but a shrub, with opposite leaves.

T. GLAUCA, Wall. *E.T.* Tree forests of Ava and Chittagong.
Leaves lanceolate to linear appressed silky-puberulous beneath.

++ *Branchlets glabrous, or nearly so. Leaves glabrous.*

T. LEIANTHA, Kz. *E.T.* Tree forests of the Andamans.
Leaves obovate, long-petioled. Umbels sessile.

T. POLYANTHA, Wall. Khakyen Hills.
Leaves lanceolate, glaucous beneath. Umbels peduncled.

** *Perianth-tube enlarged to a large fleshy cup, tapering on a thick stalk.*

‡ *Umbel solitary, clustered, or forming a reduced corymb in the axils of the leaves.*
× *Leaves not glaucous beneath.*

T. MARTABANICA, Kz. *E.T.* Martaban and Tenasserim at 4000 to 6000 feet.
Leaves shortly tomentose beneath and prominently net-veined.

×× *Leaves more or less glaucous beneath.*

T. NUCULANEA, Kz. *E.S.* Tree forests of Upper Tenasserim.
Branchlets tomentose. Leaves puberulous beneath, thick, chartaceous.

T. MYRISTICIFOLIA, Wall. *E.T.* Lower Pegu and Tenasserim.
Quite glabrous, leaves rigidly coriaceous.

var. *a myristicifolia*. Cup-stalk variable, not exceeding $\frac{1}{2}$ an inch in length.

var. *β longipes*. Cup-stalk 1 to $1\frac{1}{2}$ inch in length. Fruit twice the size of the last.

‡‡ *Umbels dispersed in axillary racemes.*

‡ *Inflorescences and all parts quite glabrous.*

T. NITIDA, Roxb. *E.T.* Tree forests of the Southern Pegu Range and Martaban.
Leaves uniformly green. Branchlets sharply angular.

‡‡ *Inflorescence puberulous to tomentose.*

T. PANAMONJA, Nees. *E.T.* Tenasserim.

Leaves slightly glaucous beneath, shortly acuminate, racemes elongate, tawny-tomentose. Fruiting-cup entire, berry oblong.

T. ALBICANS, Kz. *E.T.* Pegu Range, Eastern Slopes, along streams.

Leaves whitish or glaucous beneath, and strongly net-veined, shortly acuminate, racemes shortened, tawny puberulous. Fruiting-cup lobed, berry oblong.

T. SEMECARPIFOLIA, Wall. *E.T.* Tree forests of Martaban, rare in the Eastern Slopes of the Pegu Range.

Leaves not glaucous beneath, blunt or nearly so, racemes short and tomentose. Fruiting-cup entire, berry obovate-globular.

In J.A.S.B. ii. 1873, p. 102, Kurz describes *Tetranthera* (*Cyclicodaphne calophylla*), remarking that it may perhaps be a handsome variety of *Cyclicodaphne Wightiana*, but neither names reappear in his later list.

×× *Anthers 2-celled.*

LINDERA, *Thunbergh.*

Flowers dioecious. *Perianth* 4-6-cleft, deciduous. *Fertile stamens* 6-9, the inner 2-6 bearing glands at the base. *Fruit* resting on a small entire or 6-cleft disk. Mostly aromatic trees.

* *Leaves chartaceous or almost coriaceous, elegantly and prominently net-veined, the reticulations narrow.*

L. (APERULA) ASSAMICA, Meissn. Nat-toung in Martaban.

Peduncles slightly pubescent, nearly an inch long, perianth pubescent.

L. NERVOSA, Kz. Tree forests of Arakan and Upper Tenasserim.
Peduncles quite glabrous, 3-4 lines long, perianth glabrous.

** *Leaves membranous, laxly reticulate, all parts glabrous.*

L. (APERFLA) NEESIANA, Bl. Martaban and Upper Tenasserim.
All parts highly aromatic. Yields excellent sassafras.

× *Anthers 4-celled.*

DODECADENIA, *Nees von Esenbeck.*

Flowers hermaphrodite, solitary in the imbricately-sealed leaf-buds. *Calyx* 6-8-parted. *Perianth* 6-9-cleft. *Fertile stamens* 12-15, all introrse, the outer 6-9 glandless, the inner 6 furnished near the base of the filament with a pair of capitate stalked glands.

D. GRANDIFLORA, N.E. *E.T.* Khakyen Hills.

Leaves oblong to linear-lanceolate, scattered, penninerved, 2-3½ inches long, coriaceous, glabrous.

LITSEA, *Jussieu.*

Flowers dioecious, several together. *Perianth* 4-6-cleft, the segments deciduous. *Stamens* 4-6 or 9, the innermost ones 2-glanded at base. *Berry* seated on the more or less thickened pedicel or perianth-base.

* *Leaves whorled, by 3-5, penninerved from the base, the female flowers in small clustered umbels, the male simply clustered.*

L. (ACTINODAPHNE) CONCOLOR, N.E. Tenasserim.

Branchlets tomentose. Leaves 4 inches long.

L. (ACTINODAPHNE) ANGUSTIFOLIA, Nees. Tree forests of the Pegu Range and Tenasserim.

Branchlets and shoots densely tawny-villous. Leaves 6-8 inches long, soon turning glabrous.

L. MACROPHYLLA, Bl. Tenasserim.

Like the last, but leaves 1-1½ feet long, and when adult pubescent beneath.

** *Leaves scattered, alternate, triplinerved above the base, and penninerved further up.*

L. LEIOPHYLLA, Kz. *E.T.* Tenasserim.

Leaves quite glabrous. Flowers in short tawny racemes.

L. FOLIOSA, N.E. *E.T.* Chittagong and Hills East of Young-ngoo from 3000 to 7000 feet. Kamorta and Nankowry.

Leaves quite glabrous, glaucous beneath. Flowers in sessile involucred umbels.

× × *Anthers 4-celled.*

DAPHNIDIUM, *Nees von Esenbeck.*

Flowers dioecious, several together. *Perianth* 6-9-cleft, with the segments deciduous. *Stamens* 9 (rarely more), the 3 innermost ones 2-glanded at the base. *Berry* seated on the entire or 6-lobed perianth-base of the thickened pedicel.

× *Leaves triplinerved.*

D. PULCHRIMUM, Nees. *E.T.* Hills East of Young-ngoo up to 7000 feet.
Leaves glabrous, glaucous beneath.

D. CAUDATUM, Nees. *E.T.* Martaban and Tenasserim over 4000 feet.
Leaves densely and shortly tawny-pubescent beneath.

× × *Leaves penninerved.*

D. ARGENTEUM, Kz.

Eastern slopes of the Pegu Range and Martaban.

Leaves beautifully appressed silvery-pubescent beneath. Flowers in very short racemes.

** *Anthers opening laterally, the valves separating laterally, from the inner to the outer edge.*

HERNANDIA, *Blume.*

Flowers monœcious, the females with an involucre inclosing the fruit. *Perianth-segments* in two series, valvate in bud, the rows in the males of 3-4, in the females 4-5 segments. *Stamens* as many as the outer perianth-segments and opposite to them, basally 2- (rarely 1-)glandular. *Anthers* 2-celled, introrse.

H. PELTATA, Meissn. *E.T.*

Coasts of the Andamans. Kamorta. Katchall and Car Nicobar.

All parts glabrous. Leaves peltate, minute at the base on 3-5 inch long petiole-acute, palmately nerved, 6-8 inches long by 4½-6 broad. Flowers white, conspicuous. Wood very light, and so readily takes fire that it might be used for tinder (Kurz).

Sub-order CASSYTHEÆ.

Parasitical herbs, with the habit of *Cuscuta*, with filiform twining stem adhering by suckers to living plants.

CASSYTHA, *Linnaeus.*

Flowers hermaphrodite. *Perianth* ovoid or tubular, with 3 outer equal lobes, and 3 inner minute ones. *Stamens* 9, the 3 inner ones with 2 glands at the base. *Anthers* 2-celled, those of the inner stamens turned outwards. *Staminodes* 3, small. *Fruit* inclosed in the succulent tube of the perianth. *Leaves* reduced to minute scales. *Flowers* sessile in axillary spikes.

C. FILIFORMIS, L.

Kamorta. Katchall. Car Nicobar (K.).

All the species of this Order are more or less aromatic and fragrant, and some are commercially important, as *Cinnamomum Zeylanicum*, which yields the best sort of Cinnamon, and *Camphora officinarum*, from which much of the Camphor of commerce is prepared. Camphor, however, which is a concrete volatile oil, exists in the wood and roots of several other species of this and other Orders, and is prepared by distilling the wood with water, after which it is refined by a second distillation, which, from the volatile nature of the drug, is easily effected with a very simple apparatus. *Cinnamomum Zeylanicum* is cultivated for its aromatic bark, but several allied species yield a similar, though inferior article, which is used to adulterate the genuine, as *C. cassia*, *C. rubrum*, *C. aromaticum*, *C. nitidum*, *C. tamala*, and others, the two last yielding also 'Tej pat' of the Indian bazaars, or the *folia Malabathri* of authors, so much used in cookery.

C. parthenocylon has a fragrant odour of sassafras, and is called by the Karens, on that account, says Dr. Mason, 'The tree galanga,' 'galanga' being the root of a Zinziberaceous plant, *Kampferia galanga*.

In addition to Camphor, a few Burmese species produce Benzoin. The Avocado, or Alligator Pear (*Persea gratissima*), belongs to this Order, which yields no good fruits.

Many trees of this Order yield useful and even valuable timber, as the 'Green-heart' of Demerara (*Nectandra Rodiei*); 'Madeira Mahogany' (*Persea indica*); The 'fœtid Til' of the Canaries (*Oreodaphne fœtens*); The 'Sweet-wood' of Jamaica (*Oreodaphne exalbata*), and the 'Stink-wood' of South Africa (*Oreodaphne bullata*). The 'Green-heart' yields also a powerful alkaloid, Bebeerine, the active ingredient of Warburg's Drops, and second only to Quinine as a vegetable antiperiodic. The woods of our Burmese *Laurineæ* are not well known, but some seem adapted for light carpentry and indoor work. One such is specified by Dr. Mason as producing a hard wood named in Tavoy 'Kyaizai,' whilst another is recommended for occasional,

or, I may say, limited, use for a singular reason, thus explained by Dr. Mason: "A solitary post of a species of *Laurus* is often found in Tavoy houses. There was one in mine, which the white ants selected in preference to others, and as long as left undisturbed they never wandered from home. It may be an advantage to have one post of a house of this timber, but one is quite sufficient." On the other hand, this Order embraces the Bornean Iron wood (*Eusideroxylon Ziegeneri*), probably the heaviest and hardest wood known, and one which alike defies Teredo and Termite. The Laurel (*Laurus nobilis*) was once held in high esteem, and victors¹ were crowned with a wreath of its leaves, but these have now, alas! descended to the mean office of flavouring dishes, and serving as a lining wherein Turkey figs are packed.

Order MYRISTICACEÆ.

Flowers regular, diccious. *Perianth* deciduous, 3- (rarely 2- or 4-)lobed, the lobes valvate in bud. *Male flowers*: *Stamens* united in a central column. *Anthers* 3-6 or more, adnate to the column at the apex or in a ring immediately below the column, 2-celled, the cells parallel, opening longitudinally. *Female flowers*: *Ovary* free within the perianth, with a single erect anatropous ovule. *Stigma* sessile or nearly so, capitate or depressed. *Fruit* thick- or fleshy-coriaceous, opening tardily in 2 valves. *Seed* erect, sessile, more or less covered with an entire or more usually lobed or jagged coloured arillus. *Albumen* ruminant. *Embryo* very small, basilar, with divaricate cotyledons. *Trees*, rarely shrubs. *Leaves* alternate, simple, usually dotted and penninerved. *Stipules* none. *Flowers* small, the males more numerous than the females, in axillary or supra-axillary racemes or panicles. *Bracts* minute or none.

An Order consisting of a single genus, of which 5 species occur in Burma. The nutmeg and its envelope *mace* (*Myristica fragrans*) is the produce of this family. Aromatic qualities prevail, while the bark abounds in an acrid juice, which is viscid, and causes a red stain.

MYRISTICA, *Linnaeus*.

(Characters, those of the Order.)

* *Anthers* linear, adnate to the whole back of the cylindrical or spindle-shaped staminal column. *Flowers* in simple racemes. *Arillus* lacinate and lobed.

* *M. FRAGRANS*.

The *Nutmeg* is indigenous in the Moluccas, but might perhaps thrive in Southern Tenasserim, and has been successfully grown in Mergui.

M. ELLIPTICA, Wall. *E.T.*

Tree forests of South Andaman.

Fruits 2 inches long or more, glabrous. Flowers rusty-scurfy, on pedicels 1-2 lines long.

** *Staminal column* pear-shaped or globular, covered all over, or only along the depressed apex, with anthers. *Perianth* globular, or nearly so, 2-3-cleft. *Flowers* minute, in compound panicles. *Arillus* nearly complete and entire.

M. IRYA, Gaertn. *E.T.*

Tree forests of Tenasserim and the Andamans.

Fruits globular, the size of a cherry. Inflorescence rusty-scurfy, tomentose.

M. AMYGDALINA, Wall. *E.T.*

Tree forests of the southern part of the Pegu Range, Tenasserim, and the Andamans.

Fruits oblong, the size of a prune. Inflorescence glabrous or nearly so.

*** *Staminal column* club-shaped, at the apex dilated into a disk, round which the anthers are attached. *Female perianth* globular; male 1, turbinate, often lengthened into a stalk. *Flowers* clustered. *Arillus* lacinate or lobed.

¹ For much other curious information, see *Mythologie des Plantes*, vol. ii. p. 188.

M. LONGIFOLIA, Wall. *E.T.*

Tree forests of Chittagong. Pegu
and Tenasserim.

Za-deip-lpyu (Kuruz).

Leaves large, 1-1½ feet long. Petiole thick. Fruits 2 inches long.

M. CORTICOSA, H. f. et Th.

Tree forests of Chittagong, Pegu, Tenasserim,
the Andamans, and Kamorta.

Leaves 7-9 inches long. Petiole ½ an inch long, slender. Fruit an inch long, glabrescent.

Order MONIMIACEÆ.

Flowers apetalous, usually monœcious, solitary, geminate, or in cymes, bracteoles, caducous. *Sepals* 4, decussate, or 5-8, many-seriate, imbricate in bud. *Stamens* usually indefinite, in male flowers lining the wall of the capsule, or in hermaphrodites occupying the throat only, free. *Anthers* usually adnate to, and shorter than the connective. *Carpels* numerous, 1-celled, free, sessile on the surface of the receptacular capsule (rarely sunk in its walls).

Much diversity of opinion has existed as to the natural relations of this Order, but Hooker, *fil.*, et Thomson, place it next to *Myristicaceæ*, from its aromatic properties, pellucid-punctate leaves, dielism, solitary anatropous ovule, and divaricate cotyledons.

MONIMIEÆ.

Perianth fig-like, or sub-globose, at length dehiscent, ovule pendulous.

KIBARA, *Endlicher*.

K. CORIACEA, H. f. et Th.

Great Nicobar (K.).

CHENOPODIALES.

Flowers usually hermaphrodite. *Perianth* green or coloured, usually regular, tube very short or none. *Segments* imbricate in bud. *Ovary* superior (except in *Cynocranbeæ*) or 1, rarely several carpels. *Ovules* solitary (2 or more in some *Amarantaceæ* and *Paronychieæ*), basal. *Embryo* usually curved. Herbs or shrubs.

Order BASILLEÆ.

Sepals 5, 1-2-seriate, green or coloured. *Stamens* 5, perigynous, opposite the sepals. *Anthers* 2-celled. *Ovary* 1-celled. *Stigmas* usually 2 or 3-lobed. *Ovule* 1, basal. *Albumen* mealy. Fleshy herbs, often trailing.

BASILLA, *Linnaeus*.

Bracteoles adhering to the perianth, and united in a 2-lobed external calyx. *Perianth* ovoid, shortly 5-lobed. *Style* single, with 3 oblong stigmatic lobes. *Fruit* inclosed in the globular succulent perianth and bracts. *Seed* vertical. *Embryo* spiral, with little or no albumen. *Leaves* alternate, flat, but succulent. *Flowers* sessile, in simple or branched spikes. *Stem* twining.

* B. ALBA, L.

Cultivated.

Gyen-baing.

This species (with its var. *rubra*) and *B. cordifolia* are much esteemed as vegetables in India.

Order AMARANTACEÆ.

Flowers small, hermaphrodite, or dichinous, sessile, or in heads or spikes. *Bracts* usually 3, persistent, the lowest largest, rarely 2, or leafy. *Calyx* usually of 3-5. *Sepals* distinct, or sometimes basally coherent. *Corolla* none. *Stamens* hypogynous, 5 fertile (rarely fewer). *Anthers* introrse, 1-2-celled, dehiscing longitudinally. *Ovary* free, 1-carpelled, 1-celled. *Stigma* capitate, 2-lobed or 2-3-fid. *Ovules* 1 or more, basal or singly suspended from separate erect funicles.

GOMPHRENIÆ.

Anthers 1-celled. Ovary 1-ovuled.

ALTERNANTHERA, Mart.

Perianth of 5 nearly equal scarious segments, not enveloped in wool. *Stamens* 5, or sometimes fewer, very shortly united at the base. *Anthers* 1-celled. *Ovule* solitary. *Style* short, or scarcely any, with a capitate stigma. *Utricle* usually flattened, ovate or obcordate, indehiscent. *Leaves* opposite. *Flowers* in sessile axillary or terminal clusters or heads. Herbs.

A. SESSILIS, R. Br.

Telanthera polygonoides, Seem.

GOMPHRENA, Linnaus.

*G. GLOIOSA, L.

Cultivated.

Ma-hnyo-ben.

ACHYRANTHIÆ.

Anthers 2-celled. Ovary 1-ovuled.

CENTROSTACHYS, Wallich.

C. AQUATICA, Wall.

DIGERA, Forskahl.

D. MURICATA, Mart.

AMARANTUS, Linnaus.

Flowers polygamous. *Perianth* of 5 equal segments, thin, but less scarious than usual in this Order. *Stamens* 5, or rarely 3, free and slightly perigynous. *Anthers* 2-celled. *Ovary* solitary. *Style* divided to the base into 2 or 3 stigmatic lobes. *Utricle* opening transversely or indehiscent. *Embryo* coiled round the albumen. *Leaves* alternate. *Flowers* small, green or reddish, clustered in axillary or terminal spikes or panicles. *Bracts* small.

*A. TRISTIS, L. (M.).

Cultivated.

*A. OLERACEUS, L. (M.).

Cultivated.

Nipal spinach.

A. POLYGAMUS, L. (M.).

var. *atropurpureus*.

Hen-ka-nweh.

A. SPINOSUS, L. (M.).

Hen-ka-nweh.

A. GANGETICUS (K.).

Katchall.

A. VIRIDIS, L. (K.).

Katchall and Kamorta.

A common weed.

All the species of *Amarantus* are edible, their leaves, especially when young, forming a capital spinach, particularly *A. oleraceus*, *A. polygamus*, and *A. tristis*.

ÆRVA, Forskahl.

Æ. MONSONLE, Mart. (M.).

Æ. SCANDENS, Mart. (M.).

Æ. BRACHATA, Mart. (M.).

*Æ. JAVANICA, Juss. (M.).

Cultivated.

Æ. LANATA, Juss. (M.).

Burma. Katchall (K.).

ACHYRANTHES, *Linnaeus*.

Perianth usually glabrous, of 5 slightly unequal segments, hardened after flowering, with 1 subulate, almost spinous bracteole on each side. *Stamens* 5, united in a cup at the base, with as many small scales between them. *Anthers* 2-celled. *Ovule* solitary. *Style* simple, with a capitate stigma. *Embryo* coiled round the albumen. *Leaves* opposite. *Flowers* green, or rarely scarious, reflexed, in terminal spikes or rarely heads.

A. ASPERA, L. (M.).

Burma. The Nicobars (K.).

Apang (*fide* Balfour).CYATHULA, *Loureiro*.

Habit, inflorescence and flowers of *Achyranthes*, except that on each pedicel, besides 1 or sometimes 2 perfect perianths, there is on each side a cluster of stiff hooked bristles, slightly dilated at the base, consisting of bracts and abortive perianth segments.

C. PROSTRATA, Blume (K.).

Great Nicobar.

CELOSIEÆ.

Anthers 2-celled. *Ovary* many-ovuled.DEERINGIA, *Brown*.

D. INDICA, Spreng. (M.).

CELOSIA, *Linnaeus*.

Perianth of 5 nearly equal segments. *Stamens* 5, united at the base. *Anthers* 2-celled. *Ovary* with several ovules. *Style* simple, with a capitate, or minutely 2-lobed stigma. *Capsule* opening transversely. *Embryo* coiled round the albumen. *Leaves* alternate. *Flowers* white or coloured in terminal spikes. Herbs.

C. ARGENTEA, L. (M.).

White Cockseomb.

C. CRISTATA, L. (M.).

Kyet-yet. Kyet-mouk. Crested Cockseomb.

A species of *Celosia*, allied to *C. cernua*, Roxb., is said by Mason to be cultivated by the Karens, and to be the most elegant member of its tribe. It bears a long pendulous drooping panicle, and is probably a variety of Roxburgh's species.

Order POLYGONÆÆ.

Flowers diœcious or dielinous. *Perianth* herbaceous or petaloid. *Stamens* perigynous. *Ovary* 1-celled and 1-ovuled. *Ovule* erect, orthotropous. *Fruit* an achene. *Albumen* farinaceous. *Leaves* alternate, with an intrapetiolar stipule. This Order embraces a few useful plants, as the Rhubarb¹ (*Rheum rhoponticum* and *undulatum*), and Buckwheat (*Fagopyrum esculentum*), so valuable as a bread stuff on the poorer soils of Northern Europe. *Polygonum tinctorium* is cultivated in China for its blue dye, which is extracted from the leaves like indigo. The leaves of many species of the Order are edible, and rich in Oxalic, Citric, and Malic acids.

POLYGONIÆÆ.

Involucre none. *Stipules* ochreate.POLYGONUM, *Linnaeus*.

Perianth of 5, rarely fewer, segments, all equal, or the 2 or 3 outer ones enlarged. *Stamens* 8, or sometimes fewer in the same species. *Styles* 3 or 2, sometimes united

¹ 'Rhubarb' is derived from *Rha barbarum*, or Scythian, as distinguished by the ancients from *Rha Ponticum*, or Thracian Rhubarb.

at the base. *Stigmas* entire. *Nut* triangular or flattened, inclosed in the persistent perianth. *Flowers* small, pale green or red with white edges, clustered, or rarely solitary in the axils of the upper leaves, or in little clusters, within a sheathing bract, and collected in terminal spikes, heads or panicles.

P. FLACIDUM, Roxb. (K.). Marsh behind Katjui, Katchall.

P. TOMENTOSUM, Willd. (M.). All tropical Asia.

P. PLEBEIUM, Br.

P. herniarioides, De Can.

P. Miquelianum, *effusum*, *Roxburghii*, *illicebroides*, *Cliffortioides*, *Perrottetii* and *ciliatum*, Meisn. (Bentham).

* *Flowers* in terminal spikes. *Stems* erect, ascending or climbing.

† *Stipules* sheathing, wholly scarious, truncate or ciliate.

P. BARBATUM, L. (M.).

Stems and *peduncles* glabrous. *Sheathing stipules* hairy, with long bristles at the top. *Styles* 2.

P. GLABRUM, Willd. (M.).

Spike slender, continuous. *Perianth* not dotted. *Stipules* not ciliate. *Styles* 2.

†† *Stipules* green and spreading, at least at the top.

P. PERFOLIATUM, L. (P.).

A glabrous, prickly climber. *Stipules* spreading from the base. *Leaves* triangular. *Styles* 2.

** *Flowers* in little heads, in dichotomous panicles. *Stems* erect or climbing.

P. CHINENSE, L.

A weak half-climbing herb. *Styles* 3.

Order PHYTOLACCEÆ.

Perianth green or petaloid, tube short or none. *Stamens* hypogynous or nearly so. *Ovary* of several free or connate 1-ovuled carpels. *Embryo* usually curved or coiled. *Albumen* floury or none. *Herbs*, shrubs or trees. *Leaves* usually alternate, stipulate or not.

GISEKIA, *Linnaus*.

G. PHARNACEOIDES, L. (M.).

Order NYCTAGINEÆ.

Perianth simple, inferior, the lower portion persistent, and inclosing the ovary and fruit, the upper portion variously shaped with 5, rarely 4, angles, folds, teeth or lobes, deciduous or withering. *Stamens* 4 or 5, or fewer, or rarely more (up to 20), inserted on, or united at the base with a narrow or cup-shaped disk, more or less adnate to the stalk of the ovary. *Filaments* slender, often exerted. *Anthers* 2-celled, the cell attached back to back, and opening longitudinally round the outer margin. *Ovary* shortly stalked, 1-celled, with a solitary erect ovule. *Style* terminal, simple. *Fruit* 1-seeded, inclosed in the persistent tough or hardened base of the pericarp-like perianth, the real pericarp thin and membranous, more or less adherent to the thin testa of the seed. *Embryo* curved transversely, folded, or longitudinally convolute around or within a mealy albumen. *Radicule* inferior. *Herbs*, shrubs or trees, with often thickened-jointed branches. *Leaves* usually opposite, rarely alternate, simple. *Flowers* solitary, or in clusters or umbels, the bracts sometimes forming a coloured involucre, or small and deciduous.

BOERHAAVIEE.

PISONIA, Plumier.

Perianth in hermaphrodite flowers contracted above the ovary, in the males, bell-shaped, in the females ovoid or cylindrical, the limb in all 5-angled or 5-toothed. *Stamens* 6-8, rarely 10, longer than the perianth, rudimentary in the females. *Seed* solitary. *Albumen* scanty. The roots possess emetic and purgative properties.

* *Fruits with a double or simple row of prickles along the 5 corners.*

P. ACULEATA, L. S.S. Beach jungles of Tenasserim and the Andamans.
Leaves 1-3 inches long, bluntish; prickles of fruit in a double row, short, glandular-headed.

P. ALBA, Span. E.T. Beach forests of the Andamans.
Leaves 7-10 inches long. Prickles in a single row, short, and irregular, acute.

** *Fruits unarmed, with a broad, blackish sticky line along the 5 bluntish corners.*

P. UMBELLIFERA, Seem. E.T. Tree forests of the Andaman coast.
Flowers diceious, small. Fruit glabrous.

BOERHAAVIA, Linnæus.

B. GLUTINOSA, Vhl.

MIRABILIEE.

MIRABILIS, Linnæus.

* M. JALAPA, L.

This is a native of Tropical America, but Dr. Mason remarks: "The red, white and yellow varieties of this pretty annual are all cultivated by the Burmese, as well as by Europeans, who often call it the Jalap plant. The true Jalap is, however, quite a different plant, a species of *Ipomœa*." The root was once supposed to be the source of Jalap, whence its name, and possesses an acrid and nauseous flavour, but is worthless and uncertain in its action. It is easily propagated and soon becomes a weed in a garden.

Division II. MONOPETALOUS.

Flowers furnished with both Sepals and Petals, the latter connate.

Exceptionally *Polypetalous* species occur in *Primulaceæ*, *Oleineæ*, *Plantagineæ*, *Lobeliaceæ*, *Ericaceæ*, *Monotropææ*, *Pyrolaceæ*, *Plumbagineæ*, *Myrsineæ*, *Sapotææ*, *Cyrilleæ*, *Styracææ*, *Ebenaceæ* and *Jasminææ*, and *Apetalous* species in the three first-named Orders.

Series I. HYPOGYNOUS or PERIGYNOUS.

OVARY SUPERIOR.

Exceptions: Inferior in *Vaccinieæ* and some *Primulaceæ*, *Myrsineæ*, *Styracææ* and *Gesneraceæ*.

* *Flowers very irregular, rarely regular.*

LAMIALES.

Corolla usually 2-lipped, rarely sub-regular or quite regular, hypogynous. *Stamens* fewer than the corolla-lobes, rarely as many, unequal, generally quadridynamous or two. *Ovary* 2- or 4-celled. *Style* simple. *Ovules* solitary in the cells, rarely 2 or more, in some *Myoporinææ* and *Verbenaceææ*. Fruit an indehiscent 2- or 4-celled drupe or of 2 or 4 nucules. *Leaves* exstipulate.

Order LABIATÆ.

Flowers irregular, very rarely almost regular. *Calyx* persistent, 2-lipped or 5-toothed. *Corolla* more or less 2-lipped or rarely nearly equally 4-5-lobed, imbricate in the bud. *Stamens* 2 or 4, in pairs, inserted in the tube of the corolla, and alternating with its lower lobes. *Anthers* either 2-celled or 1-celled by abortion or by amalgamation of the 2 cells. *Ovary* 4-lobed and celled, with a solitary erect ovule in each cell. *Style* simple, 2-lobed, arising from the centre of the ovary. *Fruit* of 4 small 1-seeded nuts inclosed in the calyx. *Albumen* none. *Embryo* straight (curved in *Scutellaria*), the radicle inferior. *Cotyledons* thick. Herbs or shrubs, very rarely small trees, glandular-dotted and aromatic, the branches usually 4-cornered. *Leaves* opposite or whorled, simple or divided. *Stipules* none. *Flowers* in clusters or half-whorls or solitary, forming often racemes, cymes or panicles.

This Order is rich in bitter aromatic or astringent herbs, especially prized as condiments or carminatives, as: Peppermint (*Montha piperata*), Spearmint (*M. viridis*), Pennyroyal (*M. pulegium*), Thyme (*Thymus vulgaris*), Savory (*Satureia hortensis* and *montana*), Balm (*Melissa officinalis*), Basil Thyme (*Calamintha acinos*), Lemon Thyme (*Thymus citriodorus*), Sweet Basil (*Ocymum Basilicum*), Bengal Sage (*Meriandra Bengalensis*), Sage (*Salvia grandiflora* and *officinalis*), Marjoram (*Origanum Marjorana*), Hyssop (*Hyssopus officinalis*). Among scents and cosmetics included in this Order may be mentioned Rosemary (*Rosemarinus officinalis*), Lavender (*Lavendula vera* and *spica*), and Patchouly (*Pogostemon intermedius*), the first of which enters into the composition of Hungary water and Eau de Cologne. Ground ivy (*Glechoma hederacea*) is an antiscorbutic, and Horehound (*Marrubium vulgare*) still maintains its reputation for relieving coughs in the form of the sweetmeat called "Horehound rock."

AJUGOIDIÆ.

Nucules rugose, basally sub-connate. Stamens parallel, ascending.

CYMARIA, *Bentham*.

- C. DICHOTOMA, Benth. (M.).
- C. ELONGATA, Benth. (M.).

AJUGA, *Linnaeus*.

- A. MACROSPERMA, L. (M.).

TEUCRIUM, *Linnaeus*.

- T. STOLONIFERUM, Buch. (M.).
- T. QUADRIFARIUM (M.).

PRASIÆ.

Stamens 4, parallel, and ascending under the upper lip. Nucules fleshy, sub-connate basally.

GOMPHOSTEMMA, *Wallich*.

- G. STROBILINUM, Wall. (M.).
- G. VIRIDE, Wall. (M.).
- G. OBLONGUM, Wall. (M.).
- G. LUCIDUM, Wall. (M.).
- G. CRINITUM, Wall. (M.).
- * G. MELISSIFOLIUM, Wall. (M.).

COLQUHOUNIA, *Wallich*.

Calyx tubular, bell-shaped, 10-nerved, sub-equally 5-dentate. *Corolla* 2-lipped, the upper erect, entire, the lower almost spreading, and 3-lobed. *Stamens* 4, ascending, didynamous, the lower ones shorter. *Anthers* 2-celled. *Style* unequally

bifid, the lobes subulate. *Flowers* crimson or dull purple, in lax axillary half-whorls, or rarely crowded into a terminal spike. *Bracts* minute. Scandent or straggling shrubs, often tomentose.

C. ELEGANS, Wall.

Khakyen Hills and Martaban at 4000 to 5000 feet.

All soft parts pilose-pubescent. Flowers orange-coloured, crimson-dotted, very shortly pedicelled. Corolla curved, half an inch long, pubescent outside.

COLEBROOKIA, Sm.

Stamens straight or diverging. *Corolla-tube* hardly longer than the calyx, the limb subequally quadri- or quinque-fid. *Calyx* bell-shaped, 5-parted, feathery, turning pappose in fruit, adhering to the achenes. *Anthers* 4, distant, almost sessile, parallelly 2-celled. *Disk* glandless. *Style* deeply 2-cleft, the lobes subulate.

C. OPPOSITIFOLIA, Sm.

Khakyen Hills. Tenasserim.

Leaves opposite, rennate, thick-membranous. Flowers minute, with a pair of floral leaves at the base of the panicle. Achenes oblong, subtriquetrous, villous at the apex.

STACHYDIEÆ.

Stamens of Prasiceæ. Nucules quite free, erect.

LEONOTIS, R. Brown.

L. LEONURUS, R. Br. (M.).

LEUCAS, Bentham.

L. (ANISOMELES) OVATA, R. Br. (M.).

L. (ANISOMELES) MALABARICA, R. Br. (M.).

L. TERES, Benth. (M.).

L. STRIGOSA, Benth. (M.).

L. MOLLISSIMA, Wall.

L. pilosa, Benth. (M.).

L. FLACIDA, Brown (M.).

L. MARTINICENSIS, Brown (M.).

L. ZEYLANICA, Brown (M.).

L. aspera, Spr.

L. hyssopifolia, Benth.

L. dimidiata, Spr.

L. linifolia, Spr.

Thwaites says this is a most variable species, and is eaten in curries in some places.

L. NUTANS, Spr. (M.).

L. (ANISOMELES) CAUDICANS, Bentham (M.).

SCUTELLARIA, Linnæus.

S. INCURVA, Wall. (M.).

S. DISCOLOR, Colebrooke (M.).

S. RIVULARIS (P.).

MONARDIEÆ.

Stamens 2, straight or ascending. *Anther-cells* linear, oblong, solitary or separated by a long connective.

SALVIA, Linnæus.

S. OFFICINALES, L. (M.).

Garden sage.

S. SPLENDENS, Sello. (M.).

SATUREIEÆ.

Stamens remote, straight, spreading, or connivent under the upper lip, 4 or 2, with *Anther-cells* contiguous. *Corolla-lobes* flat.

MENTHA, *Linnaeus*.

- * M. SYLVESTRIS, L. (M.).
Bu-di-na. Mint.

PERILLA, *Linnaeus*.

- P. SCYMOIDES, L. (M.).

ELSHOLTZIA, *Willdenow*.

- E. BLANDA, Willd. (M.).
E. INCISA, Benth. (M.).

DYSOPHYLLA, *Blume*.

- D. AURICULARIA, Bl. (M.). Burma. Kamorta (K.).
D. QUADRIFOLIA, Benth. (M.).
D. VERTICELLATA (P.).

POGOSTEMON, *Desfontaines*.

- P. PANICULATUS, Benth. (M.).

A species of this genus, *P. intermedius*, Benth., yields an essential oil known as 'Patchouli.' The leaves are used for flavouring tobacco, and scenting real and imitation Kashmir shawls.

OCIMOIDIÆ.

*Stamens declinate.*ANISOCHILUS, *Wallich*.

- A. CARNOSUS, Wall. (M.).
A. PALLIDUS, Wall. (M.).

PLECFRANTHUS, *L'Heritier*.

- P. COETSA, Don. (M.).
P. menthoides, Benth.
P. Macraei, Benth.
P. TERNIFOLIUS, Don. (M.).
P. AROMATICUS, Roxb. (M.).
Pyn-bu.

The tubercous roots of *P. tuberosus*, Blume, are cultivated in Ceylon as a vegetable.

ORTHOSIPHON, *Bentham*.

- O. RUBICUNDUS, Benth. (M.).
O. STRAMINEUS, Benth. (M.).
* O. ROSEUS, Benth. (M.).
* O. INCURVUS, Benth. (M.).

MOSCHOSMA, *Reich*.

- M. POLYSTACHYUM, Benth. (M.)

ACROCEPHALUS, *Bentham*.

- A. CAPITATUS, Benth. (M.).

GENIOSPORUM, *Wallich*.

- G. STROBILIFERUM, Benth. (M.).

OCIMUM, *Linnaeus*.

- O. CANUM, L. (M.). Burma.
O. BASILICUM, L. (M.). Burma.
O. VILLOSUM, Roxb. (M.). Burma.
Pyn-zeing or Hlung.

O. SANCTUM, L. (M.). Burma. Kamorta. Katchall and Nankowry.
Pyn-zcing-zi. Holy Basil. Tulsī, of the Hindus.

This plant is extremely venerated by Hindus, as sacred to Vishnu, and the most binding oath is that on Ganges water and the Tulsī leaf. For example, in the tale of the 'Enchanted Fruit,' by Sir W. Jones, Drapuli, when compelled to confess her indiscretions, appeases the suspicions of her five husbands by swearing by this plant :

“By Tulsī's leaf the truth I speak,
The Brahmin only kissed my cheek.”

The leaves of several species of *Ocimum* are fragrant and aromatic, and a decoction of them is in some repute as a mild febrifuge and carminative in infantile diarrhœa. The leaves are also used for flavouring sauces, and the seeds are mucilaginous and cooling, and administered in renal complaints. The root is fashioned into beads worn by some classes of Brahmins.

LAVENDULA, *Linnaeus*.

L. CARNOSA, L. (K.). Tōn-doung. Pegu.

HYPTIS.

H. SUAVEOLENS, Poir. Nankowry.

Mason gives the following Sgau-Karen names for sundry plants of this Order : Phau-ka-bo, Hau-wor-thwac, Klo-na-ni, Hpor-lai-thwai, Hor-lipgi, and the Burmese Su-la-na-lpa.

Order VERBENACEÆ.

Flowers irregular, or rarely regular. *Calyx* persistent, truncate-toothed or lobed. *Corolla* 4- or 5- rarely 6-8-lobed or rarely truncate, the lobes more or less 2-lipped or nearly or quite equal, imbricate in bud, the upper lip or uppermost lobe or sometimes the lateral ones outside. *Stamens* inserted in the corolla-tube, usually 4, in pairs or nearly equal, and alternating with its lower lobes, or when the corolla is regular 4 to 8, alternating with its lobes. *Anthers* 2-celled, the cells usually parallel, and opening longitudinally. *Ovary* not lobed, or only shortly 4-lobed, usually more or less perfectly divided into 2 or 4 cells or half-cells, with a solitary ovule in each cell, or half-cell, either anatropous and erect from the base, or more or less amphitropous, and attached laterally or near the top, so as to appear pendulous. *Style* terminal, simple, entire, or more frequently with 2 short stigmatic lobes. *Fruit* dry or more or less drupaceous, the whole fruit, or the endocarp, separating into 2 or 4 nuts or pyrenes, or quite indehiscent and 2- or 4-celled, and sometimes with an additional central cavity between the carpels, having the appearance of a third or fifth empty cell. *Seeds* solitary in each cell or half-cell, erect, usually without albumen. *Embryo* straight, with thick cotyledons, and an inferior radicle. *Leaves* opposite, whorled, or rarely alternating, entire or divided. *Stipules* none. *Inflorescence* various. Herbs, shrubs or trees.

AVICENNIEÆ.

Inflorescence capitate, spiked, or centripetal. *Flowers* with imbricate bracts. *Calyx* 5-leaved. *Corolla* 4-fid. *Ovules* geminate, pendulous, amphitropous. *Fruit* indehiscent. *Embryo* germinating in the pericarp.

AVICENNIA, *Linnaeus*.

Fruit a 2-valved capsule. *Seed* solitary, without integuments, germinating white on the plant, cotyledons large, folded, radicle very hairy.

A. OFFICINALIS, L. *E.T.* Tidal forests all over Burma and the
Thamē. Andamans.

Flowers shortly spiked. *Calyx*-lobes 1 line long, style very short.

Wood grey, soft, with very cross-grained fibres, and hence much used for rice-husking mortars. Weight 47 lbs. Gamble (Manual, p. 300) says the wood weighs 58 lbs. and is 'very brittle,' which is ludicrously inaccurate, as from its interlacing or cross fibres, it is next to impossible to split it, and on this account it is used for rice-mortars and oil mills (W.T.).

A. TOMENTOSA, Roxb. *E.T.* Tidal forests of Arakan and Burma.

Flowers in heads. Calyx-lobes 2 lines long. Style long and slender.

A small tree, which, like the mangrove, springs from arching roots and occasionally attaining to 70 feet in height. The kernels are bitter but edible, and the green fruit boiled and mashed with butter is used for ripening tumours and as an application to the suppurating pustules of Variola. The timber is also used, and the bark supplies materials for tanning.

VITIEÆ.

Inflorescence cymose, definite. Ovules pentulous, amphitropous or sub-anatropous.

** *Ovules laterally attached above the base, or near the summit of the cells. Flowers usually supported by 2 bractlets.*

‡ *Cymes involucred. Capsule coriaceous, indehiscent.*

SYMPHOREMA, Roxburgh.

Involucre 6-8-phyllous, corolla limb regular, 5-12-cleft. Style very short. Stamens as many as corolla-lobes, inserted at the throat. Anthers dorsifixed, 2-celled. Ovary 2-celled, with 2 erect collateral ovules in each cell. Scandent shrubs with opposite simple leaves.

* *Involucre shorter than the calyces.*

S. GROSSUM, Kz. *E.S.S.* Swampy forests of Pegu and Tenasserim.

Leaves entire, shortly tomentose beneath.

** *Involucre much longer than the calyces. The leaflets an inch long or more.*

‡ *Ovary smooth, leaves more or less pubescent beneath.*

S. INVOLUCRATUM, Roxb. *W.C.* All over Ava, Pegu, and Martaban. Nweh-sat (Kurz).

Leaves coarsely-toothed, and with the inflorescence greyish pubescent beneath. Flowers small, white, sessile.

S. UNGUICULATUM, Kz. *S.S.* Pegu. Tenasserim and the Andamans up to 3000 feet. Ka-nweh (Kurz).

Leaves entire, tawny-pubescent beneath. Inflorescences tawny or rusty-pubescent. Flowers small, cream-coloured, sessile.

‡‡ *Ovary pubescent or villous. Leaves glabrous, or nearly so. Cymes collected into terminal panicles.*

S. PENTANDRUM, Kz. *S.S.* South Tenasserim.

Calyx piloso-tomentose. Corolla-throat glabrous. Flowers small, purple, sessile, in small clusters.

S. JACKIANUM, Kz. *S.S.* South Tenasserim.

Calyx glabrous. Corolla-throat woolly.

CONGEA, Roxburgh.

Involucre 3-phyllous. Corolla 2-lipped, the upper lip elongate. Stamens 4, didynamous. Style capillary, exserted.

C. TOMENTOSA, Roxb. *S.S.* All over Burma.

Tha-ma-kā-nweh (Kurz).

Branchlets covered with a short soft tomentum. Flowers whitish, sessile, supported by a pinkish involucre.

C. AZUREA, Wall. (M.).

C. VELUTINA, Wight (M.).

Ka-yau.

Inflorescence without involucre.

+ *Ripe capsules separating into 4 (or by abortion fewer) valves.*

† *Calyx very ample, orbicular-explanate, corolla tubular, 2-lipped.*

HOLMSKIOLDIA, Retzius.

Calyx membranous, usually red. *Stamens* 4, didynamous, exserted. *Ovary* 4-celled, with a solitary ovule in each cell. *Style* almost simple, with a short lateral lobe. Scandent shrubs with opposite simple leaves.

H. SANGUINEA, Retz.

Ava and Prome.

Leaves ovate, acute at the rounded base, slightly serrate, membranous. Flowers nearly an inch long, crimson, on filiform minutely pubescent pedicels.

†† *Calyx more or less cup- or bell-shaped.*

Δ *Fruiting calyx not winged.*

GLOSSOCARYA, Wallich.

Calyx bell-shaped, 4-5-toothed, with twice as many nerves as teeth. *Corolla* funnel-shaped, with a slender tube, the limb nearly equal, 4-5-parted, spreading. *Stamens* 4 or 5, inserted in the corolla tube and exserted. *Ovary* 2-celled, with 2 ovules in each cell, suspended from the 2-lamellate spermaphore. *Style* filiform, with a 2-cleft stigma. Shrubs, with opposite simple leaves.

G. MOLLIS, Wall.

Ava and Tenasserim.

Branches 4-cornered, greyish tomentose. Leaves ovate, 3-4 inches long, on short pubescent petioles.

ΔΔ *Fruiting calyx 4-winged, bladderly.*

HYMENOPYRAMIS, Wallich.

Calyx very small, 4-toothed, much enlarging after flowering. *Corolla* almost funnel-shaped, with a short tube the length of the calyx, the limb 4-parted, almost equal. *Stamens* nearly equal, inserted at the throat, exserted. *Anthers* 2-celled, opening longitudinally. *Ovary* 2-celled, with 2 ovules in each, suspended from a bilamellate spermaphore. *Style* capillary, with a 2-cleft stigma. Scandent shrubs, with opposite simple leaves.

H. BRACHIATA, Wall.

Ava and Prome.

Chin-thea-lek-nweh (Kurz).

Leaves ovate, lanceolate, entire, almost chartaceous, glabrous above, whitish velvety beneath, 3-5 inches long. Flowers minute, white, on short capillary, puberulous pedicels, much elongated in fruit. Capsule globular, inclosed in the calyx, pilose.

VITICIEÆ.

+ + *Fruit indehiscent, dry or drupaceous.*

† *Nut dry, spongy-villous, included in the enlarged calyx.*

TECTONA, Linnæus, f.

Calyx bell-shaped, 5-6-cleft. The corolla tube nearly as long as the calyx, the limb 5-6-cleft, almost equal and spreading, hairy at the throat. *Stamens* 5-6. *Anthers* cordate, 2-celled. *Ovary* 4-celled, with a solitary ovule in each cell. *Style* as long as the stamens. *Stigma* sharply 2-cleft.

T. GRANDIS, L. f.

From Ava to Upper Tenasserim.

Kyoon-pen. Teak.

Wood too well known to need description. Weight 40-50 lbs. Breaking weight of 'girdled' timber 202 lbs., of 'ungirdled' timber 238 lbs. These remarkable results were obtained by experiments on rods 1 inch square and 4 feet in length, conducted by the Forest Department, and which were analysed and summed up in a Report on Forestry, submitted by me in 1873.—W. T.

T. HAMILTONIANA, Wall.

Ava and Prome.

T. ternifolia, Buch.

Ta hāt (Mason).

The branchlets 6-8, angular-furrowed. Leaves ternate, obovate, acute at the base, but not decurrent, on a shortly-pubescent petiole 4-6 lines long. Flowers small, pale blue. Calyx tawny, in fruit about 4 lines long, ovoid, closely inclosing the small tomentose nut.

Wood uniformly pale brown, heavy, close grained, takes a fine polish (Kurz).

†† *Drupe more or less sappy or fleshy.*

Δ *Drupe containing a single 4-celled (or by abortion fewer) nut.*

PREMNA, *Linnaeus.*

Calyx bell-shaped, 4-5-cleft or toothed, or almost 2-lipped. *Corolla* small, funnel-shaped, 2-lipped, with a short tube. *Stamens* 4, didynamous, or almost equal, usually as long as the corolla. *Ovary* 4-celled, each cell with a single ovule. *Style* filiform, with 2 spreading stigmatic lobes.

× *Tomentose or velvety pubescent trees. Calyx 5-toothed.*

P. TOMENTOSA, Willd.

All over Burma.

Kyoon-na-leng (Kurz).

All parts stellate-tomentose. Flowers small, yellowish-white, in panicles. Drupes obovoid, 2 lines long, smooth.

Wood yellowish, close-grained, weight 45 lbs. Adapted for cabinet-work.

P. VIBURNOIDES, Wall.

Ava and Prome.

All softer parts velvety-pubescent. Flowers cymose in corymbs. Drupes globular, bluish-black, smooth, the size of a peppercorn.

× × *Almost glabrous trees. Calyx 4-toothed.*

P. SAMBUCINA, Wall. *E.T.*

Arakan and Upper Tenasserim.

Leaves glabrous, except the pubescent nerves. Flowers small, greenish white, cymose, in corymbs. Corolla 1 cleft, bearded at the throat.

× × × *Shrubs. Calyx 5-toothed. Leaves toothed, at least towards the apex.*

P. ESCULENTA, Roxb.

Chittagong.

Glabrous. Leaves acuminate, 2-4 inches long, on a petiole 2-3 lines long. Flowers small, yellowish white. Corolla yellowish-white, with a golden blotch at the base of the middle lobe.

P. AMPLECTENS, Wall.

Pegu and Upper Tenasserim.

Glabrous. Leaves nearly obovate, 2-10 inches long, serrate towards the apex, on a very thick petiole 1-2 inches long. Corolla glabrous; the tube pubescent within. Drupes the size of a peppercorn, smooth, purplish.

P. MACROPHYLLA, Wall.

Pegu and Martaban.

All parts softly and shortly puberulous. Leaves, whilst young, sessile. Calyx puberulous. Drupes globular, the size of a peppercorn, smooth, bluish-black.

× × × × *Scandent shrubs or climbers.*

P. SERRATIFOLIA, L. *E.S.S.* Tenasserim. The Andamans. Kamorta.
P. integrifolia, L. Katchall and Car Nicobar.

Leaves blunt, glabrous. Calyx 4-toothed.

P. SCANDENS, Roxb. *S.S.* Hills East of Toung-ngoo.

Leaves acuminate, glabrous. Calyx truncate.

P. LUCIDULA, Miq. *E.S.S.* Tree forests of the Andamans and Upper Tenasserim.

Leaves acuminate, more or puberulous beneath. Calyx 2-lipped and 5-toothed.

Flowers clustered or forming a more or less interrupted raceme or spike.

P. RACEMOSA, Wall. *E.T.* Upper Tenasserim.

Leaves glabrous, or nearly so. Flower-clusters sessile or nearly so. Flowers greenish-white. Filaments pubescent at their insertion.

GMELENA, *Linnaeus.*

Calyx 4–5-toothed or sinuately lobed. *Corolla* usually large. *Drupe* large, fleshy. *Stamens* 4, didynamous, inserted at the inflated part of the tube, shorter than the corolla. *Ovary* 4-celled, with a solitary ovule in each cell, laterally attached at or above the middle. *Fruit* a fleshy drupe, the putamen hard or bony.

* *Bracts small and deciduous, green.*

G. ARBOREA, Roxb. All over Burma and the Andamans.
Ya-ma-nay.

Leaves glaucous beneath. *Corolla* 2-lipped. The upper lip short, 2-lobed, straight. *Drupe* smooth, glossy and yellow, the size of a plum. Wood white and light. Weight 35 lbs. Kurz recommends it for furniture, but its weight marks it for a poor wood of small value.

Mason gives Kywon-hpyu as the vernacular name (White teak).

G. ASIATICA, L. Swampy forests near Rangoon, and
G. parvifolia, Roxb. of the Tsittoung Valley. Kamorta.

Leaves villous-pubescent beneath. *Corolla* 4-lobed, lobes sub-equal, the upper reflexed. *Drupe* smooth, glossy and yellow, the size of a cherry.

** *Bracts large and gaily coloured, densely imbricate, spiny-armed.*

G. HYSTRIX, Schult. Tenasserim and Siam.

Leaves glabrous. Flowers large, yellow, sessile.

△ △ *Drupe* containing 2–4 distinct 1-celled nuts. *Stamens* exerted.

‡ *Style* shortly 2-lobed.

|| *Corolla* tube longer than the limb.

CLERODENDRON, *Linnaeus.*

Calyx bell-shaped. *Corolla* funnel-shaped, the limb unequal and almost 2-lipped, 5-cleft. *Stamens* 4, nearly didynamous, inserted on the tube and long exerted. *Ovary* 4-celled, each with a solitary ovule laterally attached at or above the middle of each cell. *Fruit* a drupe, containing 4 (or by abortion fewer) 1-celled pyrenes. Shrubs.

* *Drupe* dry, capsule-like, when ripe, separating into 4 or fewer, woody, valve-like nuts.

C. INERME, Gaertn. *E.S.* var. *α* Tidal Jungles of Burma, the Andamans,
Kamorta and Car Nicobar.
var. *β* Arakan and Tenasserim Coasts.

Unarmed. Leaves glabrous. Calyx minutely toothed and truncate.

var. *a genuinum*.

Leaves opposite, shorter, obovate, about 1-2 inches long, blunt.

var. *β neriifolium*, Wall.

Leaves opposite and often ternate, lanceolate, 2-4 inches long, acute.

** *Drupes sappy*, 4- (or by abortion fewer-) lobed. Nuts quite smooth.

× *Calyx truncate, with 5 short teeth.*

C. SERRATUM, Spreng. *E.S.* Ava. Arakan and the Pegu Range up to 2000 feet.
Bē-byā or Bai-kyo (Kurz).

Panicle more or less leafy-bracted, more or less mealy-puberulous. Flowers blue. Leaves glabrous, serrate.

The name 'Bē-byā' is also applied, according to my experience, to a tree yielding a fairly good timber, dark-reddish, and 52 lbs. in weight.

× × *Calyx 5-lobed, to the middle or lower.*

+ *Pubescent or tomentose.*

C. VILLOSUM, Bl. *E.S.* Martaban between 2000 and 4000 feet.

Corolla tube only as long as the calyx, panicle with small bracts only, leaves entire, softly pubescent-tomentose.

C. INFORTUNATUM, L. *E.S.* Tree forests all over Burma and the
Kha-oung-kyee (Kurz) Andamans up to 3000 feet.

Corolla-tube 5-6 lines long. Panicle conspicuously and densely bracted. Leaves serrate, appressed, pubescent.

++ *Quite glabrous.*

C. NUTANS, Wall. Khakyen Hills.

Panicles terminal, nodding, elongate.

Of this plant Dr. Mason remarks: "The Karen glens of Tavoy and Mergui are embellished with one of the most elegant flowering shrubs that ever beautified a landscape; it is the nodding *Clerodendron*. The flowers are tinged with rose, but nearly white, growing in long panicles at the extremities of the branches, from which they make a graceful curve, and hang down perpendicularly from 10 to 15 inches, like an inverted cone, so that the soft green foliage seems canopied with rosy-white veils. The flowerets are few, the divisions of the panicle being remote, and each bearing only 3 or 5 flowers. The divisions and sub-divisions being all rectangular, and each blossom hanging from its pedicel like an ear-drop, order and beauty are inseparable associations with this rare plant. The shrub blossoms in the dry season and rarely exceeds in its native soil more than 10 feet in height."

C. GRATUM, Wall. Ava. Khakyen Hills.

Panicles raceme-like, spreading, axillary.

Kurz adds from the Nicobars:

C. PANICULATUM, L.

Mason enumerates the following species also:

C. SQUAMATUM, Vahl. (M.).

Bu-gyi-ni.

C. SIPHONANTHUS, R. Br. (M.).

C. URTICIFOLIUM, Gærtn. (M.).

C. FRAGRANS (M.).

C. VISCOSUM (M.).

Bu-gyi-hpyu.

||| *Corolla-tube shorter than the limb.*

VITEX, *Linnaeus.*

Calyx cup-shaped, 5-toothed or lobed. *Corolla* almost 2-lobed, the limb unequally 5-lobed, the lower lobe larger and lip-like. *Stamens* 4, didynamous, inserted in the tube and exserted. *Ovary* 2- (or less perfectly) 4-celled, with a solitary ovule, laterally attached, in each cell. *Style* filiform, shortly and acutely 2-lobed. Mostly trees, with 3-7 digitate, rarely 1-foliolate leaves. *Bracts* very small.

* *Flowers in panicles.*

‡ *Panicles terminal, without or only with minute subulate bracts.*

V. AGNUS-CASTUS, L. *E.S.* var. β Valley of the Irrawaddy and Salween.
V. trifolia, L.

Kyoung-bān.

All parts minutely greyish-mealy, leaves white, at least beneath. Leaflets sessile, flowers sessile or nearly so.

var. α *Agnus-castus*, L.

Leaves 5-7, foliolate, more or less linear, acuminate.

var. β *trifolia*.

Leaves 3-1, foliolate, broader, acute or bluntish.

V. CANESCENS, Kz.

Prome.

All parts softly and shortly pubescent. Flowers on slender pedicels, median leaflets petioled.

V. HETEROPHYLLA, Roxb. *E.T.*

Tree forests of Pegu and Tenasserim.

Adult parts all glabrous, at least above. Leaflets petioled.

V. WIMBERLEYI, Kz. *E.T.*

Tree forests of the Andamans.

Glabrous. *Corolla* tomentose. *Calyx* puberulous. Leaflets coarsely crenate.

‡‡ *Panicles terminal, with numerous conspicuous leafy bracts. All parts pubescent. Leaves digitately 3-foliolate, leaflets sessile.*

V. PUBESCENS, Vhl. *E.T.*

Southern Pegu and Tenasserim.

Kyet-yoh (Kurz).

Petiole not, or but slightly winged at the apex, panicle cymose-branched. Flowers blue.

V. LIMONIFOLIA, Wall.

Ava and Prome.

Petiole broadly and leafy winged. Panicle spike-like, interruptedly cymose.

‡‡‡ *Panicles axillary, elongate, lar, leaves 3-foliolate, leaflets sessile, glabrous.*

V. ALATA, Rottl. et Willd. *E.T.*

Pegu and Tenasserim up to 2000 feet.

Kyet-yoh.

Bark grey, smooth, 2 lines thick, peeling off in long curved flakes.

Kurz describes the wood: "Yellowish or light brown, clouded, close-grained, rather heavy, soft but strong, weight 45 lbs." This is hardly correct. The wood is hard, as its name imports, '*Fur's-bone*,' and its weight proves, which is 61 lbs. to the cubic foot. It is one of the handsomest woods I know, of a rich pale nankin-brown, and highly deserving of attention as a furniture wood of the better sort. The native name, however, applies to more trees than one, and my remarks apply to selected samples of the heavier wood. Brandis describes a wood of this name as 45 lbs. weight, and "much prized, but scarce" (W.T.).

** *Flowers in axillary dichotomous cymes. Petiole not winged.*

V. VESTITA, Wall.

Ava.

All softer parts pubescent. Cymes pubescent, shorter than the petiole.

V. LEUCOXYLON, L. f. Chittagong. Pegu and Upper Tenasserim.
Htouk-shah.

All adult parts quite glabrous. Cymes repeatedly dichotomous, longer than the petiole.

Kurz describes the wood as "pale greyish-brown, rather heavy and close-grained, soft, durable, takes a fine polish, weight 42 lbs." The wood is not heavy, as seasoned samples are only 38 lbs. weight, and I doubt its durability. Kurz adds (following Brandis), "used for cartwheels and recommended for furniture." Now this wood, or any wood, may be used for cartwheels, where no better is available; but it is never selected for such a purpose, being in notorious disfavour. It is at the best a very second-class furniture wood, weak, and, if I mistake not, rather subject to decay; hence, though abundant, it is seldom used.

Kurz adds, from the Nicobars:

V. NEGUNDO, L. Katchall and Kamorta.

CALLICARPA, *Linnaus*.

Calyx cup-shaped, rarely tubular, 4-5-toothed or ribbed, and often angular. *Corolla* very short, the limb equal, 4-5-cleft. *Stamens* 4 (rarely 5), equal, inserted in the corolla-tube and somewhat exerted. *Ovary* 4-celled, each cell with a solitary ovule laterally attached. *Fruit* a small succulent drupe, containing 4 distinct 1-seeded nuts or pyrenes.

* *Leaves entire or nearly so.*

C. ARBOREA, Roxb. T. All over Burma up to 4000 feet.

Doung-hsap-pya (Kurz).

Leaves mealy-tomentose beneath.

** *Leaves serrate. Shrubs with 4-merous flowers.*

‡ *Leaves softly pubescent or floccose-tomentose beneath.*

C. MACROPHYLLA, Vhl. E.S. Ava.

Petiole $\frac{1}{2}$ to 1 inch long. Drupes white.

C. RUBELLA, Lindl. E.S. Martaban hills.

Petiole 2-3 lines long.

‡‡ *Leaves glabrous, except the mealy nerves, at both ends long-acuminate.*

C. LONGIPLEA, Lamk. Martaban, Tenasserim and the Nicobars.

Drupes depressed-globular, on slender pedicels; about a line thick, glabrous, snow-white.

Mason also gives *Sphenodesme Griffithiana*, Wight.

VERBENIÆ.

Inflorescence indefinite. Ovules erect, anatropous.

VERBENA, *Linnaus*.

V. OFFICINALIS, L. (M.). Cultivated.

Common vervain.

Verbena or Vervain was held in high esteem among the ancient Greeks and Romans, and also among our own Druids. It was commonly used to decorate altars at religious celebrations, as when Horace makes a feast on the birthday of Mæcenas:

"Ridet argento domus; Ara castis
Vineta verbenis auct immolato
Spargier agno."

Carm. III. 11. 6.

And more especially was it supposed to act as a love charm, whence its introduction in *Carm. I. 19*, where Horace describes his love for Glycera :

“ Hic vivum mihi cęspitem, hic
Verbenas, pueri, ponite ; thuraque
Bimi cum paterā meri ;
Mactatā veniet lenior hostiā.”

Still more explicit as regards the magic powers attributed to this herb is the invocation scene in Virgil's eighth *Eclogue*, where Alpheus says :

“ Effer aquam, et molli cinge hæc altaria vittā,
Verbenasque adole pingues et maseula thura.
Conjugis ut magicis sanos avertere sacris
Experiar sensus.” *Ecloga VIII. 64.*

V. BONARIENSIS, L. (M.).

STREPTIUM, *Roxburgh.*

S. ASPERUM, *Roxb. (M.).*

STACHYTARPHETA, *Vahl.*

S. INDICA, *Vahl. (K.).*

Kamorta.

S. MUTABILIS, *Vahl. (M.).*

A plant with variegated scarlet flowers in terminal spikes.

S. URTICIFOLIA, *Sims. (M.).*

Ovules ascending from the base of the cells. Flowers without bractlets. Fruit a drupe.

LANTANA, *Linnaeus.*

Flowers in heads or cymes. *Drupe* of 2 1-celled pyrenes. *Calyx* very shortly tubular, or almost bell-shaped, obscurely 4-toothed. *Corolla* slightly widened at the throat. *Stamens* 4, didynamous, inserted and included in the corolla-tube. *Anther-cells* dehiscing longitudinally. *Ovary* 2-celled, with a solitary erect ovule in each cell.

* L. MIXTA, L.

A Brazilian plant cultivated in Burma, and in some places become feral.

Branchlets usually aculeate along the corners, nuts, if not entirely, at least at the base separated by a spongy mass.

Of this plant Thwaites remarks that it “appears to have found in Ceylon a soil and climate exactly suited to its growth, for it now covers thousands of acres with its dense masses of foliage, taking complete possession of land when cultivation has been neglected or abandoned, preventing the growth of any other plant, and even destroying small trees, the tops of which its subscandent stems are able to reach. The fruit of this plant is so acceptable to frugivorous birds of all kinds, that through their instrumentality it is spreading rapidly, to the complete exclusion, in spots where it becomes established, of the indigenous vegetation.”—*Enumeratio plantarum Zeylanicę*, Preface, p. vii.

L. ALBA, *Mill.*

Maulmain (feral *vide* Mason).

L. Indica, *Roxb.*

L. nivea, var. *mutabilis*, *Mason.*

Flowers small, white, yellow at the throat, arranged in dense axillary heads, elongating into spikes. Mason describes the flowers as yellow when they first open, but soon changing to a rose colour. Kurz, quoting Mason, says “probably Ava,” but Mason says “Maulmain.”

L. ODORATA, L. (M.).

L. ACULEATA, *Wall. (M.).*

Order MYROPORINEÆ.

Corolla sub-regular, or 2-lipped. *Lobes* 4-5, imbricate. *Stamens* 4, sub-equal, or 2. *Anthers* 1-celled. *Ovary* 2-celled. *Stigma* simple. *Ovules* 1 in each cell, pendulous. *Fruit* of 1 or 2 unequal achenes or utricle. *Embryo* straight. *Albumen* fleshy. Herbs or under shrubs. *Leaves* alternate, fasciated or sub-opposite, narrow.

MYOPORUM, *Banks.*

M. acuminatum, *Brown* (M.).

The heartwood of *M. tenuifolium*, from the Sandwich Islands, is very fragrant, though less esteemed than sandal-wood.

PERSONALES.

Corolla monopetalous, hypogynous, often bilabiate. *Stamens* fewer than the corolla-lobes, rarely as many, generally 4, didynamous, or 2. *Ovary* 1- or 2-, very rarely 4-celled. *Style* simple. *Stigmata* 1 or 2. *Ovules* usually very numerous. *Fruit* usually capsular. *Leaves* exstipulate. Herbs, rarely shrubs or trees.

Order SESAMEÆ (PEDALINEÆ).

Corolla bilabiate, lobes imbricate. *Stamens* 4, didynamous, or 2. *Anther-cells* shorter than the connective, tip glandular. *Disk* annular or capular. *Ovary* 1- to 4-celled. *Stigma* bilamellate. *Placentas* axile or parietal. *Ovules* few or many. *Fruit* a capsule or drupe, often of remarkable form. *Embryo* straight, exalbuminous or nearly so. *Leaves* opposite or alternate, exstipulate. Herbs with vesicular glands.

EUSESAMEÆ.

SESAMUM, *Linnaeus.*

**S. INDICUM*, *L.* (M.).

Huñā or Huñā-mā.

Largely cultivated as an oil seed. Sesamum oil, when carefully prepared, is excellent for culinary purposes, and not inferior for the table to good salad oil.

The sesamum or 'til' seed enters largely into certain ceremonies of the Hindus, and is thus described by De Gubernatis: "D'après le *Brahmapurāna* le sésame aurait été crée par Yama, dieu de la mort, après de longues pénitences. Cette légende a été probablement imaginée, après coup, pour commenter l'usage indien, d'employer le sésame spécialement dans les cérémonies funéraires et expiatoires, comme un purificateur et un symbole de l'immortalité. Le sésame devait représenter le principe de la vie." And again, "Le sésame, avec le riz et avec le miel, entrāit aussi dans la composition de certains gâteaux appelés *pinḍās*, offerts aux Mānes, dans les cérémonies *crāddhās*, mais mangés par les assistants, qui s'appelaient en consequence *sapinḍās*." —*Mythologie des Plantes*, vol. ii. p. 315.

PEDALINEÆ.

* *Seeds winged.*

BRANDISIA, *Hooker f. et Thompson.*

Calyx bell-shaped, gamosepalous, 5-ribbed, 5-7-toothed. *Stamens* 4, inserted near the base of the corolla-tube, didynamous. *Filaments* glabrous. *Anthers* rotundate, 2-celled. *Ovary* 2-celled. *Seeds* linear at both ends, elongated in a narrow wing.

B. DISCOLOR, *H. f. et Th.* *E.S.*

Martaban at 3000' to 6000 feet.

Leaves lanceolate, on a mealy-puberulous petiole 3-4 lines long, acuminate, 1-2 inches long. *Calyx* 3 lines long, shortly tawny-tomentose.

** *Seeds not winged.*

Buddleia, *Linnaeus.*

Calyx 4-toothed or almost 4-cleft. *Corolla* nearly bell-shaped, the limb 4-lobed. *Stamens* 4. *Anthers* almost sessile at the throat of the corolla, or the filaments longer and inserted half way up the tube. *Ovary* 2-celled. *Seeds* numerous, small, spindle-shaped.

B. ASIATICA, Lour. E.S.

All over Burma.

Kyoung-mi-ku.

Leaves lanceolate, minutely toothed, membranous, glabrous above, beneath covered with a whitish appressed tomentum. Flowers small, white, almost sessile.

B. PANICULATA, Wall.

Khakyen Hills.

A tall tomentose shrub.

Leaves ovate-lanceolate, pointed at both ends, entire or slightly serrate upwards, thick membranous, above glabrescent. Flowers small, sessile, clustered. *Calyx* about a line long. *Corolla* tubular, about 3 lines long, tomentose outside, the lobes spreading very short, rotundate.

Order ACANTHACEÆ.¹

Corolla usually bilabiate, lobes imbricate or twisted. *Stamens* 4, didynamous or 2. *Disk* cupular or annular. *Ovary* 2-celled, cells 2- or many-ovuled, placentas usually on the septum. *Ovules* often inserted on processes of the placenta. *Capsule* bivalved. *Embryo* exalbuminous. *Cotyledons* large, sometimes crumpled. Herbs, rarely shrubs, nodes tumid. *Leaves* opposite or whorled, exstipulate.

Sub-order ACANTHIDEÆ.

Calyx herbaceous, 5- (rarely 4-)partite. *Corolla* lobe imbricate, or imbricately bilabiate in æstivation. *Seeds* borne on a hooked retinaculum.

ASYSTASIEÆ.

Corolla infundibuliform or campanulate, rarely hypocraterimorphous, bilabiate in æstivation. *Stamens* 4, 2 often being sterile and without anthers.

ASYSTASIA, *Blume.*

Corolla infundibuliform, tube long. *Stamens* 4, all fertile. *Anther-cells* basally mucronate.

A. LANCEOLATA, T. And.

Burma ad Baragyn² (B.).

A. PARISHII, T. And.

Tenasserim (P.).

Eranthemum crenulatum, var. *grandiflorum*. Hook. Bot. Mag. t. 5140, *excl. syn.*

ERANTHEMUM, *Linnaeus.*

Corolla hypocraterimorphous, with sub-equal lobes. *Stamens* 2 fertile, and 2 rudimentary sterile ones. *Anthers* 2-celled.

E. CRENULATUM, Wall. (P.).

Amherst (Wall.). Ceylon. Java.

E. (JUSTICIA) ALBUM, Roxb.

Pegu. Andamans. Katchall and Car Nicobar (K.).

¹ The arrangement here adopted is generally that of Dr. Thomas Anderson, as contained in his 'Enumeration of the Indian species of *Acanthaceæ*,' in the Linnean Society's Journal, Botany, vol. ix. with which several other species since described by Kurz are now incorporated. In J.A.S.B. ii. 1873, p. 98, Kurz gives an emended arrangement of the genera after the system of Nees von Essenbeck, which may be advantageously consulted. The letters stand for the following authorities: B. Brandis, C. Cross, Cleg, Cleghorn, F. Falconer, G. Griffith, H. Helder, Haugh, Haughton, K. Kurz, M. Mason, P. Parish, S. Scott, W. Wallich.

² A locality given in this fashion, without specifying the Province, or giving some similar aid to recognition, is simply useless, so far as any information it conveys to the general reader.

- E. CINNABARINUM*, Wall. (P.). Tenasserim. Katchall and Great Nicobar (K.).
E. SUCCIFOLIUM, Kz. Kamorta. Katchall. Car and Great Nicobar (K.).
 Near to *E. Blumei*.

JUSTICIEÆ.

Corolla bilabiate. Fertile stamens 2. Anther-cells more or less superposed. Capsule 4-seeded, sterile capsule basally contracted.
 + *Corolla-tube shortened, dilated. Lower lip unequally lobed. Stamens 2 or 4. Bracts small or none.*

GRAPTOPHYLLUM, Nees von Esenbeck.

Stamens 2. Anthers 2-celled. Style included. Bracts minute. Leaves generally variegated.

- * *G. HORTENSE*, Wall. All India and Burma. Patria unknown.

Sub-tribe DICLIPTERIEÆ.

× × *Corolla-tube elongate, straight or curved. The middle lobe of the lower lip largest, side lobes linear. Bracts (except in Rhinacanthus) much larger than the calyx.*
 † *Corolla-tube straight.*

RHINACANTHUS, Nees von Esenbeck.

Calyx 5-partite. Corolla tubular, with bilabiate limb. Anthers 2-celled. Flowers in panicles. Bracts small, subulate.

- R. COMMUNIS*, Wall. Prome Hills (Wall.).
Justicia nasuta, L.
R. osmospermus and *Rottlerianus*, Nees.

† † *Corolla-tube resapinate.*

PERISTROPIÆ, Nees von Esenbeck.

Capsule elongate, with persistent placentas.

- P. BICALYCVLATA*, Wall. Prome (W.). India.
P. ACUMINATA, Wall. Tenasserim. Silhet (W.).
 Katchall. Great Nicobar (K.).
P. FRAGILIS, Wall. Tavoy (W.). Maulmain (P.).
P. (JUSTICIA) LANCEOLARIA, Roxb. Tenasserim (H.). Maulmain (P.).

DICLIPTERA, Jussieu.

Capsule shortened. Placentas and their retinacules dehiscing.

- D. RIPARIA*, Wall. Pegu (B.). Maulmain (F.).

Sub-tribe EUJUSTICIEÆ.

Corolla-tube not elongate, straight, lower lip trifid, the central lobe largest. Upper lip very shortly bilobed. Stamens 2.
 † *Capsule walls membranaceous, dehiscing, the placentas leaving the valves.*

RUNGIA, Nees von Esenbeck.

Lower corolla lip biplicate. Spike densely bracted.

- R. (JUSTICIA) PECTINATA*, L. Burma (G.). Andaman (H.).
R. parviflora, Wall.
R. muralis, Royle.
R. polygonoides and *origanoides*, Wall.

† † *Capsule dehiscing, simply bivalve.*

JUSTICIA, Linnaeus.

Calyx divided to near the base into 5 or 4 equal segments. Corolla 2-lipped, the upper lip erect, concave, the lower 3-lobed. Stamens 2. Anther-cells oblique or

almost distinct and superposed, the lower one usually mucronate or spurred. *Ovary-cells* 2-ovuled.

Section *BETONICA*.

Spikes terminal or axillary, bracts imbricate.

J. VENTRICOSA, Wall.	Attaran Valley (W.).
J. ARGYROSTACHYA, Wall.	Prome Hills (W.).
J. GRANDIFOLIA, T. And.	Tenasserim (P.).

** *Bracts decussate, conspicuous, $\frac{1}{2}$ to $1\frac{1}{2}$ inch long.*

† *Bracts uniformly green, from orbicular to ovate and lanceolate. Capsule glabrous.*

J. ADHATODA, L. (P.).	Ava. Prome. Chittagong.
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An evergreen shrub, sometimes growing into a small tree.

Leaves long-petioled. Spikes on long stiff peduncles. Bracts orbicular to ovate, glabrous, 1-flowered. Corolla an inch long, white, minutely rusty-dotted, the upper lip longitudinally purple-streaked.

J. VENTRICOSA, Wall. <i>E.S.</i>	Tenasserim.
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Leaves shortly-petioled, usually somewhat blunt. Spikes on very short peduncles or almost sessile. Bracts orbicular to ovate, minutely puberulous, 3-4 flowered.

Section *ROSELLARIA*.

Flowers terminal, spicate or axillary, and sub-solitary. Calyx 4-partite, with a rudimentary fifth division.

† *Flowers terminal, spicate.*

J. PROCUMBENS, L.	Burma (W.) and all India.
<i>J. hedyotifolia, mollissima and crinita</i> , Wall.	Java, China, Abyssinia.
<i>Rostellaria sarmentosa</i> , Zell.	
<i>R. Abyssinica</i> , Brongn.	
<i>R. simplex</i> , Wight.	
J. DIFFUSA, Willd.	Attaran Valley (B.).

Section *GENDARUSSA*.

Flowers axillary, pedunculate, clustered, or solitary and sessile, very rarely pseudo-spicate, with small bracts. Under shrubs or woody plants.

† *Flowers subspicate, axillary, pedunculate.*

* *Lower anther-cell spurred or mucronate. Bracts inconspicuous, shorter than the calyx.*

J. GENDARUSSA, L. (P.).	Tree forests of Ava. Tenasserim and the Andamans (K.).
Bawa-neck (Kurz).	

An evergreen dense shrub. Flowers in terminal spikes; all parts glabrous. Calyx small, the segments linear, stiff, about a line long. Corolla $\frac{1}{2}$ an inch long or more, pale greenish-white, sparingly stained with purple. The strongly-scented leaves are used to preserve books from insects.

†† *Flowers solitary, axillary by twos or threes.*

J. QUADRIFARIA, Wall.	Tenasserim (H.).
<i>Adhatoda Zollingeriana</i> , De Can.	
J. BRANDISHII, T. And. (M.).	Toung-ngoo (B.).

Section *RIAPHIDOSPORA*.

Flowers in lax panicles, less frequently in interrupted spikes, verticillately disposed. Corolla-tube more or less elongate.

J. DECUSSATA, Roxb.	Pegu (W.). Maulmain (P.).
<i>Gendarussa Sumatrana</i> , Miq.	Katchall (K.).

The corolla is uniformly white (K.).

J. VASCULOSA, Wall. (P.). Tenasserim (H. F.). Katchall, Trice, Track, and Great Nicobar (K.).

Section *LEPTOSTACHYA*.

Spikes trichotomely ramosc. Flowers sessile. Corolla minute, tube short. Anthers mucicous.

J. VIRGATA, Wall. Taong-doung (W.). Tenasserim (H.).

(*Incerta sedis.*)

J. BOERHAAVLEIFOLIA, T. And. Amherst (F.).

J. DASYCARPA, Kz. Martaban.

J. CALONEURA, Kz. Martaban.

J. FLAVA, Kz. Martaban.

For descriptions of these three species, see J.A.S.B. ii. 1873, p. 96.

PHLOGACANTHEÆ.

Corolla tubular, limb bilabiate. Stamens 2. Anthers 2-celled. Cells parallel mucicous. Capsule roundish, many-seeded. Inflorescence terminal, spicate.

PHLOGACANTHUS, Nees von Essenbeck.

Capsules terete, seed-bearing from the base. Calyx regular. Stamens fertile. Corolla firm, terete, more or less incurved.

* *Calyx and racemes velvety or puberulous.*

‡ *All parts glabrous.*

P. (JUSTICIA) THYRSIFLORUS, Roxb. Ava and Martaban (K.).

An evergreen branched shrub 6-10 feet high. Branches almost 4-cornered. Flowers yellowish-brown, conspicuous, on short pubescent pedicels. Capsules rather woody, fully an inch long, 4-cornered, furrowed. Seeds 8 or fewer, shortly stipose.

P. PULCHERRIMUS, T. And. Tenasserim (H. F. P.).

P. ELONGATUS, T. And. Amherst (F.).

** *Calyx and racemes quite glabrous.*

P. INSIGNIS, Kz. Kaubalu Toung, and Eastern Slopes of the Pegu Range up to 3000 feet.

An evergreen meagre shrub 3 to 5 feet high. The stems almost terete with 4 elevated lines, white. Leaves membranous, 7-8 inches long. Flowers dark violet, in terminal racemes.

ANDROGRAPHIIDÆÆ.

Corolla limb bilabiate. Stamens 2. Anthers 2-celled, more or less bristly-ciliate. Filaments ligulate, winged. Capsule many-seeded.

GYMNOSTACHYUM, Nees von Essenbeck.

Corolla infundibuliform, tube curved. Stamens free. Filaments often dilated, ciliated. Capsule 4-angled. Inflorescence subsecund.

G. PARISHII, T. And. Tavoy (W.). Maulmain (F. S.). Andamans (H.).

G. ANDROGRAPHIODES, T. And. Burma (G.). Assam (M.).

HAPLANTHUS, Nees von Essenbeck.

Corolla subinfundibuliform. Stamens cohering. Capsule 8- to 20-seeded. Branches axillary, difform, verticillately fasciculate, at the tip spiniform.

H. HYGROPHILOIDES, T. And. Pegu (B.).

(Only provisionally referred to the genus.)

ANDROGRAPHIS, Wallich.

Corolla resupinate, limb constricted. *Stamens* cohering by the barbed anthers. *Capsule* very compressed. *Racemes* secundifloral.

- A. (JUSTICIA) TENUIFLORA, Wall. Prome Hills and Taong-doung (W.).
Haplauthus tener, Nees.
 A. (JUSTICIA) ECHIOIDES, L. Ava (W.).

ACANTHIEÆ.

Corolla unilabiate, lobes 3-5, the middle one exterior in æstivation. *Stamens* 4. *Anthers* 1-celled.

ACANTHUS, Linnæus.

Corolla-tube very short. *Calyx* upper segment, 4- or many-nerved.

* *Filaments* all straight. *Bracts* entire.

- A. ILICIFOLIUS, L. Coasts of Burma, the Andamans, and Kamorta.
 Kha-ya (Kurz).

An erect evergreen shrub. Leaves sessile, or very shortly petioled, prickly lobed. Flowers $1\frac{1}{2}$ to 2 inches long. Capsule nearly an inch long, very shining, blunt, seeds large.

- A. EBRACTEATUS, Vhl.

An evergreen glabrous shrub, 3-4 feet high. Petioles $\frac{1}{2}$ an inch long, rarely very short, leaves entire, or toothed. Flowers an inch or more long.

- A. VOLUBILIS, Wall. Tidal Jungles of Arakan and Pegu.
Dilivaria scandens, De Can.

An evergreen twining shrub, 10-15 feet long, unarmed and glabrous. Leaves obovate, entire, fleshy-coriaceous. Corolla white, an inch long, the lower lip shortly 3-lobed, velvety inside.

BLEPHARIS, Jussieu.

Calyx upper segment whole, 3-nerved, lower segment 2-nerved. *Capsule* with membranous valves.

- B. BOERHAAVEFOLIA, Pers. Ava. Prome (W.).
Acanthus Maderaspatensis, L. India. Ceylon. Abyssinia.
 A. ciliaris, Burm.
 B. Abyssinica, Hochst.

BARLERIEÆ.

Corolla hypocraterimorphous, or infundibuliform, the lobes imbricate in æstivation (bilabiate in *Lepidagathis*).

† *Anthers* 1-celled.

LEPIDAGATHIS, Willdenow.

Calyx 5-partite. *Corolla* bilabiate. *Stamens* 4, didynamous. *Anthers* 2-celled.

- L. FALCATA, Wall. Taong-doung (W.).
 L. CHLOROSTACHYA, De Can. Mergui (G.).
 L. PURPURICAILIS, Wall. Burma (W.).
Ruellia retrofracta and *striata*, Wall.
 L. (RUELLIA) DULCIS, Wall. Prome Hills (W.).
 L. IRIDESCENS, T. And. Rangoon (MacC.).
 L. LINEARIS, T. And. Burma (R. S.).
 L. SIMPLEX, T. And. Tenasserim (H.).
 L. HYALINA, Wall. (P.). Pegu. Attaran Valley (W.).
 L. FASCICULATA, Wall. Pegu (B.). Tenasserim (W. F. H.).
 L. STROBILINA, F. And. Martaban (P.).

|| Anthers 2-celled.

§ Corolla-lobe imbricate in æstivation.

NEURACANTHUS, Nees von Essenbeck.

Calyx unequally 5-partite. *Corolla* infundibuliform, the lobes in æstivation folded-imbricate. *Stamens* 4, fertile, didynamous.

N. SUBUNINERVIS, Kz.	Prome (K.).
N. GRANDIFLORUS, Kz.	Prome (K.).
N. TETRAGONOSTACHYUS, Wall. (P.).	Prome Hills (W.).

BARLERIA, Linnæus.

Calyx 4-partite. *Corolla* regularly infundibuliform or hypocraterimorphous. *Stamens* 2 or 4, fertile, and 3 or 1 sterile and shorter ones.

* B. CRISTATA, L. (P.).	
<i>B. ciliata</i> and <i>dichotoma</i> , Roxb.	Prome. Seguin (W.).
<i>B. laciniata</i> , <i>Nepalensis</i> , and <i>nuda</i> , Wall.	

Extensively cultivated, and with *B. prionitis* used in Java as a hedge plant (T. And.).

B. POLYTRIDEA, Wall.	Irawaddy Valley (W.).
<i>B. hirsuta</i> , Wall.	Tenasserim (P. H.).
B. STENOPHYLLA, Kz.	Ava (K.).

Sub-order RUELLIDEÆ.

Calyx herbaceous, 5- rarely 4-partite. *Corolla*-lobes in æstivation contorted. *Seeds* borne on a hooked retinaculum or papilla. *Stem* not twining.

RUELLIEÆ.

Calyx small, herbaceous. *Seeds* conspicuous, compressed, borne on a hooked retinaculum.

STROBILANTHIEÆ.

Calyx unequally divided. *Corolla* infundibuliform, usually curved, with unequal lobes. *Stamens* 4. *Stigma* subulate. *Capsules* basally sterile, 4- to 16-seeded.

DEDALACANTHUS, T. Anderson.

Bracts large, variegated. *Calyx* scarious. *Anthers* mucous. *Capsule* oblong, 4-seeded.

D. (ERANTHEMUM) SCABER, R. Br.	Pingee. Irawaddy Valley (W.).
<i>Eranthemum nervosum</i> , var. <i>scabrum</i> , R. Br.	
D. (ERANTHEMUM) MACROPHYLLUS, T. And.	Irawaddy Valley. Karen Hills (M.).
<i>D. stricti</i> , T. And. Kew, No. 6128.	Tenasserim or Andamans (H.).
D. (ERANTHEMUM) TETRAGONUS, Wall.	Burma ad Trogl ¹ (W.). Maulmain (P.).
“Nees von Essenbeck has described the corolla as ‘coccinea’? Parish says it is blue.”—T. And.	
D. (ERANTHEMUM) SUFFRUTICOSUS, Roxb.	Andamans (R. Haugh).
<i>E. barlerioides</i> , Roxb.	Car Nicobar (K.).
D. MICROSTACHYUS, T. And.	Tenasserim (P.).
D. (JUSTICIA) MONTANUS, Roxb.	Maulmain (P.).
D. PARISHII, T. And.	Maulmain (P.). Pegu (B.). Shuayghin (S.).

STROBILANTHES, Blume.

Corolla straight or curved, traversed within by 2 longitudinal bearded lines.

¹ Or Trockla (no doubt), the village on the Salween River near which the noble *Amherstia* was first discovered.

Anthems muticous. *Capsule* 4-seeded, more or less angular, often tapering in a sterile base. *Calyx* segments more or less unequal.

Section *LEPTACANTHUS*.

Flowers in lax panicles, usually deciduous. *Calyx* segments unequal, 2 being the longer. *Capsules* large, ovoid.

S. MICROCARPUS, T. And. Tenasserim or the Andamans (H.).

Section *PANICULATI*.

Flowers paniculate. *Bracts* and *bracteoles* herbaceous, less than the *calyx*. *Calyx* segments equal.

* *S. FLACCIDIFOLIUS*, De Can (M.). Karen Hills.

S. Championi, T. And.

Ruellia indigofera, Griff. (apud Mason).

"This is the plant that yields the blue dye called by the Assamese 'Room.' Although the plant is indigenous, it is said to be cultivated by the Assamese near their dwellings." It is, no doubt, also the plant mentioned by Dr. Mason as cultivated by the Burmese for its blue dye.

S. LANCEIFOLIUS, T. And. Tenasserim (P.).

Section *GOLDFUSSIA*.

Flowers spicate. *Spikes* nude. *Bracts* soon deciduous.

S. CRATEGIFOLIUS, T. And. Hill Forests near Maulmain (P.).

S. BICEPS, Wall. Taong-doung (W.).

S. BRANDISHII, T. And. Toung-ngoo at 4000 feet (B.).

S. CAPITATUS, Wall. Karen Hills, Toung-ngoo (M.).

S. (RUELLIA) GLOMERATUS, Wall. Salween Valley and Taipu Hills at 3000 (B.).

Section *AMENTIANTHES*.

Flowers spicate, *spikes* rather lax, elongate, flaccid (except *S. acrocephala*), *bracts* subimbricate.

S. (ADINACANTHUS) ACUMINATUS, Wall. Tenasserim (H.).

S. IMBRICATUS, Wall. Taong-doung (W.). Tenasserim (H.).

S. (RUELLIA) RUFESCENS, Roth. Pegu (B.). Tenasserim (H.).

Butera ulmifolia, Wall.

S. ATRICULATUS, Wall. (P.). Taong-doung and Prome Hills (W.).

S. amplexans and *plumulosus*, Wall. Pegu (B.). Karen Hills (M.).

S. Edgeworthianus, De Can.

S. HELFERI, T. And. Tenasserim, "3 Pagodas" (H.).

S. HAPLANTHOIDES, T. And. Maulmain (F.).

S. REMOTUS, T. And. Tenasserim (H.).

Section *EUSTROBILANTHES*.

Flowers clustered in dense, shortened strobiliform spikes. *Bracts* imbricate.

S. GLAUDESCENS, Wall. Tenasserim (H.). Pegu (B.).

S. CRISPUS, Bl. Rangoon (C.). Maulmain (F. P.).

S. (RUELLIA) ROSEUS, Wall. Taong-doung (W.).

S. (RUELLIA) SCABER, Wall. Prome Hills (W.).

R. flava, Roxb.

Incerte sedis.

S. FALCONERI, T. And. Maulmain (F.).

Kurz also records the following species:

* *Capsules* 6-15-seeded. *Corolla* yellow.

S. FLAVA, Kz.

Tree forests of Pegu and Tenasserim (K.).

Myet-hna-pan (Kurz).

An evergreen, very bushy shrub. Leaves harsh, glabrous, shortly petioled. Flowers yellow, in dense spikes, bracts green, capsules 6-8-seeded.

** *Capsules 2-4-seeded. Corolla purple or blue.*

S. SIMONSI, T. And. Tree forests of Kambalu Toung in the Pegu Range and of Upper Tenasserim.

An evergreen shrub up to 12 feet high. Spikes head-like, on longer or shorter peduncles, occasionally sessile. Bracts conspicuous, irregularly imbricate. No leafy involucre. All parts glandular-puberulous.

S. LAMIOIDES, T. And. Tree forests of Martaban from 2000 to 4000 feet.

An evergreen shrub, branches slightly 4-cornered, almost terete, glandular-puberulous. Flower heads dense, at or near the base surrounded by floral leaves, which form a conspicuous involucre. Leaves glabrous above. Flower buds yellowish villous. Bracts leafy.

S. FIMBRIATA, N.E. Tree forests of the Pegu Range and of Upper Tenasserim.

An evergreen, glabrous shrub 4-8 feet high. Spikes glabrous, lax. Bracts long, lanceolate, minutely appressed, bristly, not glandular, filaments villous.

S. NEESII, Kz. Tree forests East of Toung-ngoo, along streams.

A large shrub, 6-12 feet high. Spikes and the long lanceolate bracts glandular-pubescent. Corolla and filaments glabrous.

S. FETIDISSIMA, Kz. Martaban.

S. PTEROCAULIS, Kz. Pegu.

S. KARENSIUM, Kz. Martaban.

S. SUB-FLACCIDA, Kz. Tenasserim.

S. DASYSPERMA, Kz. Pegu.

For descriptions of these 5 last species refer to J.A.S.B. ii. 1873, p. 93.

HEMIGRAPHIS, Nees von Essenbeck.

Bracts large, imbricate, covering the calyx. Corolla straight, tomentose within. Stamens included. Capsule 6- to 16-seeded.

H. (RUELLIA) GRIFFITHIANA, Nees.	Mergui (G.).
H. (RUELLIA) QUADRIFARIA, Wall.	Taong-doung (W.). Tenasserim (P.).
H. (RUELLIA) ELEGANS, Roxb.	Rangoon (S.). Prome Hills (W.).
H. GLANDULOSUS, T. And.	Katchall. Car Nicobar (K.).
H. BURMANICUS, Kz.	Ava. Prome (K.).

EURUELLIEÆ.

Corolla infundibuliform. Capsule basally sterile. Seeds produced above the middle.

† *Bract 1, large. Bracteoles 2, shorter.*

* *Capsule subterete.*

PHAYLOPSIS, Willdenow.

P. PARVIFLORA, Willd. Prome Hills and Taong-doung (Wall.).
Athelma reniforme, Wall.

†† *Bracts minute or none.*

RUELLIA, Linnaeus.

Corolla straight or curved. Anthers muticous. Capsule with a swollen apex, subglobose, many-seeded.

R. CILIATA, Hornem.	Prome Hills (W.).
R. PROSTRATA, Poir.	Oil wells, Ava (W.). Meaday (S.).
<i>Ruellia ringens</i> , Roxb.	
R. FLACCIDA, Kz.	Pegu.

- R. MACROSIPHON, Kz. Pegu.
 For description see J.A.S.B. Part ii. 1873, p. 91-92.
 R. REPENS, L. Mergui (G.).
Dipteracanthus lanceolatus, Wall.

** Capsule compressed, sublinear.

CYSTACANTHUS, T. Anderson.

Bracts 2, opposite remote from the calyx. *Calyx* 5-partite, segments equal, elongate, cleft to the base. *Corolla* inflated, slightly curved, tube short, limb contracted at the top, equally 5-toothed. *Stamens* 2, included, with 2 rudimentary sterile ones. *Filaments* round, smooth, basally geniculate bearded. *Anthers* 2-celled, connective submueronate. *Ovary* hairy. *Style* round, smoothish. *Stigma* very shortly 2-fid. *Capsule* 12-seeded.

- C. CYMOSUS, T. And. "ad Hoandro" (B.).
 C. PANICULATUS, T. And. Maulmain (Lobb).

HYGROPHILLIÆ.

Corolla bilabiate. *Capsule* many-seeded, with striated or grooved valves.

HYGROPHILA, R. Browne.

Capsule roundish, or oblong. *Flowers* sessile, verticillate.

† Fertile stamens 4.

- H. SPINOSA, T. And. (P.). Prome (W.).
Asteracantha longifolia, Nees.
 H. SALICIFOLIA, Wall. Kamorta (K.).
 var. *a glabra*, T. And. Tavoy (W.). Rangoon (Cleg.).
H. quadrivalvis, obovata, undulata, and radicans, Wall.
H. angustifolia, R. Br.
 var. β *H. (Ruellia) hirsuta*, Roxb.
H. phlomooides, Wall.
H. incana and *assurgens*, De Can.

†† Fertile stamens 2.

- H. (HEMIDELPHIS) POLYSPERMA, Wall. Rangoon (MacClell.).

NOGAPHILA, Blume.

Capsule linear, compressed. *Flowers* in lax panicles.

- N. PARISHII, T. And. (P.). Tenasserim (F. P.). Pegu (B.).

NELSONIÆ.

Calyx small, herbaceous. *Seeds* minute, globose, borne on a small papilla.

† *Corolla* bilabiate.

ADENOSMA, Nees von Essenbeck.

Stamens 4, very rarely 2.

- A. BIFLICATA, Wall. Prome (W.).
Synnuma Aranum, Bentham.
 A. HIRsutUM, Benth. Kamorta (K.).

†‡ *Corolla* infundibuliform.

EBERMAIERA, Vahl.

* *Flowers* in spikes.

- E. MACCLELLANDII, T. And. Pegu (MacClell.).
 E. PANICULATA, Wall. Burma (G.).
E. venosa, T. And.

- E. (ERYTHRACANTHUS) OBTUSA, De Can. Mergui (G.). Maulmain (F.).
 E. GRACILIS, T. And. Zing-zeik, Martaban (P.).
 E. MERGUENSIS, T. And. Mergui (H.).
 E. LASIOBOTRYS, De Can. Mergui (G.). Tavoy (P.). Maulmain (F.).
 E. HELFERI, T. And. Thongyin (B.). Maulmain (P.).
 E. VELUTINA, De Can. Mergui (G.).
 E. (STAUROGYNE) ANGUSTIFOLIA, Wall. Tenasserim (F. W.). King's Island (H.).
E. thyrsoidea, Wall. (Catalogue).
 E. ZEYLANICA, De Can. Maulmain (W.). Rangoon (Cleg.).
E. thyrsoidea, Wall. (Pl. As. Rar.).

** *Flowers axillary, solitary, or in little cymes.*

- E. HUMILIS, Wall. Prome (W.).
 E. GLAUCA, De Can. Pegu. Prome (W.).
E. polybotrya, De Can.
 Kurz adds from the Nicobars :
 E. LANCEOLATA, Hassk. Great Nicobar.

NELSONIA, *R. Browne.*

Stamens 2, fertile, none sterile.

- N. TOMENTOSA, Willd. Attaran and Salween valleys (W.).
N. rotundifolia, R. Br. Pegu (B.).
 N. NUMMULARIFOLIA, Roem. et Sch.
N. Pohlîi, Nees.
N. canescens, De Can.

Sub-order THUNBERGIDEÆ.

Calyx reduced to a toothed or naked ring. *Corolla* lobes contorted in æstivation. *Seeds* resting on a cup-shaped expansion of the placenta. Twining plants, rarely prostrate.

THUNBERGIA, *Linnaeus fil.*

Calyx inconspicuous, concealed by 2 large bracts.

| *Calyx limb many-toothed.*

- T. FRAGRANS, Roxb. Mergui (G.).
T. lavis, Wall.
T. Javanica, Gaert.
T. angustifolia, Ham.
T. Roxburghia, Nees.
 T. LAURIFOLIA, Lind. Tenasserim (W.F.). Ava (W.).
T. Harrisii, Hook. Tree forests all over Burma and the Andamans (K.).
T. grandiflora, var. *sinuata*, Wall.
Heacacntris acuminata, De Can.

Nweh-chō (K.).

- T. GRANDIFLORA, Roxb. Chittagong (W.). Singapore (Jack.).
T. cordifolia, De Can.

Leaves broadly ovate, angular-lobed, more or less hairy.

- T. SMILACIFOLIA, Kz. Ava.

Leaves ovate-oblong, remotely toothed, glabrous, peltate at base.

Order BIGNONIACEÆ.

Flowers hermaphrodite irregular. *Calyx* tubular to bell-shaped, truncate, toothed or laterally split. *Corolla* elongate or rarely short and bell shaped, 5-lobed, the lobes spreading, often arranged in 2 lips, variously imbricate or rather induplicate, valvate

in bud. *Fertile stamens* 2 or 4 (rarely also the fifth rudimentary one developed), in pairs inserted in the tube. *Anthers* 2-celled, the cells divaricate, or rarely parallel, dehiscing longitudinally. *Ovary* usually 2-celled, with 2 distinct placentas in each cell, attached to the dissepiments and either contiguous or separated by a considerable interval, or the dissepiment discontinued between the placentas, and the ovary appearing 1-celled. *Ovules* several or numerous to each placenta. *Style* filiform, with two short stigmatic lobes. *Fruit* a capsule, often very elongated, opening loculicidally or septifragally in 2 valves, leaving the dissepiment free. *Seeds* transverse, usually flattened, winged, or wingless. *Albumen* none. *Embryo* straight, or rarely curved, with flat or fleshy cotyledons, the radicle next the hilum. Trees or shrubs, often climbing, very rarely herbs. *Leaves* opposite, or rarely scattered, compound or rarely simple, the leaflets usually opposite. *Stipules* none. *Flowers* often showy, solitary, and axillary, or more usually in racemes or panicles.

* *Seeds in a single row, along the edges of the septum.*

‡ *Septum continuous. flat.*

STENOLOBIUM, D. Don.

Calyx more or less distinctly 5-ribbed and 5-toothed, marcescent-persistent. *Leaves* unpaired pinnate, with serrate-cut leaflets.

* S. STANS, Seem. *E.S.*

An American shrub, now cultivated.

All parts glabrous. *Leaves* variable, from 1-3 foliolate to unpaired pinnate. Leaflets in 1 to 2 pairs, almost sessile. Capsule 6 inches long, glabrous.

‡‡ *Septum more or less corky-medullary, jointed.*

STEREOSPERMUM, Chamisso.

Calyx net-ribbed, marcescent-persistent. *Seeds* spuriously 2-celled. *Leaves* pinnate.

× *All parts and the inflorescences quite glabrous.*

S. CHELENOIDES, D.C.

Ava. Chittagong. Pegu.

Tha-khwöt-hpyu (Kurz), or Tha-kut-hpyu.

Flowers yellow, rather small, septum of capsule terete.

Wood close-grained, soft, elastic, durable, and takes a good polish (Kurz).

S. SERRULATUM, D.C.

Ava.

Leaflets only about an inch long, serrulate, septum of capsule compressed.

× × *Younger parts and inflorescences variously pubescent.*

S. NEURANTHUM, Kz.

Pegu Range.

Than-deh (Kurz).

Flowers pale lilac or bluish-white with dark purple veins, inflorescence and calyx simply pubescent. Seeds and septum as in *S. chelonoides*.

Wood greyish or reddish-brown, close-grained, heavy, soft. Weight 33-36 lbs. (Kurz). There is some confusion here, as a wood of 36 lbs. to the cubic foot cannot be termed heavy. A wood under 40 lbs. may be termed light (W.T.).

S. SCAVEOLENS, D.C.

Martaban.

Flowers 2-lipped, uniformly lilac or purple, the lobes crenulate-undulate, inflorescence viscid-pubescent.

S. FIMBRIATUM, D.C. Tree forests of Martaban and Tenasserim up to 3000 feet.

Than-that (Kurz).

Flowers funnel-shaped, uniformly pale lilac, the lobes long-fimbriate, inflorescences glandular pubescent.

* * Seeds in 2 or more imbricated rows, along the edges of the continuous septum.

‡ Calyx more or less circumsciss-deciduous.

× Leaves ternately bipinnate, or decomposed.

RADLEMACHERA, Zollinger.

Calyx urceolate, obsoletely 5-toothed. Filaments inserted at the constriction of the tube. Anther-cells divaricate.

R. (SPATHODEA) AMGENA, D.C. Ava.

All parts glabrous, leaves tripinnate on an almost terete petiole, 3-4 inches long. Corolla more than an inch long, funnel-shaped, streaked yellowish-brown inside at the bottom. Septum compressed, bearing along each border a single row of long-winged seeds.

R. LOBBII, Miq. Tree forests of Kamorta.

MAYODENDRON, Kurz.¹

Calyx spathaceous, slit to about its middle. Filaments adnate up to about the middle of the corolla. Anther-cells almost parallel.

M. (SPATHODEA) IGNEUM, Kz. Ava and Martaban up to 3000 feet.

Leaves ample, resembling those of *Acrocarpus*, the lower pinnae 2-pinnate, the upper ones gradually simply pinnate, glabrous. Calyx 6-7 lines long, shortly puberulous, green or purplish-green. Corolla glabrous; inside at the tube puberulous, 2 inches or more long. Pods thin, slender, cylindrical, 1½ inch long, glabrous.

× × Leaves unpaired-pinnate.

SPATHODEA, P. Browne.

Calyx spathaceous, slit to the base. Filaments inserted at the constriction of the tube. Anther-cells divaricate.

* Corolla white, tubular-funnel-shaped. Seeds corky, winged.

S. RUEDELI, Wall. The Pegu Range, Tenasserim, the Andamans and Katchall.
Tha-khwöt or Tha-khut.

All parts, and the calyx, glabrous. Leaves up to a foot long. Flowers very large, white, usually forming a poor raceme at the end of the young branchlets. Calyx nearly an inch long, smooth, green.

* * Corolla yellow or brownish-yellow, campanulate-funnel-shaped, abruptly constricted, on a rather short tube. Seeds membranously winged.

S. STIPULATA, Wall. Ava. Pegu Range and Martaban.

S. serrulata, Brandis.

Ma-lwā.

Leaves entire, unpaired-pinnate, 1 to 1½ feet long. Bark ½ an inch thick, resembling that of teak. Calyx 1¼ inch long, tawny-villous. Corolla somewhat inflated above the constricted short tube, quite glabrous. Capsules narrow, lanceolate, 1-1¼ feet long. Seeds elongate-winged, nearly 2 inches broad.

Of this tree Mason remarks: "A common flowering tree is a species of *Bignonia* that bears a long twisted pod. It is common at Maulmain, and the flowers are often seen in the Bazaar, where they are sold for food. The tree enters into the *Materia medica* as affording a cure for *Psora*."

S. VELUTINA, Kz. Ava. Pegu.

Leaves serrulate, else as the last. Calyx tawny, velvety.

¹ "In honorem viri nobilissimi Mayo, proregis infausti, Indiæ Orientalis dictum."—Kurz, J.A.S.B. Part ii. 1873, p. 91.

‡ ‡ *Calyx persistent, or marcescent-persistent.*
 × *Leaves unpaired-pinnate.*

HETEROPHRAGMA, *De Candolle.*

Calyx 2-3-lobed, without ribs. *Capsule* rather flat, not winged.

H. SULPHUREA, Kz.

Prome and the Pegu Range.

Thit-leng-dā (Kurz).

Corolla funnel-shaped, yellow, pods rather flat, without ribs, villose-tomentose.

H. ADENOPHYLLA, Scem.

Ava. Pegu. Tenasserim and the Andamans.

Hpet-thān (Kurz).

Corolla campanulate-funnel-shaped, dull brown, pods rather cylindrical, ribbed, scurfy-tomentose. Wood pale yellowish-brown. Weight 53 lbs. Excellent for furniture (W.T.).

PAYANELIA, *De Candolle.*

Calyx 5-winged, 5-toothed. *Capsule* flat, winged.

P. MULTIJUGA, D.C. *E.T.*

The Pegu Range, Tenasserim and
the Andamans.

Kyoung-tonk (Kurz).

All parts glabrous. Leaves $1\frac{1}{2}$ to 3 feet long, with an angular rachis. Leaflets in 10-12 pairs, with an odd one. *Calyx* nearly an inch long. Corolla 2-3 inches across the lobes. Capsules flat, obovate-lanceolate, $1\frac{1}{2}$ feet long by 3 inches broad, broadly winged, glabrous. Heart wood brown, rather close-grained.

× × *Leaves ternately 2-pinnate or decompose, capsules flat.*

OROXYLUM, *Ventenat.*

Calyx truncate. *Corolla* campanulate-funnel-shaped. *Fertile stamens* 5.

O. (BIGNONIA) INDICUM, L.

All over Burma and the Andamans.

Kyoung-ya-pen (Kurz).

All adult parts glabrous. Bark an inch thick, grey, smooth, but not even. Leaves ample, 2-3 feet in diameter; leaflets unequal at the rounded or obtuse base, 2-3 inches long. Chartaceous glabrous above, minutely puberulous below. Flowers large, showy, purplish with a yellow tube, on short and very thick pedicels. Wood coarse-grained. Weight 23 lbs. Worthless.

MILLINGTONIA, *Linnaeus.*

Calyx obsoletely 5-toothed. *Corolla* salver-shaped. *Petiole-stamens* 4, one of the anther-cells spurred.

M. HORTENSIS, L. f. *E.T.*

Ava. Martaban. Tenasserim.

Ay-ka-yit (Kurz).

Bark an inch thick, dark grey, corky-fissured. Leaves 2-3 feet long. Flowers showy, white, fragrant, on short puberulous pedicels. *Calyx* 1-2 lines long, almost truncate. Seeds nearly an inch across, surrounded by a pellucid tender wing. Bark used as a substitute for cork.

CALOSANTHES, *Blume.*

C. INDICA, Bl. (M.).

Kyoung-chā.

BIGNONIA, *Tournef.*

B. ADENOPHYLLA, Wall. (M.).

B. FIMBRIATA, Wall. (M.).

- B. SUBEROSA, Roxb. (M.) Pegu. Ava.
 B. CORONARIA, McClell. (M.).
 B. SPATHOIDIA, McClell. (M.).
 B. CRISPA (M.).

Mason in addition to the above enumerates several vernacular names of various *Bignonias*, Thān-thit, Thu-gai-ni, Sain-bhā, and in Sgau-Karen Kywai-tha.

Order GESNERACEÆ.

Corolla more or less bilabiate, hypo-, peri- or epigynous; lobes 5, imbricate. *Stamens* usually 4, didynamous. *Anthers* often cohering. *Disk* annular or unilateral. *Ovary* 1-celled, superior. *Placentas* two, parietal, many-ovuled. *Fruit* a berry or capsule. *Seeds* minute. *Embryo* straight, albuminous or not. Herbs, rarely shrubs. *Leaves* usually opposite or whorled, exstipulate.

EPITHEMA, *Blume*.

- E. CARNOSCUM, D.C. (K.). Kamorta. Maulmain (P.).
E. Zeylanicum, Gard.

CYRTANDRA.

- C. ACUMINATA, Wall. (?)

RHYNCOGLOSSUM.

- R. INTERMEDIUM. (P.).

CHIRITA.

- C. HAMOSA. (P.).

ÆSCHYXANTHUS, *Jack*.

- Æ. (INCARVILLIA) PARASITICUS, Wall. (P.).
Trichospermum grandiflorum, Don.

A parasitical plant with crimson and yellow flowers, resembling those of the Fox-glove (*Digitalis purpurea*). Stem succulent, with enlarged joints, giving out fibrous roots.

LXOTIS, *Brown*.

- L. INTERMEDIA, Benth. (M.).

Order OROBANCHEÆ.

Corolla bilabiate, lobes imbricate. *Stamens* 4, didynamous. *Disk* fleshy. *Ovary* 1- rarely 2-celled. *Placentas* parietal, many-ovuled. *Capsule* bivalvate. *Embryo* minute in fleshy albumen. Parasitic leafless herbs.

ÆGINETIA, *Linnaeus*.

- Æ. INDICA, Roxb. (M.).

Order UTRICULAREÆ.

Corolla bilabiate, lobes imbricate. *Stamens* 2, included. *Anthers* 1-celled. *Ovary* 1-celled. *Placenta* globose, basal, many-ovuled. *Stigma* bilabiate. *Fruit* capsular. *Embryo* straight, undivided, exalbuminous. Scapigerous herbs, often floating. *Leaves* radical, entire or capillary and multitud.

UTRICULARIA, *Linnaeus*.

- U. DIANTHA, Roem and Schult. (K.). Kamorta, in a stream East of Enaca.
 U. FASCICULATA, Roxb. (M.). -
 U. PUNCTATA, Wall. (M.). Maulmain (P.).

- U. AFFINIS, Wight (M.).
 U. BIFIDA, L. (M.).
 U. RACEMOSA, Wall. (M.).
 U. FILICAULIS, Wall. (M.).
 U. ORBICULATA, Wall. (M.).

Sir J. Hooker records a curious use made of the leaves of a genus of this order: "*Pinguicula* leaves, whether fresh or dry, are used by the Lapps to thicken fresh still warm milk, which neither curdles nor gives cream thereafter, but forms a delicious compact tenacious mass, a small portion of which will act similarly on another quantity of fresh milk."

Order SCROPHULARINEÆ.

Corolla often bilabiate, lobes imbricate or folded. *Stamens* 4, didynamous, or 2. *Ovary* 2-celled. *Placentas* on the septum. *Style* simple. *Stigmas* 1 or 2. *Ovules* definite or many. *Fruit* a capsule, rarely a berry. *Embryo* straight or curved, albuminous. *Herbs*, very rarely shrubs or trees. *Leaves* opposite alternate, or whorled, simple.

Sub-order RHINANTHIDEÆ.

Corolla imbricate in æstivation, the two lateral lobes, or one of them, placed outside all the others, the posterior never. *Inflorescence* usually indefinite.

GERARDIÆ.

Leaves all or the lower only opposite. *Inflorescence* centripetal, racemose. *Stamens* approximate in pairs. *Anthers* 2-celled, cells often spurred, equal, or one empty.

CENTRANTHERA, R. Brown.

- C. HISPIDA, R. Br. (K.). Kamorta.
 C. BRUNNONIANA, Wall. (M.).

BUCHNERIÆ.

Leaves all or the lower only opposite. *Inflorescence* centripetal, racemose. *Stamens* approximate, in pairs. *Anthers* dimidiate, 1-celled.

STRIGA, Linnaeus.

- S. HIRSUTA, Bth. (K.). Kamorta.
 With yellow flowers.

SIBTHORPIÆ.

Leaves alternate or fascicled, with the flowers at the nodes, rarely opposite, not connate. *Floral leaves* similar or upper smaller. *Flowers* rarely cymose.

SCOPARIA, Linnaeus.

- S. DULCIS, L. (M.). Kamorta and Katchall (K.).

Sub-order ANTIRRHINIDEÆ.

Corolla imbricate in æstivation, bilabiate, the posterior or upper lip placed outside the lower. *Inflorescence* completely indefinite or mixed.

GRATIOLIÆ.

Corolla tubular, not saccate, nor spurred. *Capsule* 2-valved, rarely indehiscent. *Inflorescence* centripetal, uniform (composite in *Manulea*). *Calyx-lobes* imbricate.

BONNAYA, *Link and Otto.*

- B. VERONICIFOLIA, Spreng. (M.).
 B. VERBENEFOLIA, Spreng. (M.).
 B. TENUIFOLIA, Spreng. (M.).
 B. PARVIFLORA, Benth. (M.).
 B. BRACHIATA. (P.).

DOPATRIUM, *Ham.*

- D. JUNCEUM. (P.).

HERPESTIS, *Gaertner, f.*

- H. MONNICRIA, Kth. (M.).
H. procumbens, Spreng.

LIMNOPHILA, *R. Brown.*

- L. HIRSA, Bth. Kamorta (K.).
 var. *scaberrima*.

TORENIA, *Linnaeus.*

- T. CORDIFOLIA, Roxb. Maulmain (P.). Kamorta (K.).
 T. ASIATICA. Maulmain (P.).
 T. FLAVA. Maulmain (P.).

VANDELLIA, *Linnaeus.*

- V. SCABRA. (P.).
 V. CRUSTACEA. (P.).

LINDENBERGIA, *Lhm.*

- L. MACROSTACHYA. Zwa-ka-bin (P.).
 L. URTICIFOLIA.

ERINUS.

- E. BILABIATUS. (P.).

CHELONIEÆ.

Corolla tubular, not saccate nor spurred. Capsule 2-4-valved, rarely an indehiscent berry. Inflorescence composite. Calyx imbricate.

PENSTEMON, *Michaux.*

- P. LEVICAUDATUM, Mich. (M.).

RUSSELLIA, *Jacq.*

- R. FLORIBUNDA, Kth. (M.).
 R. JUNCEA, Zuc. (M.).

ANTIRRHINEÆ.

Corolla tubular, often saccate, or spurred. Capsule dehiscing by pores. Leaves, lower or all, opposite or whorled. Inflorescence centripetal, uniform.

LINARIA, *Tournef.*

- L. RAMOSISSIMA, Wall (M.).

This Order (*Scrophularineæ*) yields few useful products. It embraces some familiar flowers and plants, ornamental to our gardens, or once held in repute for their medicinal properties, as *Calceolaria*, Snapdragon (*Antirrhinum*), Eye-bright (*Euphrasia officinalis*), from which an eye-water is prepared; Toad-flax (*Linaria vulgaris*), once esteemed in jaundice and skin diseases; and some possessing bitter and febrifuge qualities, as the Indian *Herpestis amana* and *Picrorhiza tecta*. But the most useful in

its medicinal effects is the Fox-glove (*Digitalis purpurea*), which owes its energetic action to the presence of a peculiar bitter principle, *Digitaline*, which possesses the power of lowering the pulse, and is hence of extreme value in certain forms of heart disease.

** *Flowers usually regular.*

SOLANALES.

Corolla monopetalous, hypogynous, regular or oblique. *Stamens* as many as the corolla-lobes, epipetalous, equal or unequal. *Ovary* 2-celled, syncarpous. *Cells* very numerous, and very numerous ovuled. *Leaves* alternate or geminate, rarely opposite exstipulate. Herbs, rarely shrubs or trees.

Order SOLANEÆ.

Flowers regular, or nearly so, hermaphrodite. *Calyx* 5- rarely 5-10-toothed, lobed or cleft, rarely almost entire and truncate, persistent, or rarely circumscissiduous, beyond the base, often enlarging in fruit. *Corolla* from rotate to funnel-shaped, plaitedly 4- (rarely 4-10-)lobed or cleft, imbricate or twisted in bud. *Stamens* as many as corolla-lobes, and alternating with them. *Filaments* usually very short and connivent, either parallel or more usually tapering upwards, and forming a cone round the style, opening in apical pores or transverse slits, rarely dehiscing along their whole length, usually without any prominent connective between the cells. *Ovary* entire (or rarely consisting of 2-30 distinct carpels), 1-6-celled, each cell with 1 or many ovules. *Style* and *stigma* simple, or with as many lobes as there are ovary-cells. *Fruit* either a drupe with a 1-6-celled putamen (or rarely the drupes distinct with a 2-celled and 2-seeded putamen), or more usually a pulpy berry or a septically opening, 2-valved or at the summit circumscissid-opening capsule. *Seeds* compressed. *Albumen* copious fleshy. *Embryo* curved to spiral, rarely straight, with half cylindrical cotyledons, the radicle terete. Herbs, shrubs, or rarely soft-wooded trees with alternate simple lobed or pinnate leaves. *Stipules* none. *Flowers* solitary or in centrifugal cymes or unilateral racemes usually at first terminal, but becoming lateral from the elongation of the shoot, rarely axillary. *Bracts* and bractlets usually none.

SOLANIEÆ.

Berry 2- or more seeded, placentation central. Rarely a capsule without valves.

* *Fruit a berry.*

‡ *Fruiting calyx enlarged or not, supporting the berry.*

+ *Ovules and seeds very numerous.*

SOLANUM, *Linnaus.*

Anthers opening by apical pores.

× *Corolla more or less pubescent or tomentose outside.*

‡ *Glabrous or only very thinly sprinkled with minute stellate hairs.*

S. TRILOBATUM, L.

Tree forests of Arakan and Pegu.

The 3-lobed nightshade.

Scandent under shrub, armed with recurved prickles, leaves slightly lobed. Berries the size of a pea, edible, though rather bitter.

‡‡ *All parts more or less densely stellate-tomentose.*

+ *Flowers in a true cyme.*

S. TORVUM, Swartz.

All over Burma and introduced into the Andamans.

Prickly, leaves more or less lobed, pubescent.

S. VERBASCIFOLIUM, L.

All over Burma.

Unarmed. Leaves entire, thickly tomentose. Berries edible.

++ *Flowers in a raceme, often much reduced, rarely solitary.*

† *Berries free, not inclosed, but only supported by the calyx.*

*S. FEROX, L. Pegu Range and Tenasserim, and introduced into the
Hsyn-ka-de (Kurz). Andamans. Cultivated by the Karens.

Prickly armed, flowers in very short racemes. Berries 1 to 1½ inch thick, globular, hirsute, or puberulous.

var. *Trougam*, Poir.

More thickly stellate-tomentose, the flowers more frequently solitary, berries somewhat larger, losing their hairiness, and becoming glossy and sparingly pubescent.

S. INDICUM, N.E. All over Burma.

Prickly armed, flowers racemose, berries globular, the size of a pea.

× × *Corolla quite glabrous.*

† *Calyx 6-merous.*

S. SPIRALE, Roxb. Ava.

A glabrous shrub, flowers in long racemes, about ¼ of an inch across, leaves entire.

*S. TUBEROSUM, L. (M.). Capable of being cultivated in the drier parts of Pegu.
Common Potato.

S. RUBRUM, Willd. (M.).

*S. MELONGENA, L. Cultivated.

Kha-yan. Brinjal. Egg-plant.

This well-known plant produces one of the most esteemed vegetables in the East, of which there are many varieties. It is much improved by careful cultivation, requiring a rich soil and plenty of water. Dr. Mason gives the following vernacular names for different species of *Solanum*: Kha-yan-kyen, Ta-byeh, Neh-pu-kha-yan, Kha-yan-gywôt, Kha-yan-pa-meh.

LYCOPERSICUM, *Tournef.*

*L. ESCULENTUM, Wall. (M.).

Kha-yan-mya-phung. Tomato.

PHYSALIS, *Linnaeus.*

*P. PERUVIANA, L. Cultivated.

Pung-beu.

Cape or Brazil country gooseberry or cherry, so called, apparently on the *lucus a non lucendo* principle, from bearing not the slightest resemblance in look or flavour to either fruit. The fresh fruit is very wholesome, and makes an excellent preserve. The seeds of *P. flexuosa* are used to coagulate milk, for cheese, and a decoction of its leaves as a febrifuge, and similar properties seem to be present in all the species, due to the presence of a bitter principle named *Physaline*, whose flavour may often be detected, when first the fruit is put into the mouth. The plant abundantly repays careful cultivation.

++ *Ovules and seeds solitary in the cells.*

GARDNERIA, *Wallich.*

Anthers almost sessile. *Ovary* 2-celled, the solitary ovules springing laterally from the septum. *Seeds* concave.

G. OVATA, Wall. E.S.S. Ava.

All parts quite glabrous. Flowers rather small, white, or greenish-white, on filiform ½ inch long pedicels minutely 2-bracteolate at the middle, usually by threes on a filiform peduncle, arising from the axils of the leaves. Berries 2-seeded, the size of a pea.

CAPSICUM, *Tournef.*

- * *C. ANNUM*, L. Cultivated.
C. grossum, Willd.
C. frutescens, L.
C. baccatum, L.
C. minimum, MacClet.

The above are a few of the varieties or races which have been educed by cultivation from the wild plant. *C. minimum* is the dwarf variety, known as 'bird's eye Chillies,' but the properties of all are alike, the fiery pungency of the plant attaining its maximum development in a Trinidad variety, appropriately named 'Devil's pepper.' Its uses as a condiment are too well known to require recording, and it is said to form one of the principal ingredients in Perry Davis's 'Pain-killer,' a familiar panacea, wherever the American Baptist missionaries have effected a lodgment.

DATURIEÆ.

Capsule or berry incompletely 4-celled: primary septum bearing a placenta on each side, either on its centre, or near the parietal angle.

SOLANDRA, *Swz.*

- S. GRANDIFLORA*, Swz. (M.).

DATURA, *Linnaus.*

- D. FASTUOSA*, Wall. (M.).
D. METEL, L. (M.).
D. alba, Rumph.

Pa-daing-hpyu. The Thorn-apple.

The thorn-apple is a common weed round villages in India and Burma, and its seeds are used as narcotics by 'Thugs' and other robbers, mixed with curry or sweetmeats. The active principle is an alkali, *Datura*, which is present in both the seeds and leaves. Its use causes dilatation of the pupil and in poisonous quantities delirium, coma and death. After even a dose which does not kill, the patient often takes some days to recover his faculties. The leaves smoked in a pipe, or in the form of a cigar, are a valuable remedy for asthma, but the drug should be discontinued if it produces vertigo.

NICOTIANIÆ.

Capsule 2-celled, septoidally 2-valved.

NICOTIANA, *Tournef.*

- * *N. TABACUM*, L.

Tobacco is a plant of America, but now largely cultivated in Asia. An excellent tobacco is grown in Upper Burma and the Shan states, but care and knowledge are wanted in its growth and manufacture to insure a first-class article, and this is not likely to be, till the industry attracts European attention and capital.

There are few Orders more important to man than this, embracing as it does the potato and tobacco, the food and solace of millions. Equally valuable to millions of Asiatics is the capsicum, whose warm stimulating fruit either fresh or dried is invaluable in the insipid dietary of those whose food is mainly rice. The species of *Solanum* all contain a narcotic alkaloid, and are more or less poisonous when it is present in considerable quantity, as in the 'deadly nightshade.' Tobacco owes its peculiar soothing power to two powerfully poisonous principles, one an uncrystallizable oil, *Nicotine*, the other a concrete volatile oil. The action of either of these substances resembles that of *Digitalis*, producing a general lowering of the vital powers, paralysis and death. The moderate use of tobacco, however, is thought by some authorities to act as a preventive of malarious fever (Waring), and, as is the case with other vegetable poisons, the system becomes habituated to its use, and the unpleasant

results are therefore unknown to the hardened smoker, which are so distressing to the novice. In the potato the tubers are the only edible part of the plant, as the leaves and fruit contain a narcotic alkaloid, *Solanine*. Other species contain powerful alkaloids used in pharmacy. *Atropa belladonna* yields *Atropine*, used in asthma, rheumatism and neuralgia, and also (from its causing dilatation of the pupil) in many diseases of the eye. The same plant yields also another alkaloid, *Belladonnine*. Henbane (*Hyoscyamus niger*) is another valuable plant in medicine, its powers depending on the presence of the alkaloid *Hyoscyamine*; and lastly several species of *Datura* (*D. stramonium*, *D. tatula* and *D. metel*) yield an alkaloid, *Daturine*, and are all extremely efficacious in asthma, and some other complaints.

POLEMONIALES.

Corolla hypogynous, monopetalous, regular. *Stamens* as many as the corolla-lobes, and inserted on the tube. *Filaments* usually exerted. *Ovary* 1- to 5-celled, syncarpous (except *Dichondrea* and *Nolanea*). *Cells* 1- to 2-, very rarely many-ovuled. *Embryo* albuminous. *Leaves* alternate or none, exstipulate. Herbs, rarely shrubby below.

Order BORAGINEÆ.

Flowers usually hermaphrodite, regular, or nearly so. *Calyx* free, 5- (rarely 4- or 6-)cleft or toothed, or rarely irregularly slit. *Corolla* salver-shaped, with a longer or shorter tube, 5- (rarely 4- or 6-)lobed, imbricate or induplicate in bud. *Stamens* as many as corolla-lobes, and alternating with them, or very rarely fewer, inserted in the corolla-tube. *Anthers* 2-celled, dehiscing longitudinally, or rarely with apical pores. *Ovary* superior, entire or 4-lobed, either 4-celled, with a solitary ovule in each cell, or 2-celled and the cells 2-ovuled (in both cases the ovary consists of 2 carpels only), the ovules laterally attached, ascending or pendulous. *Style* terminal or between the lobes. *Fruit* either a drupe, with the endocarp entire, or separating into 2 or 4 pyrenes, or dry, and separating into 4 or rarely 2 nuts. *Albumen* none or scanty. *Embryo* straight, with flat and rather thick or rarely folded cotyledons, the radicle short. Herbs or perennials usually rough, from coarse hairs, or shrubs and trees, which are glabrous, or with a softer investment, with alternating or very rarely opposite leaves, simple, or very rarely deeply lobed. *Flowers* in 1-sided spikes or racemes, circumscissely rolled back when young, and often forked or dichotomous, or rarely in irregularly branched panicles or solitary. *Bracts* and bractlets often wanting.

BORAGINEÆ.

Ovary of two 2-celled or 2-partite carpels. *Style* ventral or basal. *Fruit* 2-4-partite. *Albumen* none.

TRICHODESMA, Brown.

T. INDICUM, Br. (M.).

T. PERFOLIATUM, Wall. (M.).

HELIOTROPIEÆ.

Ovary several-celled. *Style* terminal, simple. *Fruit* dry, entire, or separating into cocci. *Albumen* scanty or none. *Cotyledons* flat.

HELIOTROPICUM, Tournef.

* H. PERUVIANUM, L. (M.).

H. BREVIFOLIUM, Wall. (M.).

EHRETIEÆ.

Ovary undivided. *Style* terminal, 2-lobed. *Fruit* indehiscent, 1-seeded. *Albumen* none. *Cotyledons* flat.

EHRETIA, *Linnaeus*.

Calyx deeply cleft into 5 segments. *Corolla* more or less rotate, with a short tube, imbricate in bud. *Stamens* inserted in the tube. *Anthers* exerted, or rarely almost included. *Ovary* 2-celled, with 2 ovules in each cell, or 4-celled, with solitary ovules. *Fruit* a drupe, the endocarp forming two 2-seeded or four 1-seeded pyrenes.

× *Leaves entire. Pyrenes 4, 1-seeded.*

E. ASPERA, Roxb.

Ava.

Leaves, especially beneath, pubescent.

E. LEVIS, Roxb.

South Andaman.

Leaves glabrous.

Mason gives as the name for *Ehretia*, Yen-yai myouk-myï.

CORDIEE.

Ovary undivided. Style terminal (rarely none), twice forked. Fruit indehiscent, usually fleshy, 4-seeded. Cotyledons longitudinally folded. Albumen none.

CORDIA, *Linnaeus*.

Style twice forked. *Calyx* more or less tubular, forming a cup under the drupe.

* *Leaves beneath and calyx densely tomentose.*

C. FRAGRANTISSIMA, Kz.

Martaban and Upper Tenasserim.

Ka-la-mat (Kurz).

Calyx about 4 lines long. Adult leaves smooth above and white-dotted. *Ovary* with a sessile stigma.

Wood very fragrant (Kurz).

C. POLYGAMA, Roxb.

Martaban up to 2000 feet.

Calyx about $2\frac{1}{2}$ lines long. Leaves above very scabrous, from short hairs, and minutely white-dotted.

** *Leaves glabrous or pubescent beneath. Calyx glabrous or puberulous.*

× *Flowers small, white. Corolla-tube as long as or shorter than the calyx.*

C. MYXA, L.

Chittagong and all over Burma.

Tha-nât, or Toung-tha-nât (Kurz).

Glabrous-leaves without white dots on the upper side. Drupes the size of a cherry, acuminate.

var. *genuina*. Branchlets silvery grey, leaves usually smaller and more repand-crenate, more coriaceous. Berries about $\frac{1}{2}$ to 1 inch in diameter.

var. *brunnea*, Kz. Branchlets brown, the young shoots densely brown-pubescent. Leaves larger, of a more chartaceous texture; especially while young, covered with a soft appressed brown pubescence. Drupe about an inch long.

Wood valueless, save for fuel.

The leaves of a species of *Cordia*, called 'Mhay-â,' are used as envelopes for the common Burmese cheroots, made of chipped tobacco, rolled up into a conical cigar.

C. GRANDIS, Roxb.

Chittagong, Ava, and Pegu.

Tha-nât.

Leaves white-dotted above. Drupe the size of a pea, blunt, with a mucro.

×× *Flowers large and showy, orange or brick-red. Corolla-tube long-exserted.*

C. SUBCORDATA, Lamk. S.

Kamorta and Nankowry.

Corolla-limb nearly an inch in diameter, crumpled. Drupe the size of a cherry, crowned by the calyx-tube.

var. *a* *genuina*, the leaf-buds, inflorescence, and calices minutely tawny-puberulous.

var. *β* *glutinosa*, the same parts quite glabrous and sticky, or rarely the calyx minutely puberulous.

*** *Leaves sharply serrate. Pyrenes two, 2-seeded.*

E. SERRATA, Roxb. *E.T.*

Chittagong and Ava Hills.

Calyx and corolla-lobes very blunt.

RHABDIA, *Martin*.

Calyx 5- (very rarely 6-)parted, the lobes equal or nearly so. *Corolla* bell-shaped with a short tube, the limb 5- (rarely 6-)cleft. *Stamens* 5. *Anthers* oblong, basifixed. *Drupe* with 4 (rarely 6) 1-seeded pyrenes.

R. VIMINEA, Dalz.

All over Burma.

Leaves cuneate-oblong, on a very short pubescent petiole, or almost sessile, $\frac{1}{2}$ to 1 inch long, glabrescent. Flowers reddish-lilac.

TOURNEFORTIA, *Linnaeus*.

T. ARGENTEA, L. (K.).

Katchall. Trice. Track.

T. (TETRANDBA) GLABRA, Miq. (K.).

Katchall. Kamorta.

T. OVATA, Wall. (M.).

Several species of this Order furnish examples of the doctrine of signatures, whereby our ancestors thought they discovered the medicinal powers of plants, from certain marks or signs impressed on them. For example: Lung-wort (*Pulmonaria officinalis*), having white-spotted leaves, was supposed to be an effectual remedy in tubercular disease of the lungs; Viper's bugloss (*Echium vulgare*), having seeds like vipers' heads, was regarded as being an antidote for the bite of vipers; and Gromwell (*Lithospermum officinale*), on account of its hard pearly nucules, was held to be an excellent medicine for dissolving calculus in the bladder.

Order CUSCUTEÆ.

Corolla-lobes 4 or 5. *Stamens* inserted on the corolla-tube, with often as many fimbriate scales below their insertion, included. *Disk* none. *Ovary* 2-celled. *Styles* 2, free or connate. *Ovules* 2, erect in each cell. *Capsule* 2-celled, circumsciss at the base. *Embryo* spiral in copious fleshy albumen. Leafless parasitic filiform twining herbs.

CUSCUTA, *Linnaeus*.

C. SULCATA, Roxb. (M.).

The 'Dodders' or Devil's-guts, as they are forcibly termed in England, are filamentous parasitical plants, often seen in Burma overwhelming hedges with their long yellow thread-like stems. In Europe *C. minor* lives on clover, lucerne, thyme, broom and heath, *C. densiflora* infests flax, whilst *C. major* attacks and drains the juices of nettles, hops and the vine.

Order DICHOONDREÆ.

Corolla-lobes 5, valvate. *Stamens* inserted on the corolla. *Ovary* apocarpous. *Carpels* 2 or 4, 2-ovuled. *Styles* basal. *Ovules* erect. *Utricles* 2, 1-seeded. *Embryo* curved, cotyledons crumpled, in scanty albumen. Small herbs, erect or prostrate.

DICHOONDRA, *Forster*.

D. REPENS, Forst. (M.).

A slender creeping perennial herb, rooting at the nodes, hoary with a minute, often silky, pubescence.

Order CONVULVULACEÆ.

Flowers regular. *Calyx* of 5 sepals much imbricated in bud, rarely 5-toothed or lobed. *Corolla* bell- or funnel-shaped, rarely rotate or salver-shaped, the limb 5-lobed or angular, folded or very rarely imbricate in bud. *Stamens* 5, inserted in the corolla-tube and alternating with the corolla-lobes. *Anthers* versatile or nearly erect, 2-celled, the cells opening lengthwise. *Ovary* free, 2- 3-4-celled, rarely divided into 2-4 distinct carpels, with 1 or 2 erect or ascending ovules in each cell or carpel, or 1-celled with 2 or 4 ovules. *Style* simple, or more or less divided into 2 entire or 2-cleft branches or styles. *Fruit* either a capsule opening in as many or twice as many valves as there are cells and leaving the dissepiments attached to the axis, or opening transversely or irregularly, or an indehiscent berry. *Seeds* erect with a membranous or coriaceous testa. *Albumen* scanty or none. *Cotyledons* usually much folded, rarely straight or wanting. Shrubs or herbs, usually twining or creeping (rarely trees or leafless parasitic twiners) with usually milky juice. The milky juice of most species is strongly purgative. Scammony is derived from *Convolvulus scammonia*, and a similar product comes from *Ipomœa tuberosa*, *Pharbitis cathartica*, *piptostegia* and others. The best sort of jalap is obtained from *Eragonium purga*, and there are many other species, Indian as well as American, the roots of which yield an inferior sort of jalap. The active principle is volatile, hence the powdered drug soon becomes inert. *Convolvulus dissectus* is rich in prussic acid. Edible roots are also produced by species of this Order, and more especially by *Batatas edulis*, the common sweet potato, and *B. jalapa*.

ERYCIBIÆ.

Fruit baccate. *Carpels* connate, into a 1-celled ovary, with a sub-sessile 5-lobed stigma. *Embryo* with distinct cotyledons.

* *Corolla-lobes* 2-cleft. *Stigma* almost sessile.

ERYCIBE, Roxburgh.

Ovary 1-celled, 4-ovuled. *Stigma* large, globose. *Fruit* a berry.

* *Flowers* clustered.

E. GLOMERATA, Wall. E.S. Upper Tenasserim.

Leaves strongly and prominently nerved and veined.

** *Flowers* in cymes, arranged in raceme-like elongate panicles.

× *Leaves* glossy on both sides, not glaucescent.

E. CORIACEA, Wall. E.S.S. Chittagong and Upper Tenasserim.

Leaves very coriaceous, the lateral nerves faint, the transverse venation absent or obscure.

E. PANICULATA, Roxb. E.S.S. Ava. Tenasserim. Kamorta. Car Nicobar.

Leaves thin-coriaceous, the lateral nerves and net-venation thin but conspicuous.

× × *Leaves* opaque, on both sides glaucescent.

E. GLAUDESCENS, Wall. Tree forests of Upper Tenasserim.

Panicle and sepals sparingly silk-hairy, glabrescent.

CONVOLVULIÆ.

Carpels connate. *Style* simple. *Embryo* with distinct cotyledons.

Fruit a capsule, with a thin or hard pericarp, valvately opening, or berry-like, and the pericarp very thin and rupturing irregularly.

+ *Bracts* and branches deciduous, often small.

† *Style* simple, the stigmas capitate to filiform.

‡ *Sepals* not, or but little enlarged in fruit, capsule 2-4-celled.

IPOMÆA, *Linnaeus*.

Ovary-cells 2 or 1-ovuled. *Stigma* globose, or bi-globose. *Capsule* 2-4-valved, rarely operced, or irregularly bursting. Creepers.

* *Flowers* salver-shaped, white, *stamens* exerted.

I. BONANOX, L. All over Burma.

Nweh-ka-sun-a-hpyoo (Kurz).

Seeds glabrous; the 2 outer sepals abruptly subulate.

I. YOMLE, Kz. The Pegu Range.

Seeds velvety-tomentose. Sepals all acute and nearly conform.

** *Corolla* bell- or funnel-shaped.

× *Corolla* rose-coloured.

I. CAMPANULATA, L. Chittagong, the Andamans, and Kamorta.

Branches terete, pubescent, seeds shortly brown-tomentose.

× × *Corolla* white.

I. TURPETHUM, R. Br. All over Burma. Katchall.

Branches 3-cornered and 3-winged. Seeds glabrous.

× × × *Corolla* yellow.

I. XANTHANHA, Kz. Prome, Pegu and Martaban.

U-men (Kurz).

Glabrous, calyx scarious. Seeds softly pilose-fringed.

I. VITIFOLIA, Sw. (P.). Burma. Kamorta, Nankowry and Great Nicobar (K.).

Kya-hin-ka-lac-nweh (Kurz).

Spreadingly yellowish-hairy. Calyx hirsute. Seeds glabrous.

I. PES-CAPRE, Sw. All the Nicobars. Burma.

Pyn-leh-ka-zwōn.

Mason observes, "This large red-purple flowered species is abundant on the sands of the sea-shore."

I. SEPIARIA, Koch. (K). Kar Nicobar.

A form with narrow, almost sagittate and angular leaves.

I. NICOBARICA, Kz. Tree forests of Kamorta.

Flowers rather large, white. Calyx-lobes $3\frac{1}{2}$ -4 lines long, mucronate. Corolla infundibuliform, glabrous, $1\frac{1}{2}$ inch long. Capsules chartaceous, glabrous, with $\frac{3}{4}$ to 1 inch pedicels. Seeds smooth, black. The leaves resemble those of *I. obscura* and *I. denticulata*, but are much larger.

I. DENTICULATA, Choisy (K.). Kamorta. Katchall. Great Nicobar.

I. LINIFOLIA, Bl. (K.). Kamorta.

I. GANGETICA, Voigt. (M.).

I. TRIDENTATA, Roth. (M.).

I. FILIFORMIS, Voigt. (M.).

I. STRAMINEA, Wall. (M.).

I. PILEATA, Roxb. (M.).

I. BARBATA, Choisy (M.).

I. HISPIDA, Voigt. (M.).

I. STRIATA, Pers.

I. OBSCURA, Ker. (M.).

I. DENTATA, Willd. (M.).

I. HEPTAPHYLLA, Voigt. (M.).

I. PES-TIGRIDIS, L. (M.).

I. PETALOIDES, Choisy (M.).

From the mainland of Burma Kurz only enumerates 6 species, to which the above 13 recorded by Mason are additional.

The generic name for *Ipomœa* in the vernacular is U-men.

‡‡ *Sepals all, or 3 of them, much enlarged, and wing-like in fruit. Capsule 1-celled and 1-seeded.*

PORANA, *Linnaeus.*

Ovary 2-celled, the cells 2-ovuled. Style entire or 2-cleft. Stigma capitate.

* *Style 2-cleft. All the 5 sepals enlarged in fruit and stellately spreading. Corolla small.*

P. VOLUBILIS, Burm. (K.).

Tenasserim (probably).

Panicles without floral leaves. Sepals about 2 lines long, oval, blunt. Capsule mucronate, smooth, brown, the size of a small pea. Flowers small, white.

** *Style simple. Only 3 of the sepals fairly enlarged, erect, or erect-spreading. Flowers white.*

P. PANICULATA, Roxb. (K.).

Ava.

Corolla about 2 lines across. Fruiting sepals 1-nerved.

P. SPECTABILIS, Kz. E.S.

Tree forests of Martaban.

Corolla-limb about an inch in diameter. Fruiting sepals 5-nerved at the base, further up 3-nerved.

P. RACEMOSA (M.).

++ *Bracts leafy, enlarged in fruit, conspicuous.*

NEUROPELTIS, *Wallich.*

Corolla deeply 5-lobed. Styles 2. Capsule 4-8-valved, adnate to near the centre of the bract. Scandent shrubs.

N. RACEMOSA, Wall. (K.).

Eastern slopes of Pegu Range and Tenasserim.

All parts glabrous. Leaves elliptical, entire, coriaceous, on a glabrous petiole $\frac{1}{2}$ to 1 inch long. Stamens 5, the filaments inserted, with a villous base, at the sinuses of the lobes. Capsules ovoid-globose, the size of a small pea.

N. OVATA, Wall. (M.).

EVOLVULUS, *Linnaeus.*

E. LINIFOLIUS, L. (K.).

Kamorta.

With white flowers.

E. ALSINOIDES, L. (M.).

CALONYCTION, *Choisy.*

* C. SPECIOSUM, Choisy. (M.).

C. ROXBURGHII, G. Don. (M.).

Nweh-ka-zwōn-hpyu.

BATATAS, *Rumphius.*

* B. EDULIS, Rumph. (M.).

Ka-zwōh.

B. PANICULATA, Choisy (M.).

QUAMOCLIT, *Tournef.*

* Q. PENNATUM, Voigt. (M.).

Myat-leh-mi.

"This beautiful little plant (remarks Mason), which the French call Red jasmine, the English China-creeper, and the botanists *Quamoclit*, or Dwarf bean, is quite naturalized throughout the Province."

BLINKWORTHIA, *Choisy*.

B. LYCROIDES, Choisy (M.).

LEPISTEMON.

L. FLAVE-CENS (M.).

BREWERIA, *Brown*.

B. ROXBURGHII, Choisy (M.).

B. ELEGANS, Choisy (M.).

SKINNERIA, *Choisy*.

S. CÆSPITOSA, Choisy (M.).

HEWITIA, *Wight*.

H. BICOLOR, Wight (M.).

ARGYREIÆ.

Fruit indehiscent, coriaceous, or sub-baccate. Carpels connate. Style simple. Embryo with distinct cotyledons.

** *Corolla-lobes entire or retuse, style longer or shorter, simple or 2-cleft, or the styles distinct.*

× *Fruit an indehiscent berry.*

ARGYREIA, *Loureiro*.

Ovary 4-celled, the cells 1-ovuled. *Stigma* globose, didymous or 2-globose.

A. (IPOMÆA) ZEYLANICA, Gaertn.

Ava and Pegu Range.

O-na-kop-nwch (Kurz).

Braets up to $\frac{1}{2}$ inch long, persistent during flowering. Flowers pink. Seeds glabrous.

var. *populifolia*, all parts nearly glabrous.

var. *hirsuta*, Thw., all parts nearly glabrous.

var. *peduncularis*. Leaves not or barely cordate at the base, more elliptic, the petiole often longer than the blade.

A. TILLEFOLIA, Wight.

All over Burma.

Toung-ka-zun-kyee (Kurz).

Braets small and deciduous. Flowers white or pale purplish. Seeds densely brown-puberulous, hairy round the hilum. A creeper with twisted and buttressed stems, 3 inches thick.

A. CAPITATA (P.).

LETISOMIA, *Roxburgh*.

Ovary 2-celled, the cells 1-ovuled. *Stigmas* 2, linear.

L. CAPITATA, Bth. et H. f.

All over Burma.

All parts tawny-appressed hirsute, the flower-heads spreadingly so. Corolla an inch deep.

L. AGGREGATA, Roxb.

Ava. Tenasserim.

Nweh-ni.

All parts greyish, or whitish tomentose. Corolla about $\frac{1}{2}$ an inch deep.

L. SETOSA, Roxb. (M.).

A large red-flowered creeper, seen during the rainy season, says Mason, on almost every hedge.

Order HYDROLEACEÆ.

Corolla hypogynous, lobes 5, imbricate. *Stamens* inserted on the corolla-tube. *Filaments* slender, exserted. *Disk* none. *Ovary* 1- or 2-celled. *Styles* 2, distinct. *Ovules* many. *Capsule* 2-valved. *Seeds* minute. *Embryo* straight in scanty albumen. Herbs.

HYDROLEA, *Linnaeus*.

H. ZEYLANICA, Vahl. (M.).-

The leaves beaten to a pulp are used for dressing foul ulcers.

GENTIALES.

Corolla mono-, rarely sub-poly-petalous, hypogynous. *Stamens* equalling the corolla-lobes, or fewer, always inserted on the corolla, and usually included in its tube. *Ovary* usually syncarpous, and 2-celled. *Leaves* very rarely alternate or stipulate. Herbs, shrubs or trees.

Order GENTIANEÆ.

Flowers hermaphrodite. *Calyx* persistent, consisting of 4 or 5, rarely more, lobes or segments, much imbricate. *Corolla* usually regular, with 4 or 5 (rarely more) lobes, twisted or otherwise imbricate, or induplicate in bud. *Stamens* usually as many as corolla-lobes and alternate with them, usually inserted in the tube or at the throat of the corolla. *Filaments* usually free. *Anthers* versatile, the cells parallel, opening longitudinally or by terminal pores. *Ovary* 1-celled, but with the 2 parietal placentas projecting into the cavity, so as to partially divide it into 2 or 4 cells, or rarely completely 2-celled, with numerous ovules in each cell. *Style* simple, entire, or with 2 short stigmatic lobes. *Fruit* a capsule opening septically in 2 valves, or rarely indehiscent, or a succulent berry. *Seeds* small. *Albumen* fleshy or horny. *Embryo* small, straight, axile, with short cotyledons. Usually herbs or under shrubs, rarely trees, erect, or climbing, with opposite (very rarely alternate) simple leaves. *Stipules* none. *Flowers* usually in cymes or corymb-like panicles, rarely clustered or solitary.

The tonic properties of several species of *Gentiana* are due to the presence of a peculiar bitter principle, *Gentianine*, in the roots. In India various species of *Ophelia* supply the place of *Gentian*, and are in high esteem under the name of Chiretta. American Calumba root is produced by *Frazeria Walteri*.

FAGLEA, *Thunbergh*.

Calyx 5-parted, the lobes blunt, imbricate. *Corolla* funnel-shaped, the tube cylindrical or widened upwards, the limb 5-cleft (very rarely 6 or 7) the lobes oblique and almost twisted, imbricate in bud. *Stamens* 5, inserted in the tube of the corolla. *Filaments* filiform. *Anthers* incumbent. *Ovary* 1- or 2-celled, with numerous anatropous ovules attached to the thick, almost 2-lobed placentas. *Style* filiform. *Stigma* peltate.

* *Flowers* large, above an inch long, solitary, or by threes or fives in a short peduncled terminal corymb.

× *Corolla-tube* long, exserted above the middle, or at the summit dilated into the limb.

F. CARNOSA, Jack. E.S.

Upper Tenasserim.

All parts glabrous. Leaves entire, with recurved edges, on a compressed petiole, with a short reflexed point, smooth and fleshy. Flower large, dull yellowish-white.

×× *Corolla-tube* short or from the base funnel-shaped, dilated.

F. ATRICULARIA, Jack. E.S.

Tenasserim (probably).

Calyx about an inch long or longer. Leaves thick-coriaceous, the lateral nerves distinct, but thin and immersed on the under surface.

F. OBOVATA, Wall. *E.T.* Tree forests all over Burma.

Nyoung-kyap (Kurz).

Calyx only about $\frac{1}{2}$ an inch long. The nerves beneath the leaves not or barely visible.

** *Flowers small, up to an inch long or somewhat longer. Erect trees.*

F. RACEMOSA, Jack. *E.T.* Andamans. Kamorta and Great Nicobar.

Flowers clustered, or in small cymes, forming a terminal peduncled raceme. Leaves penninerved.

F. FRAGRANS, Roxb. *E.T.* Tenasserim.

A-nān.

Flowers in terminal or axillary, long-peduncled, many-flowered, corymbs. Nerves of leaves beneath very obsolete and immersed. Berries ovoid, reddish, the size of a pea.

Wood yellow or light brown, white-streaked, very strong and tough. Said to be imperishable if exposed to water, and unassailed by *Teredo* (Kurz).

F. CRASSIFOLIA, Wall. (M.).

F. GLOBOSA, L. (M.).

GELSEMIUM, *Jussieu.*

Calyx 5-parted, imbricate in bud. *Corolla* funnel-shaped, the limb 5-lobed, imbricate. *Stamens* 5, adnate to the base of the corolla. *Anthers* 2-celled, the connective terminating in a mucro. *Ovary* 2-celled, very shortly stalked, with numerous amphitropous 2-seriate ovules along the ventral placentas. *Style* filiform. *Stigmas* 2, 2-cleft. Scandent shrubs with opposite leaves.

G. ELEGANS, Bth. *E.S.S.* Khakycen Hills.

All parts glabrous. Calyx minutely pubescent.

EXÆCUM, *Linnaeus.*

E. PTERANTHUM, Wall. (M.).

CAUSCORA, *Lam.*

C. PARISHII, Hook. f. (P.).

C. DIFFUSA, Brown (P.).

C. SCHULTESII, Wall. (M.).

Mason refers the *chirata* to *Agathodes chirayta*, but says he has never seen the plant growing, whilst Hooker indicates several species of *Ophelia* as furnishing the drug.

GENTIANA, *Tournef.*

G. CRASSA, Kurz. Martaban.

G. NUDICAULIS, Kurz. Martaban.

PHYLLOCYCLUS, *Kurz.*¹

Calyx campanulate, inflated. *Corolla* sub-regular, with imbricated lobes, often basally bimaculate. *Stamens* 4, the lower pair longer, exerted, fertile and covered with red pollen; the upper pair shorter, sub-enclosed, infertile. *Ovary* 1-celled. *Style* deciduous. *Stigma* bilobed. *Capsule* 1-celled, bivalved. *Seeds* numerous, minute, immersed in spongy placentas.

P. (CAUSCORA) HELPERIANA, Wall. MS. Tenasserim.

P. (CAUSCORA) PARISHII, Hook.

¹ Kurz remarks: "Genus *Causcora* inter alia differt: Corollæ lobis 2 inferiores approximati a medio tali modo replicati, ut plicis arete approximatis, quasi lobum singulum mentient, indeque corollam primâ facie 3-lobum immittent. Stamina 4, quorum unum tantum fertile, et multo longius in plicâ loborum inferiorum receptum, cætera, multo minora effecta sunt."—J. A. S. B. ii. 1873, p. 236.

Order ASCLEPIADEÆ.

Flowers regular, hermaphrodite. *Calyx* free, deeply 5-parted, or the sepals distinct, often glandular at the base inside, imbricate in bud. *Corolla-limb* 5-toothed or lobed, twisted-imbricate or valvate in bud, the throat with or without scales or appendages alternating with the lobes. *Stamens* 5, inserted at or near the base of the corolla. *Filaments* short, connate or rarely free. *Anthers* united in a tube (called gynostegium) inclosing the style, 2- or by division of the cells more or less completely 4-celled, the cells opening inwards, the connective terminating in a short appendage, or more frequently in an inflexed membrane. *Staminal corona* consisting of variously shaped glandular, membranous, or fleshy appendages, attached to the back of the filaments, or the anthers sometimes united in a ring or cup, very rarely wanting. *Pollen* consolidated into 1 or 2 masses in each anther-cell, attached in the opened anther in pairs, or in fours (1 or 2 from each of the adjoining anthers) to small processes of the stigma, between the anthers, and ultimately detached from the stigma. *Ovary* of 2 distinct carpels, each with numerous, or at least several, ovules attached to the inner angle. *Styles* united immediately above the carpels, and thickened with the anther-tube into an angular body (the so-called stigma), the apex in the centre, either truncate or more or less conical, or elongate and beak-like, entire or 2-lobed. *Follicles* paired, or solitary by abortion. *Seeds* usually pendulous, compressed, often marginate with a long silky tuft of hairs at the hilum, the testa smooth or rough. *Albumen* scanty. *Embryo* straight, with leafy cotyledons, the radicle short and superior. Under shrubs or shrubs often twining or scandent, rarely herbs or trees, usually abounding in milky juice. *Leaves* simple, usually opposite. *Stipules* none or obsolete. *Flowers* often small, in racemes or cymes often reduced to umbels, axillary or lateral from between the opposite petioles. *Bracts* small. *Bractlets* none or very minute.

Sub-order STAPELEÆ.

Filaments connate. *Anthers* usually terminated by a simple membrane. *Pollinia* 10, ascending or erect, fixed in pairs to the stigmatic process. Twining plants or fleshy herbs.

CEROPEGIÆ.

† *Pollen-masses pellucid at the lip or side.*

HOYA, *R. Brown.*

- | | |
|-----------------------------|--------------------|
| H. HOOKERI, Wight. (K.). | Kamorta. Katchall. |
| H. CARNOSA, Br. (M.). | |
| H. PARVIFLORA, Wight. (M.). | |
| H. ORBICULATA, Wall. (M.). | |
| H. LACUNA, Buch. (M.). | |

DISCHIDIA, *R. Brown.*

- | | |
|------------------------------|-----------------------------------|
| D. BENGALENSIS, Coleb. (K.). | Kamorta. Katchall on cocoa palms. |
| D. NUMMULARIA, R. Br. (K.). | Kamorta. Katchall. |
| D. CUNEIFOLIA, R. Br. (M.). | |

CEROPEGIA, *Linnaeus.*

- C. LUCIDA, Wall. (M.).
 C. ARNOTTIANA, Wight. (M.).
 U-ta-lung.

CARALLUMA, *R. Brown.*

- C. FIMBRIATA, Wall. (M.).

BOXCEROSIA, *Wight and Arnott.*

- B. CRENULATA, Wight (M.).

WATTAKARA.

W. VIRIDIFLORA, Haask. (K.).

Nicobars.

BIDARIA, *Endlicher*.

B. sp. (K.).

Great Nicobar.

"Much resembles *B. tingens*, Dene., but has the leaves much larger and the pods 6-8 inches long, and narrowed into a stalk" (Kurz).

PERGULARIÆ.

†† *Pollen-masses opaque at both ends.*

SARCOLOBUS.

S. GLOBOSUS, Wall. (K.).

Great Nicobar.

S. CARINATUS, Wall. (M.).

GYMNEA, *R. Brown*.

Corolla very small, nearly rotate, with scales between the lobes. *Staminal crown* none, or reduced to 5, scarcely prominent glands, at the base of the gynostegium.

G. ACUMINATUM, Wall. *E.W.C.*

Chittagong and Upper Tenasserim.

Calyx 5-parted, the lobes erect. Anthers terminating in a membrane. Bark spongy, deeply cracked. Leaves chartaceous, glabrous, except along the puberulous nerves, and petioles puberulous.

G. MOLLE, Wall. (M.).

G. TINGENS, Spreng. (M.).

G. LATIFOLIUM, Spreng. (M.).

††† *Pollen-masses horizontal or erect.*MARSDENIA, *R. Brown*.

Corolla without appendages between the lobes. *Staminal crown* of 5 segments, adnate to the base with a short, erect, free or adnate point. *Calyx* 5-parted. *Anthers* terminating in a membrane.

M. TINCTORIA, R. Br. *E.W.C.*

Prome.

Adult parts all glabrous. *Corolla* glabrous, densely bearded at the throat.

M. TENACISSIMA, Wight et Arn.

Chittagong. Ava.

All softer parts more or less tomentose. *Corolla* pubescent, not bearded.

PERGULARIA, *Linnaus*.

Characters of *Marsdenia*, but segments of the staminal crown, with a compressed appendage inside at the top.

* P. ODORATISSIMA, L. (K.).

Ava and elsewhere in gardens.

Cowslip creeper.

Corolla tube 3.5-4 lines long, villous within, the lobes 2 lines long.

P. PALLIDA, W. A. (K.).

Ava.

Corolla-tube 1-1.5 lines long, quite glabrous within, the lobes linear, usually nearly twice the length of the tube.

TYLOPHOGA, *R. Brown*.

T. VOMITORIA, Voigt. (M.).

Sub-order EUASCLEPIADEÆ.

Filaments coherent. *Anthers* 2-celled. *Pollen-masses* 10, fixed in pairs to the prominence of the stigma, separated by a longitudinal furrow.

ASCLEPIADIEÆ.

Throat of *corolla* naked. *Staminal crown* of 5 segments. *Segments* concave or hooded, inserted at the base, rarely at the top of the gynostegium, with often a ligulate appendage on the inner face, or thickened in the middle, and then toothed at the side.

ASCLEPIAS, *Linnaeus*.

- * A. CURASSAVICA, L. (M.). Cultivated.
American wild Ipecacuanha.

SARCOSTEMMIEÆ.

Throat of *corolla* naked. *Staminal crown* usually double, outer short, inner of 5 segments, fleshy, ligulate or tumid.

× × *Pollen-masses* 2 to each anther.

† *Pollen-masses* pendulous.

CALOTROPIS, *R. Brown*.

Staminal crown double, the outer one shortly wavy-lobed, the inner one of 5 linear-oblong lobes. *Corolla* almost bell-shaped, angular, the limb 5-cleft.

- C. GIGANTEA, R. Br. Pegu and Upper Tenasserim. Also cultivated.
Ma-yo (*Mudar*, Hind.).

Flowers about an inch or more in diameter, *staminal crown* as long as the *corolla*-lobes.

Yields the 'Mudar' root. The fibre is strong and the charcoal excellent for gunpowder. The bark of the roots is a good substitute for Ipecacuanha. "The bark¹ of the root of this plant is the best and most useful part for medicinal purposes, and it should be selected from the oldest plant, because the older it is, the more active is its bark. If the bark be powdered by simply drying it, as is generally done, it requires to be used in much larger doses, to produce its proper effects. The thick rough and spongy epidermis which it is covered with, and which is quite inert, should be scraped off with a knife before it is powdered. The powder prepared with this precaution is white, and bears a great resemblance to the flower of rice, has an acrid and nauseous smell and bitterish taste." The dose of this powder is from 40 to 50 grains, and it is an excellent substitute for Ipecacuanha, especially in dysentery, combined with tincture of opium.

- C. PROCERA, R. Br. All over Ava and Prome.
Ma-yo.

Flowers a third smaller than the last. *Staminal crown* much shorter than the *corolla*-lobes.

- C. WALLICHII, Wight (M.).
C. HETEROPHYLLA, Wall. (M.).

OXYSTEMMA, *R. Brown*.

- O. WALLICHII, Wight (M.).
O. ESCULENTUM (P.).

RAPHISTEMMA, *Wallich*.

- R. PULCHELLUM, Wall. (P.).

CYNOCYTONIEÆ.

Throat of *corolla* naked. *Staminal crown* simple, cup-shaped or tubular. *Mouth* sub-entire or lobed.

¹ Dr. Moodeen Sheriff's Report, Madras Monthly Journal of Medical Science, 1870, p. 121.

CYNOCOTYLM, *Decaisne.*

C. WALLICHII, Denc. (K.). Kamorta.

HOLOSTYLLA, *R. Brown.*

H. FRAGRANS, Wall. (M.).

Sub-order SECAMONEÆ.

* *Filaments wholly connate. Pollen-masses smooth. Corolla-lobes usually twisted-imbriate.*× *Pollen-masses 4 to each anther.*TOXOCARPUS, *Wight et Arnott.**Staminal crown* of 5 scales at the back of the anthers with internal appendages. *Calyx* 5-parted. *Corolla* rotate with a very short tube, 5-cleft. *Pollen-grains* 20, very small. Climbers.

T. LAURIFOLIUS, Wight. E.S. Tree forests of the Pegu Range.

All parts glabrous, the branches corky-tubercled.

** *Filaments upwards or entirely free. Pollen-masses granular.*× *Corolla without a corona. Anthers terminated by a thick oblong bearded appendage. Woody climbers.*PENTANURA, *Blume.**Calyx* small 5-cleft, 5-glandular at the base inside. *Corolla* rotate or campanulate, deeply 5-cleft, naked at the throat. *Stamens* attached to the base of the corolla.

P. KHASIANA, Kz. Ava Hills.

Leaves lanceolate, acute at the base on a slender petiole up to $\frac{1}{3}$ inch long, coriaceous, glabrous when adult.× × *Corolla with a corona of free or connate scales, variously inserted.*FINLAYSONIA, *Wallich.**Corolla* rotate; at the throat 5-callous, the callosities terminating in an erect filiform appendage, curved at the apex. *Pollen-masses* 4.

F. OBOVATA, Wall. E.W.C. Tree forests of Pegu and Tenasserim.

All parts glabrous. Leaves opposite, acuminate at the base, on a petiole $\frac{1}{2}$ to 1 inch long, entire, fleshy-coriaceous. Flowers small, pale-coloured, fœtid.STREPTOCALON, *Wight et Arnott.**Corolla* rotate, with 5 blunt scales in the throat. *Pollen-mass* 1.

S. TOMENTOSUM, Wight. E.W.C. From Ava to Tavoy.

All soft parts tomentose. Follicles smooth. Leaves rounded at the narrowed base, on a puberulous petiole $\frac{1}{3}$ to $\frac{1}{2}$ inch long.

S. EXTENSUM, Wight. All over Burma.

Glabrous or pubescent; follicles with numerous longitudinal membranous wings.

var. *genuina*. Leaves puberulous, especially beneath.var. *paniculata*, Griff. Leaves glabrous or nearly so.CRYPTOLEPIS, *R. Brown.**Corolla* almost funnel-shaped to rotate, with 5 membranous scales, adhering to the anthers, in the swollen middle part of the tube.

C. BUCHANANI, Roem. et Schult. W.C. Ava and Tharawaddy.

Calyx turbinate, 5-cleft, with 5 crenulate glands within. *Stamens* 5. All parts glabrous, leaves on a slender petiole 3-4 lines long.

HEMIDESMUS, *R. Brown.*

II. WALLICHII, Wight (M.).

MYRIOPTERON, *Griffith.*

M. PANICULATUM, Griff. (M.).

This Order is not a very useful one to man. Most species abound in an acrid, milky juice sufficiently virulent in some species to be used for poisoning arrows, hence the names Wolf's-bane, Dog's-bane. In *Gynemna lactiferum*, however, or the Ceylon Cow-plant, the juice is innocuous and potable. Some species of the Order are purgative and emetic; but the most important medicinally is *Hemidesmus Indicus*, the root of which forms an esteemed substitute for sarsaparilla. Some species yield a good caoutchouc. *Marsdenia tinctoria* yields a blue dye, and several species of *Marsdenia*, *Orthanthera*, and *Calotropis* yield excellent fibre. The powdered bark of the root of *Calotropis gigantea* is an excellent substitute for ipecacuanha, and is so used in the Bengal Pharmacopœia. The milk and other parts of the plant are also esteemed for skin complaints and leprosy, and in early stages of that complaint have been considered beneficial (Waring). No more effectual remedy, however, for this dread disease appears to have been hit upon, than the one sometimes adopted in India when the leper gets himself bitten by a cobra, a plan which never fails to arrest the disease—so unamenable to less heroic treatment.

It is from a plant of this Order, *Sarcostemma acidum* or *riminale*, that the celebrated Soma juice, so lauded in the Vedas, was extracted according to some writers, though it is by no means clear if the original Vedic plant is now known, and the use of other plants in lieu thereof is now sanctioned in India, one of them being *Casalpinia bonduc*. Of the 'Soma' De Gubernatis remarks: "Soma enivre réellement les dieux au ciel, en renouvelant sans fin le triomphe de la lumière; le sacrifice terrestre du soma n'est qu'une pâle, naïve et grotesque reproduction de ce miracle divin; de même qu'on Grèce, au lieu de statues, on offrait à Héraclès de petits Héraclès de pâte, de même aussi peu-être, dans les temps védiques et postérieurs, en chantant les louanges du soma divin, on présentait aux dieux pour la forme quelque breuvage économique, que personne ne buvait, non pas seulement parce qu'il était réservé aux immortels, mais très-probablement aussi parce qu'aucun mortel n'en aurait voulu. Dans l'histoire des sacrifices, on trouverait un grand nombre de substitutions de cet genre."—*Mythologie des Plantes*, vol. ii. p. 351.

Without, however, attaching much importance to modern identifications of the Vedic 'Soma' plant, the high esteem in which, for symbolical or other reasons, it was held, is a curious and undoubted fact; and yet in those remote days, some three centuries before the birth of Christ, there were not wanting acute minds, which pierced deeper into the mystery of being than the vulgar herd of mankind has ever done, or probably aspired to do, and in the Mahabharata the 'soma' sacrifice is spoken of as suited rather to man's spiritual ignorance than as essentially worthy of respect. As a splendid exposition of a noble pantheism which will cause many a chord to vibrate responsively even in the Christian breast, the passage here quoted, wherein the 'soma' is alluded to, is probably unsurpassed. It is addressed as a doctrinal exposition of Divine truth by Krishna to Arjun:

"I, whose form no eye beholdeth, I stretched out this mighty whole;
 In me live and move all creatures, of all life the living soul.
 Through my care live birds, beasts, fishes, through my care are rocks and trees.
 All this changeful world of being still revolveth as I please.
 But the sons of darkness scorn me, wearing thus a human frame,
 Blind with idle pride of knowledge, swoll'n with idle lust of fame.
 I pour forth the gladdening sunshine, I withhold and give the rain,
 I am that which is, and is not, I am nectar, I am bane.
 Those who reverence the three Vedas and who pour the Soma wine,
 By me led to Indra's heaven, drink their fill of joys divine,
 But when spent their stock of merit, down they fall again to earth,
 This the fate of Veda lovers, ceaseless death and ceaseless birth.

But whoe'er with mind enlightened plants his faith on me alone,
 Firm, all other gods rejecting, him I cherish as my own.
 Blind are those who in my essence all the Godhead fail to see;
 Worshipping the Host of Heaven, yet they only worship ME.
 For ME only smoke their altars, unto ME their knees they bend;
 But by unbelief distracted, to the lower worlds descend.
 Those who seek to ME for refuge, though conceived and born in sin,
 Base mechanics, slaves, and women find a home my arms within."

(Tawney's translation.)

The mixture in some other passages, too, of Pantheistic, and what may be almost designated as Christian ideas is curious in the extreme, and may be briefly glanced at, as showing how little our actual knowledge of the deepest problems which can occupy the mind of man has advanced in three thousand years. I will quote but two passages of this splendid poem, which convincingly show that the Pantheism of Vayása (author of the Mahábhárata) by no means excluded the Messianic idea of an incarnate Saviour, and was not opposed to an estimate of Faith, as a religious duty, sufficiently exalted to please a modern evangelical, whilst inculcating at the same time the value of good works in a manner which some of our modern evangelicals might ponder with advantage. Who, when reading the first passage now given, can help reflecting on the words of another, "Verily, before all worlds, I am"?

Krishna speaks:

"Many births hast thou beheld here, many too have been my lot;
 All are from thy memory faded, I alone have not forgot.
 Though unborn, and never dying, though Almighty Lord of all,
 By my mystic power engendered, I descend at Duty's call.
 Oft as justice is in danger, and the wicked rule the earth,
 I forsake my lofty station, and in human form take birth.
 Wreak on evil-doers vengeance, rescue the down-trodden saint.
 Thus from age to age appear I, virtue to preserve from taint.
*He who knows my birth and working sets himself for ever free
 From the bonds of Transmigration, and dwells undisturbed in Me."*

Surely if we can divest ourselves of the prejudice inculcated from our infancy in favour of a personal immortality, which, by the way, is for the majority of Adam's children to be one of misery, we must admit that the longing for incorporation with Deity which prompted the above lines, is a noble and elevating one!

The second passage is equally interesting, as instancing what may be regarded as a Law, the necessity which all religious teachers lie under of advocating as the first of all virtues—Faith in the doctrine taught. For this the philosopher will make due allowance. Vayása, however, did not relegate good works to that low and ignoble position to which they are consigned by some Evangelicals. Says Krishna:

"Neither in this world nor yonder can such Hero ever fail.
 None that doeth righteous actions ever sees the realm of bale.
 He shall dwell for countless ages in the blissful worlds on high,
 But, through want of true Devotion, must again be born and die.
 In some family of Bráhmans, or of kings appears on earth,
 Or perchance of holy hermits (hard to win that glorious birth).
 With such virtues as he ended, he begins once more the race,
 Towards the goal of high perfection, setting resolute his face.
 For the night of former habits speeds him onward like the wind,
 Leaving slavish text-adorers, letter-worshippers behind.
 So through many births aspiring, purified at length from sin,
 He attains the wished-for mansion, and in peace doth enter in.
 Penance yields to high devotion. Better be devout than wise.
 Better such than virtuous action, then, do thou devotion prize.
 First of devotees I hold him who doth choose the better part,
 And in humble Faith adoring, clings to ME with perfect heart."

Order APOCYNÆE.

Flowers regular, hermaphrodite. *Calyx* free, 5-parted, or the sepals distinct, imbricate in bud, bearing occasionally small glands or scales inside at the base. *Corolla-lobes* 5, spreading, twisted imbricate, or rarely valvate in bud, the throat sometimes closed with a corona of scales, and often hairy. *Stamens* 5, inserted in the tube and alternating with the corolla-lobes. *Anthers* erect, turned inwards, 2-celled, the cells opening by longitudinal slits, either free and included in the usually swollen part of the corolla-tube, or sometimes exerted and connate, or connivent in a cone or ring round the style. *Pollen* not collected in masses, but the auricles at the base of the anthers, or the tips occasionally without pollen. *Ovary* 2-celled, with axile placentas, or more, usually the 2 carpels distinct, and with parietal placentas, the cells or carpels with few to numerous ovules, in 2 or more rows, attached to the placentas. *Styles* 1 or 2, distinct at the base, but united upwards. *Stigma* usually thickened, mitre-like, membranous or bulbous at the base, terminating in a short entire or 2-cleft point. *Fruit* either a single drupe or berry, or more frequently each or 1 of the carpels forms a follicle, opening along the inner edge. *Seeds* pendulous, or rarely ascending, or peltately attached, usually albuminous, often bearing a tuft of hairs at one or both ends. *Embryo* straight, with flat or rarely convolute cotyledons. Trees or shrubs, often climbing, rarely alternate, simple, with or without gland-like small interpetiolar stipules. *Flowers* usually cymose or cymose-panicled, axillary or terminal. *Bracts* usually very small, rarely larger and coloured, deciduous. *Bractlets* usually none.

Series I. GYMNOSPERMÆ.

Seeds naked, *i.e.* without a deciduous tuft of hairs at their extremities, sometimes persistently hairy-fringed all round, more so at the extremities. *Anthers* free.

* *Corolla valvate in bud.*

STRYCHNIEÆ.

Ovary entire, 2-celled, with axile placentas.

STRYCHNOS, *Linnaeus*.

Corolla-throat naked or bearded. *Berry* corticate or sappy, the seeds imbedded in pulp. *Albumen* horny. Trees or scandent shrubs.

* *Erect trees, without tendrils.*

× *Corolla glabrous at the throat, the tube long.*

S. *NUX-VOMICA*, L.

All over Burma up to 2000 feet.

Kha-boung. (Kuchla in India.)

Corymbs peduncled, terminal or terminating axillary shoots; berries the size of an orange or smaller, many-seeded, the pericarp thick and corky.

The strychnos-tree is about the size of an apple-tree, and the fruit, which has a hard rind, closely resembles an orange in appearance. On breaking into it, the round flat seeds are seen imbedded in an orange pulp, which, though somewhat bitter, is edible, and is largely consumed by hornbills, whence, in India, these birds are named Kuchla-kai, or 'strychnos-eaters.'

×× *Corolla villous at the throat.*

S. *POTATORUM*, L.

Panicle very short, axillary. Corolla-tube about 2 lines long. Berries 1-seeded, the pericarp coriaceous.

The seeds are used to clarify water. A seed is rubbed over the inside of an earthen water-pot, whose rough surface abrades the albuminous fleshy body of the seed. On water being now agitated in the pot, the albumen becomes dissolved, and on standing forms a flocculent deposit, which carries down with it any floating impurities, and the clear water can then be decanted. A little alum is, however, more commonly used for clarifying purposes.

The powdered *testa* of the seeds is, according to Dr. Moodeen Sheriff,¹ the best vegetable emetic in India, and a good substitute for *Ipecacuanha* in dysentery. The dose is grs x to xx, with one or two grains of opium to form a pill, to be given every three, four, or six hours.

S. WALLICHIANA, Stend. Khaboung stream of the Pegu range (so named from the *Khaboung* or strychnos-tree).

Panicle brachiate, large, terminal. Corolla-tube 4-5 lines long.

** *Scandent shrubs with woody, 2-cleft hook tendrils.*

S. LACRINA, Wall. Tenasserim.

Corolla-tube 1½ line long, bearded at the throat. Berry oblong, 1-seeded, the pericarp membranous.

S. ACUMINATA, Wall. *E.T.* Coasts of the Andamans, Tenasserim and Nankowry.

Corolla consisting of 5 free glabrous petals. Berry globular, 1- (or 2-?)seeded, the pericarp coriaceous.

Kurz describes the wood of *S. nur-vomica* as close-grained and hard, and fit for fancy cabinet work, and 52 lbs. in weight. Brandis says much the same. But my experience is that the wood is coarse and inferior. *S. potatorum* is described as durable and taking a beautiful polish.

The species of *Strychnos* contain in the bark of the root and the seeds 2 alkaloids, *Strychnine* and *Brucine*, which are powerful poisons, inducing tetanus and death by asphyxia, through the rigidity which ensues of the muscles of the chest. These alkaloids are the active ingredient in the 'curare' or arrow-poison of the aborigines of South America. The use of Strychnine to destroy domestic or other animals should be discouraged as needlessly brutal, from the shocking tetanic spasms induced, a ball through the brain, or a charge of shot, if the animal is small, being much more humane. Where recourse to firearms cannot be had, a little hydrocyanic acid poured down the throat is instantly and painlessly fatal. Very young animals, like kittens, are most humanely and easily destroyed by dashing with some force on the earth, the shock causing instant death.

MITREOLA, *Linnaeus.*

M. ODENLALANDIODES, Wall. (M.).

MITRAGYNE, *Korth.*

M. CAPILLARIS, Wall. (P.).

** *Corolla twisted-imbricate in bud.*

CARISSIÆ.

Ovary entire, 2-1-celled, with axile or parietal placentas.

* *Ovary 1-celled, with 2 parietal placentas.*

× *Fruit an indehiscent drupe or berry.*

WILLUGHBEIA, *Roxburgh.*

As preceding, but seeds without albumen. Scandent shrubs.

W. EDLIS, Roxb. *E.S.S.* Chittagong. Burma (P.).

Inflorescence shortly peduncled. Berry ovate, smooth. Yields an inferior caoutchouc.

W. MARTABANICA, Wall. Upper Tenasserim.

Flower clusters sessile or nearly so. Berry globular, wrinkled.

¹ Madras Monthly Journal of Medical Science, 1870, p. 121.

× × *Fruit a dehiscent capsule.*

ALLAMANDA, *Linnaeus.*

Corolla-throat with scales, the anthers included in the tube. *Albumen* scanty. Erect shrubs, with showy 5-merous flowers.

** *Ovary 2-celled, with axile placentas.*

* A. CATHARTICA, L.

Cultivated all over Burma.

Pha-young-ben.

The leaves are strongly purgative.

× *Corolla-throat furnished with 5 or 10 scales or appendages. Disk none.*

THEVETIA, *Linnaeus.*

Calyx many-glanded inside. *Drupe* unequally 2-celled, not pulpy. Trees or shrubs, with large flowers.

* T. NERIFOLIA, JUSS.

Cultivated about Prome.

Cerbera thevetia, L.

The yellow oleander. An ornamental shrub. The bark is reckoned a febrifuge.

× × *Corolla-throat naked.*

CARISSA, *Linnaeus.*

Corolla salver-shaped, hairy within. *Style* short or filiform. *Ovary-cells* 1-4, rarely many-ovuled, the ovules in 2 rows. *Berry* 3-1-celled, sappy. *Albumen* fleshy. Shrubs or trees, usually spiny-armed.

* *All parts glabrous.*

* C. CARANDAS, L.

var. *a* in the dry forests of Prome. Car Nieobar.

Ovary-cells 4-ovuled. Berries the size of a plum. Leaves usually blunt or retuse.

var. *a genuina.*

var. *β congesta*, Wight. Leaves almost obicular, cymes short.

var. *γ paucinervia*, Wight. Leaves linear-lanceolate.

Cultivated for its fruit in Burma (P.).

C. DIFFUSA, Roxb.

Termoklee Island. Andamans. Car Nicobar.

Ovary-cells 2-ovuled. Berries the size of a pea or somewhat larger. Leaves usually acute.

** *All parts, especially while young, shortly and softly puberulous.*

C. HIRSUTA, Roth.

Ava.

C. villosa, Roxb.

Ovary-cells 2-ovuled. Berries the size of a pea.

WINCHIA, *De Candolle.*

Apparently like preceding, but the style deeply 2-cleft and the ovules in numerous rows. Unarmed, with ternary leaves.

W. CALOPHYLLA, D.C.

Upper Tenasserim.

Panicle glabrous.

W. (CHILLOCARPUS) ATROVIRIDIS, Bl.

Tavoy.

Hunteria atroviridis, Wall.

Panicle minutely puberulous.

Probably not sufficiently distinct from the preceding species (Knrz).

PLUMERIEÆ.

Ovary consisting of 2 more or less distinct carpels, each with a single placenta.

* Fruit-carpels indehiscent, not follicular.

× Calyx gamosepalous.

RAUWOLFIA, *Linnaeus*.

Calyx toothed. Corolla elongate, funnel-shaped. Disk cupular or annular. Drupes sappy, usually connate at the base or up to the middle. Albumen fleshy. Herbs, under-shrubs, or shrubs.

R. (OPHIOXYLON) SERPENTINA, Willd. Chittagong and all over Burma.

The root is used in medicine as a tonic and febrifuge, and to cure snake bites.

OCHROSIA, *Jussieu*.

Calyx toothed or lobed. Disk none or obsolete. Drupes usually paired, fleshy-fibrous. Trees or shrubs.

O. SALUBRIS, Bl. Tropical forests of the Andamans.

Cerbera oppositifolia, Lamk. Kamorta, Trice and Track.

× × Sepals free, reflexed.

CERBERA, *Linnaeus*.

Calyx glandless inside. Disk none. Drupes usually single by abortion, fibrose-woody. Trees.

C. ODALLAM, Gaertn. Arakan. Tenasserim. Andamans. Kamorta. Katchall.

C. MANGHAS, L.

Ka-lwā.

The Burmese extract an oil for burning from the seeds, which are said to be emetic and purgative. Wood worthless.

** Fruit-carpels follicular, dehiscing along the ventral suture; rarely indehiscent. Corolla-throat naked.

× Seeds in no way winged nor hairy-fringed.

† Seeds not imbedded in pulp.

‡ Albumen none.

CALPICARPUM, *G. Don*.

Follicle broad, obliquely truncate, slowly dehiscing, 1-seeded. Shrubs.

C. ROXBURGHII, *G. Don*. (P.). Tropical forests in Martaban and Tenasserim.

Kopsia vincaeflora, Bl. Generally planted all over Burma.

K. fruticosa, D.C.

Sa-lāt.

‡ ‡ Albumen present.

VINCA, *Linnaeus*.

Follicle elongate-linear, continuous, many-seeded. Albumen fleshy. Erect shrubs or under-shrubs.

* V. ROSA, L.

V. Guillemi Waldemarii, Klotzsch.

Them-ban-mā hnyo-ben.

A South-American plant much cultivated in villages all over the country, and sometimes domesticated in rubbishy places.

GYNOPOGON, *Forst.*

Follicle elongate, moniliformly-contracted between the seeds. *Albumen* horny, homogeneous. Shrubs, more or less twining.

G. (ALXYIA) STELLATUM, Roem. et Schult. Rocky coasts of Tenasserim and
Alyxia odorata, Wall. Naukowry. The Andamans.

Corolla-tube nearly $\frac{1}{2}$ an inch long.

G. BREVIFLORUM, Kz. Tropical forests of Upper Tenasserim
and Taoo table land at 2000 feet.
Corolla-tube only about 2 lines long.

HUNTERIA, *Roxburgh.*

As preceding, but albumen ruminant.

H. LANCEOLATA, Wall. Tavoy.

Unknown to me. Can it be the same as my *Gynopogon breviflorum*? (Kurz).

†† *Seeds imbedded in pulp.*

TABERNEMONTANA, *Plumier.*

Follicles continuous, several-seeded. *Albumen* none. *Disk* none. Erect shrubs.

* *Bractlets* persistent, conspicuous, longer than the pedicels.

T. RECURVA, Roxb. Tropical forests of Chittagong, the Pegu
T. gratissima, Ldl. Range and Upper Tenasserim.

Corolla-tube longer than the tube. Calyx lobes 2-3 lines long, linear-lanceolate.

T. CALYCINA, Wall. Tavoy.

Perhaps the same as the last (Kurz).

** *Bracts and bractlets* very deciduous and small, or persistent and minute.

× *Calyx-lobes* acute or acuminate. *Follicles* tapering at the base, but not stalked, without an appendage (usually cylindrical, with 6 longitudinal lines, often raised).

+ *Cymes* branched from the base and the branchings usually recurved or horizontal.

° *Flowers* large, showy, the corolla-lobes as long as the tube.

* T. (NERIUM) DIVARICATA, L. Planted all over Burma.

T. coronaria, R. Br.

Corolla about an inch across, the lobes as long as the tube; all parts glabrous.

°° *Flowers* small, the corolla-lobes only $\frac{1}{2}$ - $\frac{1}{3}$ the length of the tube.

T. OPHIORRHIZOIDES, Kz. Hills of Martaban at 3000 and 5000 feet.

Glabrous. Calyx-lobes acute. Corolla-tube hardly $\frac{1}{2}$ inch long.

T. ROSTRATA, Wall. Segain.

Glabrous, very like the preceding. Calyx-lobes rather acute. Corolla-tube nearly an inch long. *Follicles* long-beaked.

++ *Cymes* brachiate, longer or shorter peduncled, more or less erect.

° *Calyx-lobes* broad, leafy, 3-4 lines long.

T. ALTERNIFOLIA, L. Coasts of the Andamans.

T. crispa, Roxb.

Glabrous. Corolla-lobes nearly as long as the tube.

×× *Calyx-lobes* narrow, small.

T. MEMBRANIFOLIA, Kz. Tropical forests of Toukyegat, East of Toung-ngoo.

Glabrous, the cymes short-peduncled. Calyx-lobes subulate-acuminate. Corolla-

tube slender, $\frac{3}{4}$ in. long, the lobes half as long or shorter. Anthers inserted below the middle of the corolla-tube.

Probably identical with the next species.

T. GRACILIFLORA, Wall.

Tenasserim.

Glabrous, leaves as in preceding. Cymes long-peduncled. Calyx-lobes said to be ovate, rather blunt.

T. MICROCARPA, Wall.

Ava. Taong-doung.

Glabrous. Peduncle 3 times as long as the 4-5 lines long petioles. Calyx-lobes ovate, acute.

× × × *Calyx-lobes rounded. Follicle long-stalked, with a coriaceous acuminate dorsal appendage.*

T. SUBCAPITATA, Wall. (P.).

Martaban. Tavoy.

Glabrous. Cymes small, longer or shorter peduncled.

Kurz adds:

T. CRISPA, Roxb.

The Nicobars.

var. *Niobarica*, Liebm.

× × *Seeds winged or hairy-fringed.*

PLUMIERIA, Tournef.

Disk none or fleshy, and adnate to the calyx. *Follicles* elongate, many-seeded. *Seeds* winged. *Albumen* none. Fleshy trees.

*P. ACUTIFOLIA, Poir.

Planted about villages.

P. acuminata, Ait.

ALSTONIA, R. Browne.

Corolla salver-shaped. *Anthers* included. *Seeds* fringed all along the borders, more so at both extremities. *Albumen* scanty. Trees or shrubs.

A. SCHOLARIS, R. Br. (P.).

Chittagong. Prome. Tenasserim.

Inflorescence densely pubescent.

A. SPECTABILIS, R. Br.

Andamans. Katchall.

Peduncles glabrous, the calyx and pedicels minutely puberulous.

Hardly separable from the last. The wood yields a powerful bitter tonic.

A. MACROPHYLLA, Roxb.

a and *β* in Tropical forests of Kamorta

var. *β acuminata*, Miq.

and Car Nicobar.

Series COMESPERMÆ.

Seeds furnished at one or both ends with a deciduous tuft or crown of long silky hairs. *Anthers* usually cohering in a cone.

ECHITIDIÆ.

* *Corolla-throat* naked, without scales. *Seeds* comose at the apex only or rarely fringed all round.

× *Disk* annular, cupular, or consisting of 5 free or connate scales. *Scandent* shrubs.

+ *Ovary* entire, 2-celled.

† *Anthers* included.

BEAUMONTIA, Wallich.

Calyx-segments leafy. *Disk-glands* 5, free or connate. *Albumen* fleshy. *Flowers* large and showy.

B. (ECHITES) GRANDIFLORA, Roxb.

Chittagong.

†† *Anthers more or less exerted.*

VALLARIS, *Burmans.*

Calyx small. *Corolla* almost rotate-bell-shaped. *Disk* 5-lobed. *Albumen* scanty. *Flowers* rather showy.

V. HEYNEI, Spreng. Promc.

Echites dichotoma, Roxb.

Pentandra solanacea, Roth.

PARSONSIA, *R. Brown.*

Calyx small. *Disk-scales* 5, free or connate. *Filaments* often spirally twisted. *Flowers* small.

P. SPIRALIS, R. Br. Pegu. Maulmain. Katchall and Car Nicobar.

P. oblonga, Wall.

Heligme Rheedii, Wight.

++ *Ovary-carpels* 2, distinct.

† *Anthers exerted, cohering in a cone round the stigma.*

POTTISIA, *Hooker et Arnott.*

Disk 5-lobed. *Flowers* small, panicled.

P. CANTONIENSIS, Hook. et Arn. Mergui.

Euthodon paniculatus, Griff.

P. HOOKERIANA, Wight (M.).

†† *Anthers included in the corolla-tube. Disk* cupular or 5-cleft.

° *Corolla* induplicate-valvate.

URCEOLA, *Roxburgh.*

Corolla urceolate or globose. *Calyx* glandless inside. *Disk* entire or 5-lobed. *Flowers* small.

U. (CHAYANESIA) LUCIDA, D.C. Pegu and Tenasserim.

C. esculenta, D.C.

°° *Corolla* twisted-imbricate.

‡ *Seeds* narrowed at apex into a long slender neck.

§ *Follicle* moniliform.

PARAMERIA, *Bentham.*

Corolla salver- or almost bell-shaped. *Calyx* many-glanded inside. *Flowers* small.

P. (ECDYSANTHERA) GLANDULIFERA, D.C. (P.). Tenasserim and the Andamans.

E. Griffithii, Wight.

E. barbata, Miq.

§§ *Follicle* continuous, not moniliform.

ECDYSANTHERA, *Hooker et Arnott.*

Corolla almost urceolate, the lobes sinistrorsely twisted. *Disk* entire or 5-lobed. *Flowers* small.

E. BRACHIATA, D.C. Khakyen Hills.

E. MICRANTHA, A. D.C. (P.).

ANODENDRON, *De Candolle.*

Corolla salver-shaped, the lobes narrow. *Disk* truncate or 5-lobed. *Follicle* woody-coriaceous. *Seeds* albuminous. *Flowers* small.

A. PANICULATUM, A. D.C. Pegu, Tenasserim, the Andamans, and Kamorta.

This is the plant selected according to Mr. Humfray by the Andamanese to form the strings of their powerful bows.

CERCOCOMA, *Miq.* (non Don).

Corolla salver-shaped, the lobes broad. *Disk* 5-claft. *Follicle* coriaceous. *Albumen* none. *Flowers* rather showy.

C. (RHYNOSPERMA) WALLICHI, D.C. Ava. Pegu range (rare).
Echites rhynosperra, Wall. Tenasserim.

ICHNOCARPUS, *R. Brown.*

I. FRUTESCENS, BROWN.
 I. OVALIFOLIUS, A. D.C.

‡‡ *Seeds not contracted into a long neck.*

§ *Ovary carpels more or less immersed in the fleshy disk.*

AGANOSMA, *G. Don.*

Calyx large and leafy, divided almost to the base. *Disk-lobes* short. *Anthers* appendaged. *Flowers* large and showy.

A. CALYCINA, D.C. Tavoy.
A. Wallichii, Don.

Calyx-lobes nearly an inch long, tawny-velvety. *Nerves* of leaves impressed.

A. (ECHITES) MARGINATUM, ROXB. (P.). Chittagong and all over Burma.
A. macrocarpa, D.C.

Calyx-lobes only 2-3 lines long, glabrous. *Nerves* of leaves prominent beneath and uniting towards the margin.

Kurz adds:

A. ACUMINATUM, DON. Tenasserim. Car Nicobar.
A. culoba, Miq.

Kyct-boung-hpyu. Tenasserim Caoutchouc-creeper.

EPIGYNUM, *Wright.*

Corolla salver-shaped. *Disk-lobes* epigynous round the ovary and almost comate.

E. GRIFFITHANUM, WIGHT. Mergui. Tavoy (P.).

§§ *Ovary entirely superior.*

CHONEMORPHA, *G. Don.*

Corolla very large, salver or funnel-shaped, the lobes twisted. *Follicle* woody. *Albumen* scanty.

C. (ECHITES) MACROPHYLLA, ROXB. Maulmain (P.). The Andamans (K.).
C. mollis, Miq.

× × *Disk none, or rudimentary. Trees.*

HOLARRHENA, *R. Brown.*

Corolla salver-shaped. *Stamens* included. *Seeds* comose at the apex only. *Albumen* none.

H. ANTHYSENTERICA, WALL. Chittagong and all over Burma.
H. codaga, C. Don.
H. pubescens, Wall.

Let-touk (*vide* Parish).

** *Corolla-throat with a corona of scales or fringes. Disk none.*

× *Anthers included in the corolla-tube. Seeds comose at the apex.*

NERIUM, *Linnaeus.*

Corolla-tube with 5 lacinate-toothed scales. *Seed* albuminous. *Erect trees* or shrubs.

* N. ODORUM, Sol.

Cultivated.

All parts of this plant are very poisonous, especially the roots of the wild varieties. It is supposed, even, to impart deleterious properties to honey. De Gubernatis says,¹ "Dans l'Inde, le *Karavira* ou *Nerium odorum* passe pour une fleur funéraire, c'est pourquoi, dans le drame *Mriçchakatikâ*, le jeune Çâradatta place une couronne d'oléandre sur sa tête, en allant à la mort," and adds many other curious particulars, too long to reproduce here, of European superstitions and proverbs connected with the same plant.

× × *Anthers exerted, united or cohering in a cone round the stigma. Seeds comose at the hilum.*

STROPHANTHUS, De Candolle.

Corolla-lobes elongate or caudate, bordered by membranous lobes or scales, each produced into 2 longer or shorter segments. Shrubs, usually scandent.

* *Corolla-lobes acute or acuminate, but not produced into long tails.*

S. BREVICAUDATUS, Wight.

Mergui (probably).

Floral bracts ovate, acute, stiff, only $1\frac{1}{2}$ lines long.** *Corolla-lobes produced into tails 2 or more inches long.*× *Floral bracts and the coniform calyx-lobes stiff, linear-subulate.*

S. GRIFFITHII, Wight.

Upper Tenasserim.

S. pentaphyllus, Griff.*S. Horsfieldianus*, Miq.

Corolla (without the tails) about an inch long.

S. LONGICAUDATUS, Wight.

Southern Tenasserim.

Corolla (without the tails) about $\frac{1}{2}$ in. long.× × *Floral bracts and the coniform calyx-lobes flaccid, reflexed, linear.*

S. (ECHITES) CAUDATUS, Burm.

S. dichotomus, D.C.Tenasserim (*vide* Parish).Corolla about $\frac{2}{3}$ in. long. Bristles twice as long as the anthers.

WRIGHTIA, R. Brown.

Corona of *corolla* consisting of 5 or 10 erect scales either distinct or united, or rarely the throat naked. Trees or erect shrubs.

* *Throat of corolla furnished with scales or fringes.*× *Corolla-throat fringed with a ring of branched long filiform scales.*

W. (NERIUM) TINCTORIA, Roxb.

Burma (*vide* Mason).

All parts glabrous. Corolla white, the lobes linear-oblong.

× × *Scales of corolla-throat thick and fleshy, entire or lobed.*

W. MOLLISSIMA, Wall.

All over Burma up to 2000 feet.

W. Walliehi, D.C.

All parts, especially the leaves, shortly and densely pubescent. Corolla-lobes broad, the scales of the throat cuncate, 2-3-lobulate.

W. (NERIUM) COCCINEA, Roxb.

Chittagong Hills.

All parts glabrous. Corolla red, the lobes broad, the scales large, rounded, obsolete crenate.

¹ Mythologie des Plantes, vol. ii. p. 257.

** *Corolla-throat quite naked.*

W. (ECHITES) RELIGIOSA, Teysm. et Binn. Tenasserim and Siam.

Glabrous, the leaves small and narrow. Pedicels filiform. Corolla small, white.

W. ZEYLANICA, R. Brown (M.).

W. antidysenterica, R. Brown.

W. TOMENTOSA, Sch. (M.).

This Order produces some useful products. The milky juice of several species of the following genera yields India-rubber: *Collophora*, *Willughbeia*, *Fabea*, *Lian-cornia*, *Urecola* and *Landolphia*. Some species are highly poisonous, as *Tonghinia veneniflua* and *Cerbera alonui*. Others yield dyes—*Willughbeia tinctoria*, a blue dye, and *W. tomentosa*, a yellow dye; and some yield edible fruits, as *W. edulis* and *Urecola elastica*, *Carissa carandas*, *C. edulis*, *Carpodium dulcis*, *Ambelania Pacouria*, and *Tabernaemontana utilis*. Some species are used as medicine, as *Allamanda cathartica*, *W. Zeylanica (antidysenterica)*, *Carissa xylopicron*, *Plumiera alba*, and *Alstonia scholaris* as a tonic.

Dr. Mason adds the following vernacular names for sundry *Apocynææ*: Sch-yeh, Meh-tu, and in Sgau-karen, Tha-peh-khan-du-den, Nor-thü-ch, Ka-thi-khieu, Hsau-ka-htau.

Order JASMINEÆ.

Flowers regular, hermaphrodite or unisexual. *Calyx* free, usually small, 4-5-, rarely more, toothed or lobed, or rarely truncate and entire. *Corolla* with a longer or shorter tube, 4- or 5-, rarely more, lobed, or divided to the base into 4 petals, rarely 2-petalled, or wanting altogether. *Stamens* 2, rarely 4, adhering to the base of the corolla. *Filaments* usually short. *Anthers* 2-celled, the cells opening by longitudinal slits. *Ovary* 2-celled, the cells with 2, rarely 1 or 3, ovules, in the young state attached laterally, but becoming pendulous or ascending, according to the growth of the ovary. *Fruit* succulent or capsular, entire or 2-lobed, 2-celled, or reduced to a single cell and seed. *Seeds* with or without albumen. *Embryo* straight. Trees or shrubs often climbing, very rarely herbs, with opposite or very rarely alternate simple or pinnate leaves. *Flowers* in axillary or terminal panicles, sometimes reduced to short racemes or clusters.

Sub-order OLEACEÆ.

Stamens 2 only, situated between a pair of corolla-lobes.

JASMINEÆ.

Corolla-limb 5-12-lobed. *Ovules erect.*

* *Fruit a dry compressed capsule.*

NYCTANINES, *Linnaeus.*

Corolla twisted in bud. *Albumen* none. Scabrous trees, with simple leaves.

N. ARBOR-TRISTRIS, L. Tenasserim and Pegu (where rare).

A dye is extracted (in Ceylon) from the corolla-tube of this plant, which Thwaites says is used by the Buddhists for dyeing their clothes yellow.

** *Fruit a 2- or by abortion 1-lobed drupe.*

JASMINUM, *Linnaeus.*

Corolla twisted in bud. *Albumen* none. Shrubs usually scandent, rarely trees. *Leaves* simple or compound.

Series UNIFOLIOLATÆ.

Leaves simple, with a jointed petiole.

* *Bracts* minute or short and filiform, rarely wanting.

× *Calyx-lobes* short, or the calyx almost truncate.

+ *Flowers* corymbose.

- J. EXTENSUM*, Wall. Ava.
Glabrous. Pedicels 2-5 lines long. Calyx 5-cornered, almost truncate.
- J. DECUSSATUM*, Wall. Tropical forests of Upper Tenasserim up to 3000 feet.
Pubescent. Flowers sessile. Calyx-teeth as long as the calyx-tube.
- ++ *Flowers in poor axillary racemes. Pedicels $\frac{1}{2}$ -1 inch long. Calyx-teeth distinct.*
† *Corolla-lobes blunt, glabrous.*
- J. SUBGLANDULOSUM*, Kz. Tropical forests of the Southern Pegu Range,
Tenasserim and South Andaman.
Nerves conspicuous on both sides, usually with a gland in the axils. Corolla-lobes usually 8, rarely 5-7.
- J. ATTENUATUM*, Wall. Nat-toung in Martaban at over 5000 feet.
Nerves thin and obsolete, without glands. Corolla-lobes usually 5.
†† *Corolla-lobes acuminate.*
- J. LAURIFOLIUM*, Roxb. var. β tropical forests of Khyakye Hills and Tenasserim.
Glabrous. Leaves more or less narrow, very long acuminate. Corolla-lobes 9-12.
var. β *brachylobum*, calyx-lobes as long or a little longer than the calyx-tube, more or less recurved.
× × *Calyx-lobes longer than the calyx-tube, subulate.*
- J. SAMBAC*, Ait. Cultivated all over Burma. Said to be wild in Prome.
J. quinqueflorum, Hcyne.
Sa-bē, Ma-li.
Small shrub, almost erect. Branchlets puberulous. Leaves penninerved.
- J. ANASTOMOSANS*, Wall. Tropical forests of the Pegu Range and Tenasserim.
Twining, glabrous. Leaves 3-nerved.
* * *Bracts leafy, conspicuous, shorter or longer than the calyx.*
× *Bracts longer than the calyx, leafy, white-discoloured.*
- J. ROTTLEIANUM*, Wall. Tropical forests of the Khaboung stream Pegu.
More or less pubescent, especially the branchlets. Corolla-tube about $\frac{1}{2}$ inch long or longer.
- J. COARCTATUM*, Roxb. Chittagong. The Pegu Range and
Hills East of Toung-ngoo.
Glabrous when adult, tufted-hairy in the nerve-axils beneath. Corolla-tube about an inch long.
× × *Bracts shorter than the calyx. Calyx-lobes subulate. Pedicels 1-2 lines long.*
- J. (NYCTANTHES) HIRSUTUM*, L. Bhamo. Pegu.
J. multiflorum, Andr. (non. Roth.).
J. pubescens, Willd.
More or less pubescent. Corolla- and calyx-lobes each 6-9 in number, the latter 4-5 lines long, pubescent.
- J. SCANDENS*, Vhl. All over Burma.
J. syringafolium and *latum*, Wall.
Glabrous or puberulous. Corolla- and calyx-lobes each 6-7 in number, the latter only a line long, more or less pubescent.

Series FOLIOLATE.

Leaves unpaired-pinnate or pinnately 3-foliolate, rarely occasionally 1-foliolate.

J. GRANDIFLORUM, L. Burma (*vide* Mason).

Glabrous. *Leaves* unpaired-pinnate. *Calyx*-lobes subulate, about 3-4 lines long.

Kurz adds from the Nicobars:

J. ACUMINATISSIMUM, Bl. (K.). Kamorta and Nankowry.

Mason adds the following vernacular names for species of Jasmine:—Tham-bauma-li, Myat-la, Then-khwa. The flowers of various species of *Jasminum* exhale a most delicious fragrance, especially after sunset, when the cool air of a garden where many jasmine bushes are in flower, seems loaded with the perfume. The flowers are used to make garlands of for the person, and also to scent oil by steeping them therein, or alternate layers of jasmine flowers and sesamum seeds are arranged, and after some time the scented seeds are put in a press and the oil extracted, with the acquired scent of the flowers. The European method is somewhat different. A number of perforated trays are arranged one above the other in a closed case, and these trays are filled alternately with jasmine (or other flowers it is wished to extract the perfume of) and fresh, sweet, and finely chopped suet. In twelve hours or so the flowers are removed, and perhaps fresh ones substituted, and eventually the suet is washed with ether, which dissolves out the volatile perfume, leaving sufficient aroma in the suet to enable it to be made the basis of a delightful pomade, and this process might be easily put in practice with various Indian flowers.

OLEEÆ.

Corolla 4-lobed, rarely 6-8-cleft or wanting, with or without a tube. *Ovules* pendulous or attached laterally near the summit of the cell.

* *Corolla*-lobes twisted in bud. *Ovules* pendulous. *Fruit* a dry capsule or samara.

SCHREBERA, Roxburgh.

Corolla salver-shaped. *Ovary* 2-celled, with 3-4 ovules in each cell. *Capsule* 2-valved. *Seeds* winged. *Albumen* none. Trees or shrubs, the leaves pinnate or rarely simple.

S. SWIETENIOIDES, Roxb. var. *a* Pegu and Martaban.

var. *a genuinum*. All parts glabrous, also the inflorescences, calyces and corollas. Capsules 2 inches long.

var. *β pubescens*, Kurz. All younger parts and inflorescence softly pubescent.

Calyx densely and minutely tomentose. *Corolla* sparingly puberulous outside. Capsules much smaller.

** *Corolla*-lobes valvate in bud or nearly so, rarely imbricate. *Fruit* drupaceous or berry-like. *Leaves* simple.

× *Corolla*-lobes induplicate-valvate.

CHIONANTHUS, Linnæus.

Petals usually elongate, free or very shortly united at the base. *Seeds* with or without albumen. Trees. Inflorescence various.

* *Petals* or *corolla*-lobes very narrow, involute.

C. MINUTIFLORUS, Kz. Hills East of Poung-ngoo.

Glabrous. Nerves prominent beneath. *Petals* $\frac{1}{2}$ line long.

** *Petals* or *corolla*-lobes broader, flat or concave, but not involute.

× *Veins* visible between the strong lateral nerves. *Leaves* 3-6 inches long.

C. PALEMBANICUS, Miq. The Andamans. Nankowry. Great Nicobar.

Panicle ample, leafy-bracted. Nerves impressed on the upper side of the leaves. Drupes 1-1 $\frac{1}{2}$ inches long.

- C. (*LEUCIERA*) *MACROPHYLLUS*, Wall. Ava, Pegu and Upper Tenasserim.
L. attenuata, Wall.
L. picrophloja, F. Muell.

Panicles rather small, with minute bracts. Nerves prominent on both sides. Drupes 1-1½ inch long.

×× No visible veins between the nerves. (Leaves 6-10 inches long.)

- C. *MONTANUS*, Bl. Hills East of Toung-ngoo up to 2000 feet.
 Panicle minutely puberulous. Petals linear. Drupes about an inch long.

OLEA, Tournef.

Ovary-cells 2-ovuled. *Seeds* albuminous. *Panicles* axillary or terminal. Trees or shrubs, erect.

* *Corolla* almost rotate, the limb spreading. *Inflorescence* axillary, or at the same time terminal. (*Olea*, L.)

× *Petals* only a line long or thereabouts.

- O. *DENTATA*, Wall. Tree forests about Rangoon and Upper Tenasserim.
 Leaves rigidly coriaceous, the nerves prominent. Panicle glabrous.

- O. *BIOICA*, Roxb. Chittagong and Arakan range (*vide* Theobald).
 Leaves thin-coriaceous, the nerves prominent. Panicles glabrous.

×× *Petals* about 3 lines long.

- O. *TERNIFLORA*, Wall. Chittagong, Pegu and Tenasserim.
O. linoceroïdes, Wight.

Leaves veinless between the nerves. Drupes nearly ½ inch long.

** *Corolla* funnel-shaped, with a longer or shorter tube. *Panicles* all terminal. (*Ligustrum*, *Tournef.*)

- O. (*PHILLYREA*) *ROBUSTA*, Roxb. Chittagong. Ava. Taong-doung. Pegu and Upper Tenasserim.

Panicles glabrous or pubescent. Drupe 3-4 lines long.

MYXOPYRUM, Blume.

Flowers minute, in axillary panicles. *Seeds* albuminous. Woody climber, with sharply 4-cornered branches.

- M. (*CHONDROSPERMUM*) *SMILACIFOLIUM*, Wall. Chittagong. Tropical forests of Martaban, the Andamans and Cocos.

var. *α genuinum*. Leaves more or less entire or remotely and minutely spinescent-toothed. Panicle ample, slender, as long as or longer than the leaves.

? var. *β ilicifolium*. Leaves somewhat narrower and stronger nerved and veined, strongly and crowdedly spinose-serrate. Panicles rather contracted, not above 2 inches long, axillary and leaf-opposed, rarely terminal, the peduncle and branchings strong and 4-cornered.

Sub-order *SALVADORACEÆ.*

Corolla 4-parted, without tube. *Stamens* 4, alternating with the corolla-lobes. *Ovules* erect.

AZIMA, Lamk.

Petals free, linear. *Stamens* free. *Ovary* 2-celled, the cells 2-ovuled. Shrubs, spiny-armed.

- A. *TETRACANTHA*, Lamk. Ava and Prome.
Monetia barlerioides, L'Her.
Fagonia montana, Miq.

EBENALES.

Corolla mono- or mono-poly-petalous, hypogynous or epigynous, rarely perigynous. *Stamens* usually many more than the corolla-lobes, if equalling them, then alternating (except in *Sapoteæ*). *Ovary* 2- to many-celled. *Cells* usually few-ovuled. *Leaves* alternate, exstipulate. Shrubs or trees.

Order STYRACEÆ.

Flowers regular, hermaphrodite, rarely polygamous. *Calyx-tube* more or less adnate to the ovary, or free, the limb 5-, rarely 4-7-lobed, toothed or almost truncate. *Corolla* deeply divided into as many or twice as many lobes as there are calyx-lobes, imbricate or almost valvate in bud. *Stamens* usually numerous, rarely as many or twice as many as corolla-lobes, inserted in a single row or more at the base, or in the short tube of the corolla, those of the outer series usually alternating with the corolla-lobes. *Filaments* filiform or flat. *Anthers* 2-celled, opening by longitudinal slits, the cells either short and almost half-oval or elongate and linear. *Ovary* inferior or half-inferior, rarely wholly superior, 5-2-celled, the cells with 2-4, rarely a single ovule, suspended from the inner axial angle or the upper ones, erect. *Style* filiform. *Stigma* simple or more or less capitate, or 5-2-lobed. *Fruit* either a more or less succulent or dry drupe, containing a 5- or fewer-celled nut, or a capsule opening by valves. *Seeds* usually solitary, pendulous, the testa thin. *Albumen* fleshy. *Embryo* straight or curved, axile with a long radicle, the cotyledons short and flat. *Stipules* none. *Flowers* usually small or middling-sized, usually in axillary spikes, racemes or clusters, rarely solitary. *Bracts* minute, often scale-like.

STYRAX, *Linnaus*.

Calyx somewhat enlarged and inclosing the fruit for one half. *Corolla* slightly twisted or almost valvate in bud. *Stamens* 10, the anthers elongate. *Drupe* dry, sometimes valvately dehiscent.

* *All parts more or less tomentose, the under-surface of the leaves particularly so.*

S. RUGOSUM, Kz.

Hills between the Tsittoung and Salween.

Leaves white-tomentose beneath. *Calyx* slit spathe-like, conspicuously subulate-toothed.

** *Younger parts more or less tomentose. Leaves sparingly and minutely stellate-puberulous, glabrescent and green.*

S. SERRULATUM, Roxb.

Khakyen Hills. Chittagong. Tenasserim.

S. floribunda, Griff.

Calyx 5- or 6-toothed. *Corolla-lobes* narrow-oblong, about 4 lines long. Leaves serrulate.

S. VIRGATUM, Wall.

Ava (probably).

S. grandiflorum, Griff.

Calyx truncate and minutely toothed. *Corolla-lobes* ovate, nearly $\frac{3}{4}$ inch long. Leaves remotely and minutely toothed.

SYMPLOCOS, *Linnaus*.

Calyx wholly or nearly wholly adnate to the ovary. *Corolla-lobes* imbricate in bud. *Stamens* numerous, indefinite, the anthers short. *Drupe* more or less succulent, crowned by the calyx-limb.

* *Ovary* 3-celled. *Drupe*s oblong or elliptical, 3-celled. *Embryo* straight.

× *Drupe*s sulcate-ribbed.

S. SULCATA, Kz.

Martaban at 3000 to 6000 feet. var. β

Daunat pass, Upper Tenasserim.

Young parts more or less rusty-pubescent. *Flowers* sessile, or nearly so, in simple tomentose spikes.

× × *Drupes smooth and terete.*
 † *Racemes or spikes not glabrous.*

S. LUCIDA, Wall. Nat-toung in Martaban over 5000 feet.
 Glabrous. Flowers sessile, in compound puberulous spikes.

S. RACEMOSA, Roxb. All over Burma up to 2000 feet.
S. Hamiltoniana and *rigida*, Wall.

Young shoots more or less pubescent. Flowers shortly pedicelled, in simple or branched villous-tomentose racemes.

†† *Racemes quite glabrous.*

S. LEIOSTACHYA, Kz. Tenasserim. Kamorta.
 Glabrous. Petioles and rib beneath sparingly hairy. Racemes slender.

** *Ovary 2- rarely 3-celled. Drupes more or less turbinate or obversely pear-shaped, by abortion usually 1-seeded, the endocarp often intruding so as to cause the seed to be more or less curved. Embryo curved.*

× *Stamens in 2 or more series, not fascicled.*

† *Flowers sessile, in simple or compound spikes.*

○ *Drupes ribbed or torulose.*

S. (DICALYX) JAVANICA, Bl. Tenasserim.
S. ferruginea, Roxb.
S. rubiginosa, Wall.
S. Horsfieldiana, Miq.

Young shoots, spikes, and leaves beneath more or less rusty pubescent or tomentose. Drupes ribbed.

S. SPICATA, Roxb. Tenasserim.
 Glabrous. Spikes glabrous. Drupes torulose-ribbed.

If *Myrtus laurina*, Retz. Obs. iv. 27, is really the same as Roxburgh's plant, the specific name will have to be changed in favour of Retz's (Kurz).

○ ○ *Drupes terete and smooth.*

S. POLYCARPA, Wall. Martaban and Tenasserim (Nat-toung and
S. attenuata, Wall. Taipo) at 4000 to 5000 feet.

Glabrous, also the spikes. Drupes ovoid-turbinate.

†† *Flowers pedicelled, in simple or compound racemes. Drupes terete.*

S. PEDICELLATA, Kz. Toukyagat, East of Toung-ngoo.
 Glabrous. Racemes compound, minutely appressed pubescent, stout. Drupes ovoid-turbinate (unripe).

S. CAUDATA, Wall. Chittagong. Upper Tenasserim.
 Glabrous. Leaves caudate acuminate. Racemes simple, slender, pubescent. Drupes ovoid-turbinate.

× × *Stamens collected into 5 bundles. Flowers white.*

S. LEUCANTHA, Kz. Swamp forests of the doāb of the Ilein and Irrawaddy.
 Racemes shortly tomentose, short. Pedicels very short and thick.

S. CRATÉGOIDES, D. Don. Nat-toung in Martaban (*vide* Mason).
 Racemes appressed pubescent, forming slender panicles. Pedicels long, filiform.

Mason gives Keun-la and Kain-tha-lipyu-gyi as the vernacular names of species of *Symplocos*.

Several species of *Symplocos* yield yellow dyes, and can be used as a substitute for tea. Storax and Benzoin are two balsams containing Benzoic acid, the former produced by *Styrax officinale*, the latter by *S. Benzoin*, a tree of the Moluccas, which Mason includes with doubt in his list.

Order EBENACEÆ.

Flowers regular, usually dioecious, rarely hermaphrodite. *Calyx* 3- to 7-lobed, persistent, in the females usually enlarging. *Corolla* gamopetalous, deciduous, 3-7-lobed, the lobes always sinistrorsely convolute-imbricate in bud. *Stamens* in the females either none, or as many as corolla-lobes, distinct, and inserted at the base of the corolla-tube; in the males 6 or more, usually 16 distinct or often united by pairs, inserted at the base of the corolla-tube, or rarely hypogynous, or partly inserted in the corolla, partly on the torus, the inner series usually shorter or wanting. *Filaments* short, usually pilose and ligulate. *Anthers* basifixed, 2-celled, opening by longitudinal slits. *Ovary* 3-14-celled, the cells with a solitary or 2 collateral ovules, suspended from the summit of the inner angle. *Styles* half the number of the cells, and 2-lobed or as many as cells, and simple. *Berry* often by abortion few-celled and few-seeded, fleshy or coriaceous, the rind sometimes rupturing into as many valves as calyx-lobes. *Seeds* pendulous, usually solitary in the cells, often compressed, the testa smooth coriaceous. *Albumen* horny, homogeneous or ruminated. *Embryo* axile or somewhat oblique, straight or curved at the apex. The cotyledons leafy, nearly as long as the superior cylindrical radicle. Trees or shrubs, rarely under shrubs, with alternate or very rarely almost opposite simple leaves, the juice watery. *Stipules* none. *Flowers* in axillary or rarely terminal cymes, the females usually larger and turning solitary by abortion of the lateral flowers.

The fruits of several species of *Diospyros* are edible when perfectly ripe, but their chief utility is as a tanning material, and dressing for fishermen's nets and lines, especially *D. embryopteris*, which coats them with a glistening varnish. Dr. Mason remarks, "The celebrated Shan vegetable black dye is made from the fruit of a species of ebony, which is said to grow on the mountains that separate the province of Tavoy from the Siamese territories. Isolated plants may be seen in the gardens of Tavoy and Maulmain, but I have never seen one in flower or fruit." This is *D. mollis*. The ebony of commerce is the heartwood of more than one species of *Diospyros*, the best being yielded by the Mauritian *D. reticulata*, and the next best by *D. ebenum*. All species, however, do not possess black heartwood.

† *Ovary-cells with 2 ovules.*

MABA, Forster.

Calyx- and *corolla-lobes* usually trimerous. *Ovary-cells* usually as many as corolla-lobes.

* *Ovary 6-celled, the cells 1-ovuled.*

M. MERGUIENSIS, Hiern.

Mergui.

Glabrous or nearly so. *Ovary* glabrous.

I separate the species with 1-ovulate and 2-ovulate ovary-cells, and from this point of view the above species, which has 1-ovulate ovary-cells apparently twice as numerous as the floral parts, cannot be a true *Maba*, but may be referable to *Diospyros*. I have seen no specimens of it (Kurz).

** *Ovary 3-celled, densely pubescent.*

M. BUXIFOLIA, D.C.

Tenasserim.

M. Neilgherrensis, Wight.

M. ebenus, Wight.

Leaves small, glabrous. Berries globular, the size of a pea.

M. (MARCFIPIA) ANDAMANICA, Kz. The Andamans. Tillangchong. Nicobars.

Leaves large, hirsute along the nerves beneath. Berries oblong, more than an inch long.

†† *Ovary-cells 1-ovuled.*

× *Anthers opening by longitudinal slits.*

GUNISANTHUS, *De Candolle.*

Calyx- and corolla-lobes usually 4, rarely 6. *Ovary-cells* usually as many. *Male and female flowers* all solitary. *Calyx* of males divided to the base, the lobes narrow, membranous.

G. (DIOSPYROS) PILOSULUS, Wall. Tropical forests of the Pegu Range and the Andamans.

Not flowering branchlets sparingly pubescent. Leaves glabrescent. Calyx-tube half the length of the corolla-lobes.

G. (DIOSPYROS) MOLLIS, Kz. Tropical forests of hills East of Toung-ngoo.

Not flowering branchlets densely villous. Leaves beneath permanently softly pubescent. Calyx-tube a little shorter than the corolla-lobes.

Very near to the last species.

DIOSPYROS, *Linnaeus.*

Calyx- and corolla-lobes usually 4-6. *Male flowers* clustered or cymose, the females solitary, or rarely in cymes or panicles. *Calyx* of males gamosepalous.

Sub-genus AMUXIS, Hiern.

Calyx in bud globular and closed, the lobes connate but afterwards bursting irregularly into 2 or 3 lobes. *Corolla* tubular, 5-lobed. *Ovary-cells* as many as corolla-lobes.

D. TOPOSIA, Ham. Chittagong.

D. racemosa, Roxb.

Glabrous. Leaves coriaceous and elegantly net-veined. Corolla conspicuous, about 4 lines long, very coriaceous.

Sub-genus EU-DIOSPYROS, D.C.

Calyx toothed or lobed, rarely truncate. *Ovary-cells* often twice as many as corolla-lobes.

* *Calyx in males short and truncate-toothed, in females large, deeply-lobed. Corolla urceolate, the lobes notched. Anthers 30-50.*

D. EMBRYOPTERIS, Pers. Tenasserim and Martaban.

Embryopteris glutinifera, Roxb.

Glabrous. Leaves coriaceous.

** *Calyx toothed or lobed. Corolla-lobes not notched. Anthers about 20 or fewer. × Corolla urceolate, in bud globular or conical, the tube short and inflated, the lobes usually rounded and short.*

+ *Flower-buds globular. Corolla quite glabrous. Flowers small, hardly a line long.*

D. CHARTACEA, Wall. Tropical forests of Martaban.

Leaves thin chartaceous, with strong prominent nerves, the net-venation distinct, lax. Ovary glabrous.

D. EHRETIROIDES, Wall. All over Burma.

Ouk-chin-zā.

Leaves thin-coriaceous, the nerves strong, the net-venation inconspicuous. Ovary tawny-villous.

++ *Flower-buds conical, acute, but never elongate.*

† *Ovary pubescent or villous. Leaves quite glabrous and glossy.*

D. RAMIFLORA, Roxb. Tropical forests of Arakan.

Flowers rather large, clustered, from the older branches.

D. OLIIFOLIA, Wall.

Tropical forests of Martaban.

Leaves glaucous-green when dry, almost polished, the nerves very inconspicuous and impressed. Peduncles 4-5 lines long. Nearly 5-6 lines long, axillary.

Leaves more or less rigid, quite glabrous, glossy.

†† Ovary glabrous or nearly so.

D. KURZII, Hiern.

The Andamans. Katchall. Kamorta. Nankowry.

Marble wood. One of the handsomest ornamental woods in the East.

Leaves drying blackish, the nerves and net-venation thin but prominent. Flowers small, axillary, the males cymose. Berries globose, the size of a cherry. Albumen homogeneous.

††† *Leaves membranous, at least while somewhat young, more or less puberulous or pubescent.*

◦ *Berries sessile or nearly so.*

D. MOLLIS, Griff.

Khakyen Hills and Martaban 2000 to 4000 feet.

Calyx-lobes of males acute. Leaves more or less acuminate. Berries the size of a cherry. Albumen homogeneous.

◦ *Berry rather long-peduncled.*

D. MONTANA, Roxb.

All over Burma.

D. heterophylla, Wall.

Leaves glaucescent, glabrescent. Berries the size of a cherry. Albumen homogeneous. Spiny-armed tree.

A variety of this (var. *cordifolia*) is frequent in the mixed forests of Pegu. It has the leaves much larger (3-4 inches long), but offers (in fruit only) no tangible characters for specific separation. I rely upon the rumination of seeds as little in *Diospyros* as in *Calameæ*.

×× *Corolla salver-shaped, elongately (very rarely shortly) conical, the tube not or hardly widened, the lobes as long or nearly as long as the tube.*

+ *Borders of the calyx-lobes of female flowers reflexed or revolute, at least at the base, and often appearing somewhat auricled.*

† *Corolla in bud short-conical (Otogyne, D.C.).*

D. BURMANICA, Kz.

Ava, Pegu, and Martaban.

Tē.

All younger parts tawny or greyish tomentose. Leaves coriaceous, glabrescent above. Flowers usually 5- (4-6)-merous. Albumen ruminant.

†† *Corolla in bud elongate conical, 4-angular. Flowers 4-merous.*

◦ *Flowers (both sexes) forming tomentose bracted usually compound cymes. Berries globular.*

D. DENSIFLORA, Wall.

Arakan and Tenasserim.

Peduncles long, the cyme often compound. Net-venation of leaves obsolete.

D. HORSFIELDII, Hiern.

Tenasserim.

Cymes large, corymb-like, fuliginous-velvety. Net-venation strong but lax.

◦ *Flowers short-peduncled or sessile, axillary.*

D. FLAVICANS, Hiern.

Tenasserim.

Flowers short-peduncled, clustered. Net venation indistinct. Berries elliptical. Hefter's No. 3632 (not seen by me) from Tenasserim or the Andamans is referred by Hiern to *D. Moonii*, Thw. (*D. hirsuta*, L.). I fear there is a mistake (Kurz).

- D. UNDIATA*, Wall. Tropical forests of Tenasserim, the Andamans and Nankowry.
Flowers sessile or nearly so. Net-venation lax but distinct. Berries globular, rusty-pubescent. Albumen homogeneous.
- D. SAPOTOIDES*, Kz. Tropical forests on the Khaboung and Choungmeh streams.
As preceding, but ovary glabrous.
++ *Borders of the calyx-lobes in female flowers plain, not reflexed nor recurved.*
† *All parts, except the very young shoots, quite glabrous. Flowers almost sessile.*
- D. LANCEFOLIA*, Roxb. Maulmain.
Flowers rusty-tomentose. Calyx short, the lobes acute. Leaves strongly net-veined. Berries tawny-tomentose. Corolla 4-cornered in bud.
- D. PYRRHOCARPA*, Miq. var. β The Andamans, probably a distinct species.
Male calyx bell-shaped, the lobes short, rounded, tomentose. Leaves strongly net-veined. Berries rusty-tomentose. Corolla terete in bud.
var. β *Andamanica*. Leaves oblong to narrow-oblong, the lateral nerves faint and numerous, net-venation more lax.
- D. VARIEGATA*, Kz. Pegu and Martaban up to 1000 feet.
Calyx ample, puberulous, the lobes rounded. Male cymes very short and stout. Leaves strongly net-veined. Corolla terete in bud.
†† *All parts, especially the leaves, more or less pubescent or otherwise hairy. Male flowers in cymes. Berries glabrous.*
- D. STRICTA*, Roxb. Chittagong.
Leaves not cordate, softly pubescent beneath. Calyx-lobes and bracts acute. Flowers 4-merous.
- D. BRANDSIANA*, Kz. Khakyen Hills, Tenasserim.
Leaves not cordate, adult almost glabrous and chartaceous. Calyx-lobes linear-lanceolate. Cymes branched, arising from the stem and older branches. Flowers 5-merous.
- D. DASYPHYLLA*, Kz. Taipo Hills. Martaban at 4000 feet.
Leaves with cordate base, softly pubescent. Calyx-lobes and bracts rounded. Cymes short, stout. Flowers 4-merous.
- Dr. Mason also adds:
* *D. KAKI*, L. (M.). 'The Chinese date.'
- Most species of *Diospyros* yield a strong serviceable timber, but only the heart wood of some species constitutes the ebony of commerce. *D. Kurzii*, a common species in the Andamans, yields one of the handsomest woods marbled in black and white known, and it would no doubt find a ready market in Europe.

Order SAPOTACEÆ.

Flowers regular, hermaphrodite. *Calyx* 5, rarely 4-8-parted or lobed, the lobes in 2 (rarely 3) series. *Corolla* divided into as many (or rarely twice as many) lobes as calyx segments, imbricate in bud. *Perfect stamens* as many or twice as many as calyx-lobes. *Anthers* 2-celled, dehiscing by longitudinal slits. *Staminodes* alternating with the corolla-lobes or the perfect stamens; rarely wanting. *Ovary* free, superior, 2- or more-celled, the cells with a solitary ovule, erect, suspended or laterally attached; *style* simple, with an entire or very slightly lobed stigma. *Fruit* a drupe or berry, usually indehiscent by abortion, often few-celled. *Albumen* fleshy, oily, or none. *Stipules* none. *Flowers* axillary, solitary or clustered, rarely in panicles. All the Burmese species are trees, some yielding valuable timber.

ISOMERI.

Calyx-lobes equal in number to the corolla-lobes.

* *Calyx segments uniseriate.*

× *Staminodes entirely absent.*

CHRYSOPHYLLUM, *Linnaeus.*

Flowers 5-, rarely 6-7-merous, with as many ovary-cells and stamens.

C. ROXBURGHII, G. Don. *E.T.* Tropical forests North of Rangoon.

C. acuminatum, Roxb.

Than-kya-pen (Kurz).

* C. CAINITO, L. (M.). Cultivated.

The star-apple.

× × *Staminodes as many as stamens and usually alternating with them.*

SIDEROXYLON, *Linnaeus.*

Flowers 5-merous. *Ovary-cells* 5-2. *Stamens* 5. *Seeds* albuminous.

Sub-genus OLIGOTHECA, D.C.

Calyx-lobes acuminate or acute. Young shoots and under-surface of leaves more or less villous-tomentose.

S. TOMENTOSUM, Roxb. Prome.

Thit-cho (Kurz).

Unarmed; calyx-lobes acuminate.

Sub-genus ET-SIDEROXYLON.

Calyx-lobes rounded or blunt.

* *Berries* 1-2-seeded.

S. ATTENUATUM, D.C. *E.T.* Tropical forests of Tenasserim. The Andamans, Kamorta. Great and Car Nicobar, and Narkondam.

Younger parts coppery or rusty-silk hairy; leaves coriaceous.

** *Berries* several, 5-10-seeded.

S. GRANDIFOLIUM, Wall. Hills between the Beeling and Tsittoung rivers,
S. regum, Wall. Tree forests of the Andamans and Kamorta.

Taw-tha-pwot-pen.

Glabrous. Leaves chartaceous.

The seeds of this species are albuminous.

SARCOSPERMA, *Hooker, f.*

Flowers 5-merous. *Stamens* and *ovary-cells* 5 each. *Seeds* without albumen. *Stipules* caducous.

S. (SIDEROXYLON) ARBOREUM, Ham. Namyoon in Upper Burma.

** *Calyx-segments* in 2 distinct series.

× *Stamens* as many as petals and alternating with as many staminodes.

ACHRAS, *Linnaeus.*

Flowers 6-merous. *Stamens* 6. *Ovary-cells* 12.

* A. SAPORA, L. *E.T.* Introduced from America and planted along roads.
Twot-ta-bat.

× × *Stamens* twice as many as petals, or numerous. *Staminodes* none.

ISONDRA, *Wight.*

Flowers 4-merous. *Stamens* 8. *Seeds* with albumen. *Ovary-cells* 4.

Sub-genus APOBASSIA, D.C.

Flowers 4- or 6-merous. *Seeds* without albumen.

* *Flowers* 4-merous.

I. CALONEURA, Kz.

Tropical forests of the Andamans.

Leaves chartaceous, strongly nerved.

Dichopsis and *Isonandra* differ in the number of floral parts and in the absence or presence of a rather scanty albumen. This species, however, has 4-merous flowers and no albumen, and hence I fear that the character derived from the albumen is of the same value as in *Limociera*, etc., amongst *Oleaceæ* (Kurz).

** *Calyx* 6-parted, the 3 outer segments valvate (*Dichopsis*, Thw.).

I. (BASSIA) POLYANTHA, Wall.

Tropical forests of Boronga Island at over 500 feet.

Leaves coriaceous, glaucous beneath, the nerves obsolete. Filaments as long as the anthers, densely villous.

I. OBOVATA, Griff.

Tenasserim.

Leaves coriaceous, glaucous beneath, the nerves strong and parallel. Filaments long and slender.

ANISOMERI.

Corolla-lobes usually 2-3 times as many as calyx-lobes.

* *Staminodes* none.

× *Ovary-cells* twice as many as calyx-segments.

PAYENA, A. De Candolle.

Calyx-lobes 4. *Corolla-lobes*, *stamens*, and *ovary-cells* 8 each.

Sub-genus EU-PAYENA.

Calyx 4-parted.

* *Anthers* glabrous.

P. LUCIDA, D.C.

Burma (and Malacca?).

Ceratophorus Wightii, Hassk.

Isonandra polyandra, Wight.

Connective of anthers produced into a broad blunt beak. Sepals blunt or nearly so. Nerves somewhat irregular. Petiole about $\frac{1}{4}$ - $\frac{1}{2}$ inch long.

P. PARALLELENEURA, Kz.

Tropical forests of Tenasserim.

Connective terminating in a bristle. Sepals acute. Nerves thin, parallel. Petiole about an inch long, slender.

× × *Ovary-cells* as many as calyx-segments.

BASSIA, Kœnig.

Calyx-lobes and *ovary-cells* 4 or 6. *Corolla-lobes* 8-14. *Stamens* about 2 or 3 times as many as corolla-lobes, in 1-3 series.

* *Anthers* aristate, included, on very short filaments or almost sessile.

B. VILLOSA, Wall.

Ava. Taong-doung.

Corolla-lobes as long as the tube. *Anthers* in 2 rows. *Berries* unknown.

** *Staminodes* 6 or 8.

MIMUSORS, Linnaeus.

Calyx-lobes and *ovary-cells* 6 or 8 each. *Corolla-lobes* 2 or 3 times as many.

M. littoralis, Kz. *E.T.* Tenasserim and the Andamans. Katchall.
M. Indica, Kz., And. Report.

Kap-pa-lee (Kuruz). Bullet-wood.

Leaves rounded or retuse. Flowers solitary, rather small. Anthers blunt (?).
 Berries the size and shape of a wood-apple, 5-6 seeded.

Wood close-grained, strong and durable.

**M. ELENGI*, L. Tropical forests of Tenasserim, South Andaman
 Khou-ya. Kha-ya-gung. and Katchall, and cultivated all over Burma.

Leaves bluntish acuminate or apiculate. Flowers clustered, conspicuous. Anthers
 very acuminate. Berries oval, usually 1-seeded.

The most valuable tree of this Order in Burma is *Mimusops littoralis*, which
 yields an excellent and durable timber. The genus *Bassia*, which embraces the
 trees which yield the so-called vegetable butters, also belongs to this Order, of
 which the African *B. Parkii*, which yields the Shea butter, is best known.
 In the Himalayas, *B. butyracea* yields a solid expressed oil from its kernels,
 of a pure white, and the consistency of hard tallow. It is an extremely bland
 oil, not readily turning rancid, and would probably prove valuable in Indian
 medicine, as not subject to the objections which natives entertain for animal fats,
 and is moreover an elegant material. It is common in the Almora bazaar. *B. latifolia*,
 the Mowa of Bengal, is another valuable tree, which would probably (if introduced)
 thrive in Northern Provinces. The fleshy calices are rich in saccharine matters and
 are eaten fresh, or dried, when they somewhat resemble 'sun raisins,' and yield by
 distillation a good 'arrack,' with a flavour almost as nauseous (to the uninitiated)
 as whisky, and doubtless as wholesome. The flowers of *Mimusops elengi* yield a
 fragrant essence, the seeds an oil, and the bark, in common with that of *Achras*
 and *Burmelia*, is astringent and febrifuge. The valuable substance Guttapercha
 is furnished by a Malayan tree, *Isonandra gutta*, which would probably thrive if
 introduced into Southern Tenasserim.

PRIMULALES.

Corolla regular, hypogynous, rarely epigynous; mono-, rarely poly-petalous.
Stamens equalling the corolla-lobes and opposite to them, or if more, one series
 always opposite to them; hypogynous or epipetalous. *Ovary* 1-celled, with free
 local placentation. *Leaves* rarely opposite, exstipulate. Herbs or shrubs, rarely
 trees.

Order MYRSINÆÆ.

Flowers regular, hermaphrodite, polygamous or dioecious. *Calyx* 5-, or rarely
 4- or 6-lobed or toothed, free, or rarely adnate to the ovary, the lobes contorted or
 very rarely valvate in bud. *Corolla* tubular, bell-shaped, or rotate, more or less
 divided into as many lobes, or rarely distinct petals, as there are divisions to the
 calyx, usually imbricate, and often contorted. *Stamens* as many as corolla-lobes,
 and opposite to them, all fertile, or rarely alternating with as many staminodes.
Filaments usually very short, free, or rarely connate. *Anthers* 2-celled, the cells
 opening by longitudinal slits, or rarely on the summit, sometimes chambered. *Ovary*
 free, or adnate to the calyx, 1-celled, the cells with several (usually ovoid or
 turbinate) ovules, attached to or immersed in a central placenta, which is usually
 quite free, thick, and globular. *Style* simple, with a simple capitate or rarely lobed
 stigma. *Fruit* an indehiscent berry or drupe, or very rarely splitting lengthwise
 on one side. *Seeds* several or usually solitary, with a thin testa. *Albumen* horny
 or almost fleshy, or rarely none. *Embryo* filiform, usually curved, the radicle longer
 than the semi-convex cotyledons. Trees or shrubs, rarely under shrubs, sometimes
 scandent, the soft parts often marked with resinous dots, with alternate simple leaves.
Stipules none. *Flowers* small, in axillary clusters, racemes, or panicles, or rarely
 in terminal panicles.

Sub-order EU-MYRSINEÆ.

Fruit an indehiscent berry or drupe. Seeds with albumen.

ARDISIEÆ.

Staminodes none. Anthers not transversely chambered. Ovary inferior to superior.

* Ovary inferior or half-inferior (*Masea*).

MÆSA, Forskahl.

Corolla bell-shaped or nearly so, imbricate in bud. Calyx 2-bracted. Drupe crowned by the calyx-limb, globular. Erect shrubs or trees.

* All parts, also the inflorescence, quite glabrous.

× Inflorescence very short (hardly as long as the petioles).

M. ANDAMANICA, Kz.

Tropical forests of South Andamans.

M. verrucosa, Scheff.

Branchlets verrucosæ. Leaves minutely and remotely callus-toothed.

× × Inflorescence very much longer than the petioles.

† Leaves entire.

M. RAMENTACEA, Roxb.

All over Burma, the Andamans, and

M. glabra, Roxb.

Kamorta.

M. Sumatrana, Scheff.

Racemes compound, shorter than the leaves.

† † Leaves coarsely serrate.

M. INDICA, D.C.

Chittagong. Khakyen Hills. Pegu Range.

Tenasserim up to 3000 feet.

Racemes compound, shorter than the leaves. Calyx only $\frac{1}{2}$ line long.

M. PANICULATA, A. D.C.

Tavoy.

Racemes compound, very slender, as long as or longer than the leaves. Calyx nearly a line long.

** Inflorescence, and more or less also the sinuate-toothed leaves and softer parts, pubescent or otherwise hairy.

M. MOLLISSIMA, A. D.C.

Khakyen Hills. Pegu Range and

M. permollis, Kz.

Martaban.

Leaves softly pubescent, especially beneath. Panicles or racemes dense, rusty pubescent, shorter than the petiole. Bracts minute.

M. MUSCOSA, Kz.

Ava (probably).

Leaves glabrous, midrib beneath sparingly hairy. Panicles densely rusty-hairy and mossy, much longer than the petioles. Bracts about as long as the pedicels.

Mason gives M. LANCEOLATA, Voight, which is probably one of the above species.

** Ovary superior. Drupe glabrous (*Ardisiæ*).

× Flowers pedicelled, clustered, lateral or axillary.

MYRSINE, Linnæus.

Corolla gamo- or rarely poly-petalous, imbricate or valvate. Flowers often polygamously diœcious. Ovules few. Erect trees or shrubs.

* Stigma 2-3 lobed, usually fringed.

× Style longer or shorter. Leaves more or less serrate, especially towards the apex.

M. SEMISERRATA, Wall.

Hills East of Toung-ngoo at 6000 feet.

Pedicels thick, 1-2 $\frac{1}{2}$ lines long.

× × *Stigma almost sessile. Leaves entire.*

M. AVENIS, D.C. Hills East of Toung-ngoo at 4000 to 7000 feet.

Leaves exactly those of *M. capitellata*. Pedicels thick, shorter than the flower or drupe. Stigmas small.

I am not sure whether the Burmese tree is Blume's species, which I have not seen. Scheffer's *M. arenis*, from Banca, is hardly the same as Blume's (Kurz).

* * *Stigma simple, linear and usually thick. Leaves entire.*

M. CAPITELLATA, Wall. Ava. Prome and Nat-toung in Martaban
M. lucida, Wall. (fide Mason). Kamorta (K.).

Flowers almost sessile or shortly pedicelled, densely clustered; lateral nerves thin, usually distinct.

Of this species there are two forms, or more likely two distinct species,—the genuine one, represented also in Burma, which has clustered sessile or almost sessile flowers, and the nerves of which are thin but pretty distinct,—and the pedicellate form, the flowers of which rest on short thick pedicels, and this also has the lateral nerves very obsolete (Kurz).

× × *Flowers in racemes or panicles.*

SAMARA, *Linnaeus*.

Corolla of 5 or 4 free petals imbricate in bud. Anthers as long as or shorter than the filaments. Ovules few. Climbers.

* *Inflorescence terminal, or terminal and axillary. Filaments short and thick.*

× *Leaves glabrous.*

S. (EMBELIA) RIBES, Burm. var. *a* Chittagong and Tenasserim.

Branchlets and inflorescence greyish or tawny velvety or puberulous. Pedicels terete.

S. SESSILIFLORA, Kurz. Karen hills (probably).

As preceding, but the velvety pubescence always greyish. Flowers sessile.

Probably only a sessile-flowered variety of the preceding species.

S. (EMBELIA) FLORBUNDA, Wall. Nat-toung in Martaban, at 6000 to 7200 feet.
E. garciniaefolia, Miq.

All parts, also the inflorescence, quite glabrous. Pedicels 4-cornered.

* * *Inflorescences axillary only. Filaments longer than the anthers, slender and filiform. Young shoots more or less pubescent.*

× *Leaves beneath more or less pubescent (at least the nerves). Flowers 5-merous.*

† *Leaves on long petioles.*

S. (EMBELIA) ROBUSTA, Roxb. var. *β* all over the Pegu Range and Tenasserim.

E. picta, D.C.

E. villosa, Wall.

Leaves 3-5 inches long. Racemes elongate. Pedicels short.

The extreme forms of *Embelia robusta* and *E. villosa* look very different, but they offer no characters for a safe distinction. The length of the pedicels and of the bracts and the thickness of the rachis of the racemes vary as much as the indumentum. The striae on the drupes of *E. robusta* are not always present (Kurz).

S. (EMBELIA) VESITA, Roxb. Along streams in the Pegu Range.

E. nutans, Wall.

Leaves 2-2½ inches long. Racemes short. Pedicels very long and slender.

†† *Leaves almost sessile.*

S. (EMBELIA) PARVIFLORA, Wall. Khakyen hills.

Leaves $\frac{1}{2}$ –1 inch long, distichous, not pellucid-dotted, only the midrib puberulous. Racemes very short and almost umbel-like.

×× *Leaves quite glabrous. Flowers 4-merous.*

S. (MYRSINE) MYRTILLUS, Hook.

Leaves $\frac{1}{2}$ –1 inch long, serrately 3-toothed at the apex, conspicuously gland-dotted beneath. Racemes very short and almost umbel-like.

Kurz adds from the Nicobars:

S. (EMBELIA) MICROCALYX, Kz. Tropical forests of Kamorta.

Allied to *E. canesens*, Jack.

ARDISIA, Sw.

Corolla gamopetalous, usually rotate, twisted in bud. *Anthers* longer than the filaments, free. *Ovules* numerous. Trees, shrubs, or under shrubs.

* *Panicles irregularly branched and compound, terminal, or accompanied by smaller ones in the axils of the upper leaves.*

+ *Pedicels much shorter than the calyx, or the flowers almost sessile.*

A. RIGIDA, Kz. Tenasserim (or Andamans).

Leaves entire. Panicle stiff and stout, rusty puberulous. Calyx-lobes acute.

×× *Pedicels much longer than the calyx.*

† *Leaves entire.*

A. PANICULATA, Roxb. Chittagong Hills.

Leaves coriaceous, decurrent on the strong petiole, the nerves arising at an acute angle. Panicle glabrous or nearly so. Peduncle angular.

A. ANCEPS, Wall. Tropical forests of Tenasserim up to 3000 feet.

A. Blumei, D.C.

Leaves almost chartaceous, not decurrent, the nerves diverging almost reetangularly, numerous. Panicle slightly puberulous. Peduncle compressed.

Scheffer attributes black berries to the Blumean species, while the Roxburghian has them white when fully ripe (Kurz).

A. NERIIFOLIA, Wall. Ava Hills (probably).

Leaves chartaceous. Panicles rusty-puberulous, chiefly from the axils of the upper leaves. Calyx-lobes lanceolate.

†† *Leaves serrulate.*

A. SERRULATA, Kz. Ava Hills (probably).

Habit of the preceding. Calyx-lobes linear.

** *Flowers in racemes often contracted umbel-like, rarely the racemes or umbels simply compound, axillary, lateral or axillary and terminal.*

× *Umbels in small axillary corymbs or cymes (Pimlandra, D.C.).*

A. EUGENIIFOLIA, Wall. Martaban at 4000 feet.

Nearly glabrous. Leaves thin coriaceous. Flowers minute. Cymes rusty velvety, of the length of the petiole.

×× *Umbels or racemes simple or compound.*

† *Umbels forming a simple terminal panicle.*

A. ANDAMANICA, Kz. Tropical forests of the Andamans.

Very like *A. attenuata*, but umbels panicled. Leaves much dotted. Pedicels $\frac{1}{2}$ -1 inch long.

So very near to *A. oblonga*, D.C., that the inflorescence only distinguishes it.

†† Umbels or racemes simple, very rarely slightly compound, axillary or lateral, rarely spuriously terminal, i.e. arising laterally from the summit of an axillary shoot.

○ Leaves entire.

‡ Calyx-lobes acute or acuminate, lanceolate or narrow.

A. GRANDIFOLIA, D.C.

Tavoy.

Racemes almost terminal, umbel-like, puberulous.

‡‡ Calyx-lobes broad, rounded or blunt.

△ Young shoots, and often also the inflorescence or under surface of leaves, puberulous or pilose.

A. AMHERSTIANA, D.C.

Pegu and Tenasserim.

Kyet-ma-ōk.

Pedicels 8-10 lines long, recurved. Calyx-lobes a line long.

△△ Quite glabrous.

A. POLYCEPHALA, Wall.

Salween River above Murgyee. var β Tropical forests of the Pegu Range and Martaban.

Pedicels $\frac{1}{2}$ inch long. Leaves 5-10 inches long, obovate-lanceolate.

var. β *acuminata*. Leaves acuminate, the nerves strong and anastomosing within the margin of the leaves. Probably a distinct species.

A. OBLONGA, A. D.C.

Tropical forests of Tenasserim and the Andamans.

Pedicels about an inch long. Leaves 3-5 inches long. Corolla-lobes nearly $2\frac{1}{2}$ lines long.

A. HUMILIS, Vahl.

Tropical forests of Arakan, Pegu, and Martaban.

A. solanacea, Roxb.

Leaves 3-5 inches long, obovate-lanceolate, the lateral nerves rather distant, thin but strong, irregular.

A. LITTORALIS, Andr.

Beach jungles of Tenasserim, the Andamans, and Nicobars.

A. obovata, Bl.

A. umbellata, Roxb.

Climacandra obovata, Miq.

Very similar to the above, but the leaves more coriaceous, the lateral nerves rather crowded, straight, thin, and often obsolete.

○ Leaves more or less serrate or crenate (at least towards the apex).

‡ Inflorescence peduncled, simple.

△ Calyx-lobes bluntish.

A. WALLICHII, D.C.

All over Pegu and Tenasserim.

Glabrous or the young shoots and slender-bracted racemes puberulous. Leaves acute.

A. BRANDISIANA, Kz.

Salween River near Toung-yit-seik.

Glabrous. Leaves blunt. Racemes umbel-like, puberulous or glabrous, somewhat shorter than the leaves.

△△ Calyx-lobes acute.

A. HELPERIANA, Kz.

Tenasserim.

Rusty tomentose or pubescent. Leaves acuminate.

‡ ‡ *Racemes peduncled, simply compound.*

A. MEMBRANACEA.

Khakyen Hills.

Habit of *A. crispa*, but leaves larger and green. Callous, repand-toothed, gland-dotted beneath. Pedicels up to $\frac{1}{2}$ inch long. Berries striate, the size of a pea.

A. VIRENS, Kz.

Racemes divaricately corymbose and spuriously terminal. Pedicels up to 2 inches.

‡ ‡ ‡ *Inflorescence umbellate, sessile, or at least the primary racemes sessile and the lateral ones peduncled.*

A. CRISPA, D.C.

Martaban at 4000 to 7000 feet.

A. crenulata, Lodd.

A. crenata, Roxb.

A. lentiginosa, Bot. Reg.

A. densa and *polysticta*, Miq.

A. macrocarpa, Wall.

Umbels sessile, like the leaves glabrous. Calyx-lobes a line long.

Thunberg's species has not only a different nervature, but is characterized also by the numerous conspicuous gland-dots. Khasi specimens (Hb. Hf. and Th. No. 41), however, seem identical with the Japan plant (Kurz).

A. VILLOSA, Roxb.

Var. *a* Tavoy and Taipo mountain in Martaban at 4000 feet.

Leaves beneath and the sessile umbels brownish or rusty tomentose. Calyx-lobes $2\frac{1}{2}$ lines long.

var. *a* *Rohburghiana*. Leaves more or less rusty pubescent, at least on the nerves.

var. *β* *glabrata*, Bl. Leaves glabrous at least when full grown. Calyx glabrous or nearly so.

Mason gives the following names for various *Myrsineæ* in Sgau-Karen: Lac-kho-mau-thu, Lac-kho-mau-ghau, Lac-kho-mau-wā, and Lac-kho-mau-hpā-do.

Sub-order ÆGICEREÆ.

Fruit a dry cylindrical follicle-like drupe rupturing irregularly. Seeds elongate, germinating while still on the tree. Albumen none. Anther-cells many-chambered.

ÆGICERAS, Gaertner.

Corolla twisted in bud. *Filaments* connate at the base. *Flowers* in umbels. Trees.

Æ. (RHIZOPHORA) CORNICULATA, L. Tropical Coast forests of Arakan, Tenasserim,

Æ. majus and *minus*, Gaertn. the Andamans and Nicobars.

Æ. fragrans, Koen.

Bu-ta-yat.

Mason says "This large shrub, when in bloom, is covered with small white flowers, which seem to have great attractions for the fireflies. In moving up the streams near the sea-board on a dark night these trees are often seen illumined with myriads of waving brightning wings,

Retreating, chasing, sinking, soaring,

The darkness of the copse exploring.

and making them look in the deep gloom like superb candelabra hung with living lamps."

Order PRIMULACEÆ.

Corolla monopetalous, hypogynous, or rarely perigynous, or wanting, isostemonous, aestivation contorted or imbricate, very seldom none. *Stamens* opposite to the corolla-lobes. *Ovary* free, or very rarely inferior, 1-celled; placenta central, globose, many-ovuled. *Ovules* fixed by their ventral face. *Fruit* a capsule. *Embryo* albuminous.

PRIMULÆÆ.

Capsule quite free (not adnate to the base of the calyx), dehiscent usually by longitudinal valves.

LYSIMACHIA, *Linnaeus.*

Corolla rotate or bell-shaped, with gibbose swellings at the throat. Capsule usually 5-valved. Erect or creeping simple or branched herbs. Flowers solitary and axillary, or in racemes or spikes.

* *Flowers solitary or by pairs in the leaf-axils.*

L. LINEARIFOLIA, Griff. Ava (probably).

Glabrous. Stem erect, terete. Leaves linear. Flowers slenderly pedicelled.

L. PEDUNCULARIS, Wall. Ava. Taong-dong. Zwā-ka-bin (*vide* Parish).

Glabrous, erect, the stem 4-cornered. Flowers slenderly pedicelled. Leaves lanceolate.

** *Flowers in terminal racemes.*

× *All parts glabrous.*

L. MULTIFLORA, Wall. Bhamo.

Stamens shorter than the petals, narrowly bordered.

L. LOBELIODES, Wall. Khakyen Hills.

Stamens exserted. Sepals broadly-white-bordered.

× × *Stems and racemes (glandular?) hairy.*

L. GRIFFITHIANA, Kz. Ava (near Karmein).

Habit of *L. lobelioides*, corolla twice the length of the calyx.

Order PLANTAGINEÆ.

Corolla monopetalous, hypogynous, generally isostemonous, aestivation imbricate. Stamens 4 (rarely 1), inserted on the corolla, or hypogynous. Ovary 1-1-celled. Orules peltate. Fruit a capsule or nucule. Seeds fixed by a ventral hilum. Embryo parallel to the hilum, albuminous, straight, or curved.

PLANTAGO, *Linnaeus.*

P. MAJOR, L. Khakyen Hills.
var β *asiatica*, L.

Endlicher places *Plantagineæ* near *Plumbagineæ*, and I believe this to be the true affinity, for, with the exception of the stamens being alternate with the petals, the characters are all reducible to the Plumbaginaceous type (Kurz).

Order PLUMBAGINEÆ.

Flowers hermaphrodite, regular. Calyx tubular, often enlarged and scarious, or petal-like at the apex, with 5 prominent ribs usually ending in as many teeth. Corolla of 5 petals free, or more or less united, twisted-imbricate in bud. Stamens 5, inserted at the base of the corolla or petals, opposite and often more or less adnate to them. Anthers versatile, 2-celled, the cells opening by longitudinal slits. Ovary 1-celled, with a solitary ovule suspended from a filiform placenta, erect from the base. Styles 5, distinct, or united at the base. Capsule 1-seeded, not, or irregularly dehiscent. Seed solitary, with a thin testa. Albumen rarely abundant, usually scanty or none. Embryo straight, with a superior radicle. Herbs or rarely under shrubs or small trees with radical or alternate entire or lobed leaves. Flowers in terminal heads, spikes, or panicles.

STATICEÆ.

Styles entirely, or at least at the summit, free. Fruit an utricle bursting at the base or circumsciss at the top.

ÆGIALITIS, R. Brown.

Styles glabrous, free. Stigmas capitate. Petals coriaceous, jointed beyond the connate base. Fruit elongate, exserted. Albumen none. Small trees.

Æ. ANNULATA, R. Br.

Chittagong, Tenasserim, and the Andamans.

Æ. rotundifolia, Roxb.

PLUMBAGIÆ.

Styles entirely connate. Pericarp more or less dehiscent into 2 valves.

PLUMBAGO, Linnæus.

Calyx glandular-muricate. Fruit included in the calyx. Herbs.

P. ZEYLANICA, L.

In rubbishy spots all over Burma.

Spikes glandular-pubescent. Corolla white. Bract ovate, leafy. Bractlets subulate.

* P. ROSEA, L.

Ava. Pegu Range and Tenasserim.

P. coccinea, Boiss.

Ken-khyok-ni. (Red flowers.)

* P. ZEYLANICA, L. (M.).

Ken-khyok-hpyu. (White flowers.)

* P. CAPENSIS, Thunb. (M.).

The roots of Plumbago contain an acrid and vesicating juice, made use of by beggars to create sores.

ERICALES.

Corolla hypogynous. Stamens as many, or twice as many, as the corolla-lobes, epipetalous or hypogynous. Ovary 1- or many-celled, cells 1- to many-ovuled. Stigma simple, entire or lobed. Seeds minute.

Order EPACRIDÆ.

Flowers regular, hermaphrodite. Calyx of 5, rarely 4, distinct sepals, much imbricate in bud. Corolla with a cylindrical bell-shaped or urceolate tube, the limb 5- rarely 4-lobed, valvate or variously imbricate, rarely the petals all distinct. Stamens as many as corolla-lobes or rarely fewer, hypogynous and free, or more or less adnate to the corolla-tube. Anthers versatile or rarely adnate, 1-celled (more or less perfectly 2-celled before dehiscence), opening by a single longitudinal slit into 2 valves, leaving no, or only a thin, slightly prominent longitudinal dissepiment. Hypogynous-disk annular or cupular, entire, lobed or consisting of 5 distinct scales, rarely wanting. Ovary superior, 5- or fewer (rarely 6-10)-celled, the cells with a solitary or several pendulous ovules. Style simple, terminal, or spuriously lateral, rarely almost basal. Stigma small, capitate or peltate, rarely slightly lobed. Fruit in the 1-ovuled genera indehiscent, and in the several-ovuled ones more or less drupaceous, capsular and loculicidally dehiscent. Embryo terete or nearly so, much shorter than the albumen, the radicle next the hilum.

An almost exclusively Australian Order. A very few species have been found in the Indian Archipelago and Malaya.

LEUCOPOGON, Linnæus.

L. MALAYANUS, Jack.

Tenasserim.

Order VACCINIACEÆ.

Corolla monopetalous, epigynous, diplostemonous, aestivation imbricate. *Stamens* epigynous. *Anthers* of 2 bipartite cells, opening by 2 pores at the top. *Ovary* inferior, many-celled. *Ovules* anatropous. *Fruit* fleshy. *Embryo* albuminous. *Stem* woody.

* *Calyx* jointed with the pedicel.

VACCINIUM, *Linnaeus*.

Calyx terete. *Corolla* various, from large and tubular and bell-shaped to small urn-shaped. *Anthers* 8 or 10, the tubes short or long.

Sub-genus AGAPETES, *Don*.

Flowers large, rarely small. *Pedicels* more than an inch long, thickened upwards and often cup-shaped-dilated at the apex. Epiphytical shrubs.

* *Corolla* large, $\frac{1}{2}$ -2 $\frac{1}{2}$ inches long, tubular to bell-shaped, slightly curved or straight.

° *Filaments* more than $\frac{1}{2}$ inch long.

V. MACROSTEMON, *Kz.*

Martaban at 4000 to 6000 feet.

Anthers short, connate. *Corolla* tubular, slightly curved. *Racemes* glabrous.

° *Filaments* thick and short, only 1-2 lines long.

× *Calyx* and *pedicels* glandular-hirsute.

V. (AGAPETES) VERTICILLATUM, *D. Don*.

var. β on Kambalu-toung on the Pegu Range at 2800 to 3000 feet.

Corolla glabrous, tubular or campanulate-tubular. *Anthers* without bristles between the tubes.

var. α *Thibaudia obliqua*, *Griff.*

var. γ Tenasserim North of Tavoy at 4000 to 7000 feet.

Flowers in shortly peduncled umbel-like racemes.

var. β *Flowers* solitary or by twos or threes in the axils of the leaves.

var. γ *Corolla* $1\frac{1}{2}$ inch long.

× × *Calyx* and *pedicels* quite glabrous.

+ *Anthers* without a pair of reflexed or uncinate bristles between their tubes.

V. (AGAPETES) VARIEGATUM, *Don*.

Maulmain District.

Thibaudia micrantha, *Hook.*

Ceratostemma variegatum, *Roxb.*

Anthers exserted. *Nerves* of leaves uniting into a marginal nerve. *Corolla* 2 inches long or longer.

V. ROYLEI, *Kz.*

Martaban at 3600 to 5000 feet.

Thibaudia variegata, *Royle*.

As preceding, but *corolla* only half the size, scarlet.

V. (CERATOSTEMMA) MINIATUM, *Griff.*

Ava (probably).

Anthers included. *Nerves* of leaves not uniting within the margin.

++ *Anthers* with a pair of bristles between their tubes at the base or half-way up.

V. (CERATOSTEMMA) ANGULATUM, *Griff.*

Ava. Patkaye Ranges.

Corolla tubular, bell-shaped. *Calyx* toothed, the teeth subulate-lanceolate.

V. CAMPANULATUM, *Kz.*

Nat-toung in Martaban at 7000 feet.

Corolla bell-shaped, wide. *Calyx*-limb cupular, with sinuate acute teeth.

** *Flowers* rather small or small, $\frac{1}{2}$ inch to 2 lines only long, shortly or elongate-urn-shaped (*Corallobotrys*, *H. f.*).

V. (THIBAUDIA) AURICULATUM, *Griff.*

Taipo Hills, Martaban at over 4000 feet.

Corolla $\frac{1}{2}$ inch long, elongate-urceolate. *Flowers* in peduncled terminal racemes.

V. (AGAPETES) ACUMINATUM, D. D. n. Maulmain district.

Corolla 2 lines long, urn-shaped. Flowers in short umbel-like racemes arising laterally from the branches.

Sub-genus EPIGYNIUM, Klotsch.

Flowers small, urn-shaped or urceolate-campanulate. Pedicels short, slender, not or only at the very joint thickened. Racemes one-sided. Berries globose.

* *Epiphytical shrub. Bracts deciduous.*

V. PUMILUM, Kz. Epiphytic on the Martaban Hills at 5000 to 6000 feet. var. β Taipo Hill at 4000 feet.

Branchlets pubescent. Corolla villous inside at the mouth. Anthers with 2 bristles at the tubes.

V. (THIBAUDIA) LORANTHIFLORA, Wall. (M.).

** *Terrestrial shrubs or trees. Bracts deciduous.*

V. (EPIGYNIUM) DONIANUM, Klotzsch. Hills East of Toung-ngoo at 3000 to 6000 feet.

All parts, also the pedicels, corolla, and calyx, glabrous.

V. EXARISTATUM, Kz. Martaban at 3000 to 6000 feet.

Young shoots and racemes (sometimes also the calyx) pubescent. Corolla glabrous. Possibly only an exaristate form of *V. Leschenaultii*, Wight. *V. Malaccense*, one of this vicinity, differs in the puberulous corolla (Kurz).

The succulent berries of different species of *Vaccinium*, as Bilberries, Whortleberries, Cranberries, are pleasant and acid, and valued as antiscorbutics.

§§ *Corolla hypogynous or perigynous.*

* *Flowers usually regular.*

Order ERICACEÆ.

Calyx more or less deeply 5- or 4-lobed, or toothed, the tube adnate to the ovary, or quite free, sometimes very short. *Corolla* inferior or superior, the tube ovoid and globular to elongate, the lobes valvate or imbricate, very rarely as many as corolla-lobes, inserted within the corolla, but free from it. *Anthers*, 2-celled opening at the summit by 2 separate pores or oblong slits, or rarely by 2 longitudinal slits. *Hypogynous* disk very small or none. *Ovary* usually with as many cells as corolla-lobes, rarely more or fewer (3 or 2), the cells with 1 or several ovules attached to the axial placentas. *Fruit* either capsular, or succulent and indehiscent. *Albumen* fleshy. *Embryo* straight, often small. Shrubs or small trees, terrestrial or epiphytic, with simple, usually alternating pinninerved or 3-nerved leaves. *Flowers* solitary and axillary, in short clusters or heads, or in terminal racemes or corymbs.

ERICIÆ.

Corolla deciduous or persistent. Fruit a capsule.

* *Capsule loculicidally 5-6-valved (Andromediæ).*

GAULTHERIA, Linnæus.

Calyx 2-bracted at the base. *Corolla* urceolate, the revolute limb 5-cleft. *Stamens* 10. *Anthers* 2-cleft, the cells terminating in 2 awns. *Hypogynous* scales 10, usually united at the base. *Calyx* fleshy or succulent in fruit.

G. PUNCTATA, Bl. vars. β and γ in the Martaban hills at 6000 to 7000 feet.

The forms here brought together vary greatly in the length of the petiole, the pubescence of the corolla inside, size of plant, etc., and require further study.

ANDROMEDA, *Linnaeus*.

Corolla globular to tubular-urn-shaped, the reflexed limb 5-toothed. *Stamens* 10, included. *Anther-cells* usually 1-awned. *Calyx* open in bud, dry in fruit.

O. OVALIFOLIA, Wall. Martaban hills at 5000 to 7000 feet.
The leaves of this plant poison goats.

** *Capsule dehiscing septically from the apex (Rhododendricæ)*.

RHODODENDRON, *Linnaeus*.

Corolla funnel- or bell-shaped, 5-cleft. *Stamens* 5 or 10, declinate. *Anthers* opening by terminal pores. *Capsule* 5-celled.

* *Leaves shortly appressed tomentose or lepidote beneath. Calyx inconspicuous.*

R. ARBORIUM, Sm. Hills of Karen-ni (vide Mason).

Leaves beneath silvery and shortly tomentose beneath. Ovary rusty puberulous. Bracts of leaf-buds villous.

R. FORMOSUM, Wall. var. α Nāt-toung in Martaban at 7200 feet. var. β Maulmain hill.

Leaves beneath and ovary and style rusty lepidote. Bracts of leaf-buds silky ciliate only.

var. β *Vitchianum*, Hook. Flowers nearly twice the size. Leaves not ciliate.

** *Leaves glabrous and smooth.*

R. MOULMEINENSE, Hook. Tenasserim at 4000 to 7000 feet.

Ovary and style quite glabrous. Bracts of leaf-buds ciliate.

Near allied to *R. Javanicum*, from which it differs in its perfectly glabrous style and ovary and somewhat different nervation (the lateral nerves arising almost rectangularly from the midrib) (Kurz).

The *Rhododendrons* are too well known as ornamental trees to require notice, those of the Sikkim Himalayas, figured by Sir J. Hooker, being perhaps unsurpassed for beauty. Some species possess narcotic properties, and honey collected where they abound is sometimes unwholesome and stupefying. An elegant red jelly is however prepared from the flowers of a Himalayan species, *R. arborum*. The leaves of *Andromeda* poison sheep and goats. *Gualtheria procumbens*¹ yields a pungent volatile oil called 'oil of winter green' (Hooker), and the bark of *Arbutus* is used for tanning.

Series II. EPIGYNOUS.

OVARY INFERIOR.

(Except in some *Goodeniaceæ* and *Brunoniaceæ*.)

CAMPANALES.

Flowers generally irregular, rarely unisexual or collected into involucrate heads. *Stamens* as many as the corolla-lobes, or fewer. *Ovary* 2- to 6-celled, rarely 1-celled. *Style* simple. *Stigma* often indusiate. *Ovules* numerous in the cells, rarely solitary.

Order CAMPANULACEÆ.

Corolla epigynous, monopetalous, regular, isostemonous, æstivation valvate. *Stamens* epigynous. *Ovary* 1- to many-celled, many-ovuled. *Stigma* without indusium. *Ovules* anatropous. *Fruit* capsular. *Embryo* albuminous.

¹ Prior (Popular Names of British Plants, p. 253) says the name 'Winter green' is applicable to a species of *Pyrola*, but that the rightful possessor of the name is the Ivy, "as being so conspicuously green, when the trees are most of them bare of leaf."

Sub-order *CAMPANULEÆ*.

Corolla regular, more or less bell-shaped to almost rotate. *Anthers* free. *Ovary* 2-3-5-celled.

* *Capsule opening by an apical opercle-like disk.*

SPIENOCLEA, Gaertner.

Stigma shortly 3-lobed. *Ovary* 2-celled. Glauous herbs. *Flowers* in dense spikes.

S. ZEYLANICA, Gaertn.

Wet fields all over Burma.

S. pongatum, D.C.

** *Capsule dehiscing by pores or valves.*

× *Stigma lobed.*

+ *Fruit a capsule. Corolla bell-shaped.*

WAHLENBERGIA, Schrader.

Capsule dehiscing by 3-5 apical valves bearing the septa. Herbs.

W. GRACILIS, D.C.

Fallow lands in Prome.

W. agrestis, D.C.

Campanula dehiscens, Roxb.

++ *Fruit a berry.*

CAMPANUMEA, Fuchs.

Corolla bell-shaped. *Berry* supported by the adherent large calyx-lobes. Twining herbs, the juice milky. *Flowers* yellowish.

C. CANESCENS, Wall.

On rocks and brickwork in Pegu and Martaban.

Cephalostigma spathulatum, Thw.

CODONOPSIS.

C. JAVANICA, H. f. et Th.

Martaban Hills.

C. cordata, Hassk.

C. TRUNCATA, Wall. (M.).

PONGATIUM, Jussieu.

P. INDICUM, Lam. (M.).

CYCLODON, Griffith.

Corolla shallowly bell-shaped. *Calyx-lobes* linear, entire or lacinate, adnate to the base of the ovary or free. Erect annuals, the juice milky. *Flowers* small, white.

C. (CAMPANULA) LANCEFOLIUM, Roxb. (P.).

Chittagoug. Ava. Pegu Range and

C. truncatum, H. f. et Th.

Tenasserim, on rocky walls along

Codonopsis albiflora and distans, Griff.

streams up to 3000 feet.

C. leucocarpa, Miq.

Calyx-segments halfway adnate to the sessile ovary.

PENTAPHRAGMA, Wallich.

Corolla persistent, the tube short. *Stigma* shortly 3-lobed. *Calyx-lobes* broad and blunt. Succulent herbs. *Flowers* in one-sided bracted racemes.

P. (PHYTEUMA) BEGONLEFOLIUM, Roxb. (P.).

Mergui.

× × *Stigma capitate.*

CEPHALOSTIGMA, De Candolle.

Corolla almost rotate, deeply cleft, the lobes linear. *Capsule* dry. Delicate herbs.

C. PANICULATIUM, A. D.C.

All over Pegu and Martaban.

Wahlenbergia perotifolia, WA, Wight, appears to me to belong to *C. hirsutum*, not to the above, as Hooker and Thomson state (Kurz).

The plants of this Sub-Order contain a sweet and abundant mucilage, and the roots of some species are edible, as those of the Raupion (*Campanula rapunculus*). Some species were used in medicine, but have now fallen into disuse.

Sub-order *LOBELEÆ*.

Corolla irregular, usually more or less slit on the back. Anthers united round the style. Ovary 2-celled.

* *Anthers united round the style. Ovary 2-celled (Eu-Lobelia).*

PRATIÆ.

Berry indehiscent. The 2 upper anthers terminated by a single bristle. Herbs.

P. (*LOBELIA*) *NUMMULARIA*, Lamk. Yunzalin plateau at 2500 feet.
Lobelia begoniifolia, Wall.

LOBELIA, *Linnaeus*.

Capsule herbaceous or membranous, dehiscent. The upper 2, or all the anthers bearded. Small or tall herbs.

* *Small erect procumbent or creeping herbs. Flowers solitary or in spurious racemes, small, 1-1 lines long.*

× *Stems terete.*

L. *ZEYLANICA*, L. var. *a* in Tree forests of the Pegu Range and Tenasserim along streams.

Calyx puberulous. Flowers solitary, axillary.

var. *a* *L. Lobbiana*, H. f. and Th.
var. *β* *L. affinis*, Wall.; *L. succulenta*, Bl.

×× *Stems angular.*

L. *TRIGONA*, Roxb. var. *a* swampy spots all over Burma. var. *β* a hill form in Pegu. Martaban and Ava.
L. subincisa, Wall.
L. subracemosa, Miq.

Stems 3-gonous. Calyx quite glabrous. Flowers solitary and axillary, or more usually in spurious racemes.

var. *a* *L. trigona*, Roxb. All parts more succulent, the floral leaves more ovate. Peduncles thicker and flowers much larger.

? var. *β* *L. stipularis*, Wall.; *L. triulata*, Ham. Slender, erect, branched, all parts less succulent. Peduncles filiform. Flowers minute, the floral bracts often very narrow. Probably a distinct species.

Vatke identifies *L. trigona* of Roxburgh with *L. alsinoides* of Lamarek; the description of the latter, however, does not in the least agree with the Indian plant. *L. stipularis*, Wall., will take precedence, if it is not specifically different, but I am at present inclined to believe it may be different.

L. *GRIFFITHI*, H. f. et Th. var. *a* in swampy pastures near Rangoon. var. *β* along rivers in Arakan and Tenasserim.

Stems 4-gonous. Flowers in poor racemes. Calyx small.

var. *a* *genuina*. Leaves reduced to scales. Flowers only a line long.
var. *β* *L. dopatrioides*, Kurz. Leaves developed. Flowers nearly twice the size.

** *Robust erect simple or branched herbs, 2-5 feet high. Flowers $\frac{3}{4}$ -1 inch long, in leafy-bracted terminal simple or paniced racemes.*

L. *WALLICHIANA*, H. f. et Th. Khakyen Hills, Pegu Range and Hills east of Toung-ngoo.

All parts, also the white corolla, quite glabrous. Capsule glabrous.

L. ROSEA, Wall. Khakycen Hills and Karen-ni (fide Mason).
L. trichandra, Wight.

All parts, also the rose-coloured corolla and the capsule, velvety puberulous.

L. TRIANGULATA, Roxb. (M.).

* *L. SUCCULENTA*, Blume (M.). Cultivated.

** *Anthers free. Ovary 1- or 2-celled (Goodeniaceæ).*

SCÆVOLA, Linnæus.

Corolla 1- or 2-lipped, posteriorly split to the base. Soft-wooded trees or shrubs.

S. KÖNIGII, Vhl.

Coasts of Tenasserim, the Andamans,
and the Nicobars.

S. taccada, Roxb.

Glabrous, not or slightly silky-villous in the leaf-axils. Berries glabrous.

Pyn-leh-tan.

Most of the plants of this Sub-Order contain an acrid narcotic and bitter juice, which is vesicatory, and excites violent and fatal inflammation of the intestines; hence they are among the most poisonous of plants. They have been employed as medicine, but are highly dangerous, and fallen into disuse.

Order STYLIDEE.

Corolla epigynous, monopetalous, anisostemonous, aestivation imbricate. Stamens united to the style. Ovary with 2 many-ovuled cells. Ovules ascending, anatropous. Embryo albuminous.

STYLIDIUM, Swartz.

S. FLIGINOSUM, Swartz.

Swampy lands in Arakan, Pegu and Tenasserim.

S. Kunthii, Wall.

S. Brunonis, Griff.

S. tenellum, Swartz.

Leaves palmatinerved, almost rosulate, the stems terete. Flowers white, in dichotomous leafless or few-leaved radical glandular-puberulous spikes or panicles.

S. ROSEUM, Kz.

Swampy land in Chittagong.

S. tenellum, Kz. (non Swartz).

ASTERALES.

Flowers regular or irregular; if unisexual, usually collected in involucrate heads. Limb of the calyx usually reduced to a pappus, or none. Stamens as many as the corolla-lobes, rarely fewer, inserted on the corolla. Ovary inferior, 1-celled and 1-ovuled, or if 2- or 3-celled, only 1 cell ovuled. Leaves exstipulate. Herbs or shrubs, rarely trees.

Order COMPOSITÆ.

Flowers (usually called florets) collected into a head (very rarely reduced to a single or a few florets), surrounded by an involucre of several to many bracts, either in a single or several rows, the whole appearing like a single flower. Receptacle on which the florets rest either naked, or with chaffy scales or hairs or bristles between the florets. Calyx-limb wanting, or transformed into a pappus or ring of hairs or scales on the top of the calyx-tube. Corollas either all hermaphrodite, tubular, and 5- or rarely 4-toothed (heads discoid), or all hermaphrodite and ligulate (i.e. tubular with a flat strap-shaped lamina), or those of the centre or disk tubular, and hermaphrodite or male, and those of the circumference either ligulate and female, or neuter, forming a ray (heads radiate), or filiform and female (heads discoid but heterogamous). Stamens 5, rarely 4, inserted in the tube of the

corolla, the anthers linear and united in a tube round the style (except in *Xanthium*), 2-celled, opening inwards by longitudinal slits, the basal lobes sometimes prolonged into short or long fine hair-like points called tails, the connective usually produced at the top into a small erect appendage. *Ovary* inferior, with a solitary erect ovule. *Style* filiform, usually with 2 short stigmatic lobes. *Fruit* a dry nut or achene, crowned by the pappus, or naked. *Seed* erect, without albumen. *Embryo* straight or rarely curved. *Radicle* inferior. Herbs or shrubs, sometimes scandent, rarely trees. *Leaves* alternate or opposite. *Stipules* none. *Flower-heads* terminal or rarely axillary, solitary, or in panicles or corymbs, sometimes reduced to clusters or heads.

Sub-order ASTERACEÆ.

Florets all tubular or bilabiate, or more usually the outer ones ligulate and forming a ray. *Style-branches* in the female florets always filiform, those of the hermaphrodites variously shaped (in the sterile florets sometimes the style simple). Herbs, shrubs, or rarely trees; the sap usually watery, never milky.

CORYMBIFERIEÆ.

Florets all tubular, or more usually the marginal ones ligulate and forming a ray. *Style* not thickened, joint-like at or near the apex. Herbs, shrubs, or trees, usually aromatic.

* *Flower-heads* heterogamous, radiate or discoid, the hermaphrodite or male florets tubular, and the female ones ligulate or filiform (or rarely the heads homogamous in absence of the ray-florets).

+ *Anthers* free or nearly so. *Female flowers* all apetalous. *Flower-heads* unisexual, rarely heterogamous.

Sub-tribe AMBROSIEÆ.

Style of hermaphrodite florets undivided. *Anthers* inflexed-appendaged. *Pappus* none. *Leaves* alternate.

XANTHIUM, Linnæus.

Male florets numerous, in globular heads, the involucre small, consisting of free bracts in a single row. *Female florets* 2 together, consolidated with the involucre into a prickly burr.

X. STRUMARIUM, L.

Rubbishy spots all over Burma.

X. Indicum, Roxb.

X. Roxburghii, discolor, and brevirostre, Waller.

X. inæquilaterum, D.C.

++ *Anthers* always united into a tube. *Style-branches* truncate or appendaged.

× *Pappus* of short stiff awns or scales, or reduced to a raised border or none at all. *Anther-cells* not tailed at the base. (Genera with a similar or no pappus, not included here, should be sought for in the next division with capillary bristles.)

Sub-tribe HELIANTHOIDEÆ.

Flowers either heterogamous, with the female florets more or less ligulate, the central ones tubular hermaphrodite or male, or rarely discoid, with all the florets hermaphrodite and tubular. *Receptacles* with chaffy scales between the florets, or rarely (in *Helenioidæ*) naked. *Anthers* without tails. *Style-branches* truncate and penicillate, or appendiculate, or the style of the sterile flowers undivided. *Pappus* of stiff awns or of short scales or none. *Achenes* 3-5-gonous, terete, or more usually variously compressed. *Leaves* opposite or rarely alternate.

* *Receptacle* paleaceous.

+ *Pappus* consisting of numerous scales, rarely awn-shaped (or none).

TRIDAX, Linnæus.

Flower-heads radiate. *Involucral bracts* in 2 rows, membranous, or the outer ones herbaceous. *Scales* of pappus feathery-fringed. Herbs, leaves opposite. *Receptacle* flat or nearly so.

T. PROCUMBENS, L.

A weed in Chittagong, Akyab and Rangoon, but not yet spread over the interior.

++ Pappus consisting of only 1-4 bristly awns, or cyathiform, or absent.

× Corolla of all the flowers deciduous.

† Achenes more or less compressed from the top. Pappus of 2 (rarely 4) bristles, or none.

‡ Involucral bracts distinct, almost equal, the outer ones herbaceous, the inner almost conform to the scales of the receptacle.

SYNEDRELLA, Gaertner.

Ray-florets fertile. Achenes almost flat, lacerate-winged, crowned with 2-3 awns. Herbs, leaves opposite. Flower-heads sessile or peduncled.

S. (VERBESINA) NODIFLORA, L.

Arakan, Maulmain and the Andamans, where introduced and spreading. Kamorta.

‡‡ Involucral bracts in 2 rows, the inner ones membranous, often connate at the base or higher up, the outer ones small or minute.

§ Style-branches truncate, penicellate or overtopped by a short appendage.

BIDENS, Linnæus.

Ray-florets sterile, rarely fertile or none. Involucral bracts free or connate at the base. Style-branches terminating in a short acute or shortly subulate appendage. Achenes not beaked, crowned with 2-4 stiff awns, finally minutely retrorsely bearded or aculeate. Leaves opposite, simple to pinnatisect.

Sub-genus PSILOCARPÆA.

Achenes slender, 4-cornered.

B. PILOSA, L.

Hills North of Ava and East of Toung-ngoo at 2000 to 4000 feet.

B. leucantha, Willd.*B. sundaica*, Bl.

Leaves mostly pinnately 4-3-foliolate. Ray-florets white.

B. BIPINNATA, L.

Tavoy.

B. Wallichii, D.C.

Leaves mostly bipinnate. Ray yellow. Slender dry herb.

COSMOS, Cavanilles.

Ray-florets sterile, often rose-coloured or violet. Achenes more or less beaked. Rest as in *Bidens*. Leaves opposite, simple to pinnatisect.

C. CAUDATUS, Hum. Bon. and Kun.

Waste spots near Rangoon.

Florets all purple to rose-coloured. Achenes long and slenderly beaked, the beak terminated by 2 stiff awn-like bristles.

C. SULFUREUS, Cav.

Waste spots near Akyab and Rangoon.

Coreopsis artemisiaefolia, Jacq.*Adenolepis calva*, Schultz.

Florets all yellow. Achenes long, but thickly beaked, the beak without pappus-bristles.

I am not at all sure whether the above synonymy is correct. The same plant (*Adenolepis calva*) has become quite a nuisance about Buitenzorg and other places in Java, entering freely the hill-savannahs (Kurz).‡‡ Achenes all thick, or those of the ray triquetrous, those of the disk laterally compressed. Pappus cyathimorph or of 2-3 stiff chaffy or bristly awns, with or without intermediate scalelets or none (*Verbesinæ*).

‡ Inner involucral bracts (or outer scales of the receptacle) embracing or enveloping the achenes of the fertile ray-florets. Pappus none, or of minute free scales.

ENHYDRA, *Loureiro*.

involucre of 4 broad leafy bracts, the 2 outer larger than the 2 inner. Ray-florets in several rows, with very small ligules. Pappus none. Aquatic herbs, with simple opposite leaves. Flower-heads axillary, sessile or nearly so.

- E. FLUCTUANS, Lour. Swampy grass lands of Bhamo, Arakan and Pegu.
E. heloncha, D.C.
E. paludosa, D.C.
E. longifolia, D.C.
Hingtscha repens, Roxb.

SIEGESBECKIA, *Linnaeus*.

Outer involucreal bracts leafy, narrow, spreading, gland-hairy, the inner ones and the receptacle-scales enveloping the florets. Ray-florets in a single row, with small ligules or almost bell-shaped. Pappus none. Herbs with opposite leaves. Flower-heads paniced.

- S. ORIENTALIS, L. Bhamo and Martaban from 2000 to 7000 feet.
S. brachiata, Roxb.

‡‡ *Inner involucreal bracts all flat.*

§ *Scales of receptacle flat, very narrow, usually only few.*

ECLIPTA, *Linnaeus*.

Involucreal bracts in 2 or 3 rows, the outer ones ovate-oblong. Disk-florets 4-toothed. Ligules small, almost 2-seriate. Pappus none or shortly 2-awned. Style-branches obtuse and flattened. Herbs, leaves simple, opposite.

- E. (VERBESINA) ALBA, L. var. α and β all over Burma and introduced in
E. erecta, L. the Andamans. var. γ Prome.
E. longifolia, Schrad.

§§ *Scales of receptacle concave or complicate, more or less embracing or enveloping the disk-florets.*

‡ *Achenes wingless, compressed or 4-5-cornered.*

△ *Pappus united at the base into a ring or cup. Flower-heads small or rather small.*

WEDELIA, *Jacqueminot*.

Ray-florets fertile, with conspicuous spreading ligules. Disk-achenes crowned by numerous minute scales or fringes or by 1-2 short deciduous awns united at base into a cup or ring, or rarely the pappus very minute or obsolete. Herbs, leaves opposite, simple. Flower-heads peduncled or almost sessile. Florets yellow.

* *Some of the outer involucreal bracts more leaf-like and longer than the others. Pappus cup-shaped.*

W. (VERBESINA) CALENDULACEA, L. Tidal forests of Arakan and Tenasserim.
 Flower-heads on very elongate peduncles, always solitary. Leaves oblong to lanceolate, almost sessile or narrowed into a short petiole.

- W. URTICIFOLIA, D.C. Prome Hills.
Verbesina biflora, Roxb. non L.

Flower-heads rather short-peduncled, usually by pairs or few, axillary, terminal and in the fork of the branchings. Leaves ovate to ovate-lanceolate, slenderly petioled.

** *Outer involucreal bracts not larger than the inner ones. Pappus none or of 2 or 1 deciduous bristles. Flower-heads larger or shorter peduncled, by 2-3 or few, axillary, terminal, and in the branch-forkings.*

- W. (VERBESINA) BIFLORA, L. Tidal forests of Arakan. Tenasserim,
Wallastonia scandens, Clark. the Andamans and Nicobars.
W. Horsfieldiana, Miq.
W. insularis, D.C.

Straggling perennial. Leaves ovate or broadly ovate-lanceolate.

△△ Pappus-scales or awns free from the base. Flower-heads usually large.
 †† Achenes of the disk laterally compressed (those of the ray sometimes dorsally compressed or triquetrous), ciliate or winged on the margins. Flower-heads small.

SPILANTHES, *Linnaeus*.

Ray-florets, if present, fertile. Style-branches truncate and not appendaged. Achenes usually ciliate. Awns of pappus, if present, very thin. Herbs, leaves opposite. Receptacles conical.

S. ACNELLA, L.

var. *a* all over Burma up to 3000 feet.

Prostrate or ascending, branched. Flower-heads solitary in the leaf-axils or in the forks of the branches.

Hen-ka-la,

var. *a genuina*. Achene marginate with the borders, bristly-rough, usually crowned with 1 or 2 bristles.

var. *β calca*, D C. Achenes not, or scarcely marginate, pappus obsolete.

var. *γ oleracea*, Jacq.

S. PANICULATA, Wall.

Pegu and Martaban.

S. acmella, var. *ε paniculata*, Clark.

In my eyes a very distinct species. It is the Ein-bi-zat of the Burmese, used for poisoning fish (Kurz).

TITHONIA, *Desfontaines*.

Ray-florets sterile. Awns of the pappus deciduous or persistent, the intermediate scalelets persistent. Involucral bracts striate at the base, stiff, elongate-leafy at apex. Tall herbs, leaves alternate. Flower-heads on thickened peduncles.

* T. TAGETIFLORA, Desf.

Attaran.

No doubt only an escape from cultivation (Kurz).

** Receptacle naked (*Helenioides*).

TAGETES, *Linnaeus*.

Involucral bracts oily-glandular, in a single row, united into a toothed cup. Pappus of 5-6 unequal scales or awns. Flower-heads usually radiate. Herbs, leaves opposite, pinnatisect or serrate.

* T. PATULA, L.

Cultivated.

Peduncles elongate and almost cylindrical. Involucral bracts plain.

* T. ERECTA, L.

Cultivated; but less commonly.

Peduncles elongate, much swollen at the apex. Involucral bracts almost angular.

Sub-tribe ANTHEMIDIEÆ.

Flower-heads heterogamous, the females ligulate or filiform or without corollas, the disk-florets hermaphrodite or male, or very rarely all the florets tubular and hermaphrodite. Receptacle naked, or very rarely scaly. Anthers tailless. Style-branches truncate or penicillate, rarely shortly appendaged. Pappus none, or reduced to a raised border or rarely of short scales. Leaves usually alternate.

* Receptacle naked, or alveolate fibrillose.

× Flower-heads radiate. Involucral bracts rather broad.

CHRYSANTHEMUM, *Linnaeus*.

Receptacle flat or convex. Achenes regularly or irregularly 5-10-ribbed. Pappus none, or rarely of very short scales or forming a cup.

Sub-genus EU-CHRYSANTHEMUM.

Achenes of the ray almost triquetrous, the inner nerve produced at the apex into a tooth. Pappus scarcely any.

- * *C. CORONARIUM*, L. Cultivated in Ava and Prome.
C. Roxburghii, Desf.
Pyrethrum Indicum, Roxb. non L.

Flower-heads large, on long terminal or almost terminal peduncles. Ray yellow.
 Sub-genus PYRETHRUM.

Achenes oblong, irregularly 3-5-cornered. *Pappus* scarcely any.

- * *C. INDICUM*, L. Ava. Cultivated.
C. tripartitum, Sweet.
C. Chinense, Sab.

Flower-heads numerous, on slender peduncles, in terminal corymbs. Rays yellow, or in garden varieties variously (purple to white and orange) coloured.

C. FENICULACEUM, L. (M.).

Of the *Chrysanthemum leucanthemum*, L., Prior¹ remarks: "Moon Daisy, a large daisy-like flower, resembling the pictures of a full moon, the type of a class of plants, which, on the doctrine of signatures, were exhibited in uterine complaints, and dedicated in pagan times to the goddess of the Moon and regulator of monthly periods, Artemis, whom Horsley (in Hosea ix. 10) would identify with Isis, the goddess of the Egyptians, with Juno Lucina, and with Eileithuia,² a deity who had special charge over the functions of women, an office in Roman Catholic mythology assigned to Mary Magdalene and Margaret."

For the information of non-Catholic readers it may be as well to add: "It is necessary to observe that the monks in the middle ages mixed up with the story of the Magdalene, as recorded in Scripture, that of another St. Mary, whose early life was passed in a course of debauchery. . . . Her penance and pardon were a favourite subject for the legends of all Western Europe. The attributes of the impure Goddess of the Egyptians, Isis, and of the Greek Artemis, and the Roman Juno Lucina, have been transferred in Roman Catholic times to this saint and her counterpart, St. Margaret" (*i.e.* p. 151).

× × *Flower-heads heterogamous, discoid (Cotulce).*

+ *Florets of the circumference few. Achenes obovate or rounded at the top.*

ARTIMISIA, *Linnaeus.*

Involucral bracts in few rows. *Achenes* almost terete or compressed, 2- or thinly many-ribbed or without ribs. Herbs or undershrubs, the leaves dissect to simple. *Flower-heads* small, in racemes or paniced racemes.

Section *DRACUNCULUS.*

Flower-heads heterogamous, the ray-florets in a single row and female, the disk-florets bisexual, but sterile by abortion of the ovaries.

- A. PARVIFLORA*, Roxb. Bhamo and Nat-toung in Martaban (*vide* Mason).
A. glabrata, Wall.

More or less glabrous, the lower leaves simple, obovate-oblong, toothed at the apex.

¹ Popular Names of British Plants, p. 159.

² Among the Romans we know Hithya was a mere title of Diana in her capacity of Lucina, as in the Carmen Sæculare—

Rite maturos aperire partus
 Lenis, Hithya, tuere matres,
 Sive tu Lucina probas vocari
 Seu Genialis.

But in the Homeric poems the functions of the Roman Lucina were assigned to the Hithyie, 'daughters of Juno,' *i.e.* ministers of her functions—

Ὅς δ' ὕτ' ἂν ἀδίνουσαν ἔχη βέλκος ὀξὺ γυναιῖκα,
 Δρ. μὲν, τό τε προΐεσι μογαστόκοι Εἰλειθυῖαι,
 "Ἡρῆς θυγατέρες πικρὰς ἀδίνυς ἔχουσαι.

I. c. XI. 269.

Section *ABROTANUM*.

Flower-heads heterogamous, the ray-florets female, the disk-florets hermaphrodite: all fertile.

- A. VULGARIS*, L. var. *a* Khakyen Hills and Karen-ni (*vide* Mason).
A. leptostachya, D.C. var. *β* Ava and Khakyen Hills.

Leaves once or twice bipinnatifid, the segments rather broad and elongate, more or less greyish or silky-villose beneath. Flower-heads in large panicles.

- A. CURVIFOLIA*, Roxb. Promé.

Leaves twice or thrice bipinnatifid, glabrous, the segments almost filiform, acute. Flower-heads rather large, in loose panicles.

The English name of *Artemisia absinthium*, L., Wormwood, affords a curious illustration of how the sense of words and names gets changed through the errors of copyists and the ignorance of uneducated people. The word was originally *wer-mod* or *wer-muth* from *wehren* or *werian*, to keep off, and *mod*, a maggot or worm. In time *wer* got altered into *worm*, annexing the initial letter of the next word, and *od* (left out in the cold!) naturally got fashioned into *wood*, the more so as the plant, being a bitter one, was considered good against 'worms.'—Prior, Popular Names of British Plants, p. 258.

++ *Florets of circumference very numerous. Achenes flat or concave at the top. Flower-heads spherical or hemispherical.*

COTULA, *Linnaeus*.

Florets of the circumference without any or with a very short broad or conical corolla, the hermaphrodite florets 4-toothed, with a widened or thin tube. *Achenes* flat, obtuse or truncate. *Flower-heads* peduncled. Small herbs.

- C. ANTHEMOIDES*, L. var. *a* Khakyen Hills.
Pleiogyne cardiosperma, Edg. var. *β* Bhamo. Pegu.
 var. *a genuina*. Achenes not winged.
 var. *β hemispherica*, D.C. Achenes winged.

MYRIOGYNE, *Less*.

Florets of the circumference with a 2–3-cleft corolla nearly as long as the style, the hermaphrodite florets 4-toothed. *Bracts* of involucre small and much shorter than the 3–4-cornered achenes. *Flower-heads* sessile, minute. Prostrate herbs.

- M. MINUTA*, Less. All over Burma, and now introduced into the Andamans.
Artemisia sternutatoria, Roxb.
Dichrocephala Schmidii, Wight.
M. Cunninghamii, D.C.
Centipeda orbicularis, Miq. non Lour.
Spheromorpha Russeliana, D.C.
Centipeda minima, A. Braun et Aschers.

CENTIPEDA, *Loureiro*.

As preceding, but involueral bracts large and broad, in fruit connivent and covering the cylindrical slightly striate achenes. Prostrate herbs. *Flower-heads* sessile, small.

- C. ORBICULARIS*, Lour. In dried-up marshes near Radbource (Siam).

×× *Pappus usually of numerous capillary soft bristles (rarely paleaceous or none).*

° *Anthers* tailed at the base.

Sub-tribe INULOIDIEE.

Flower-heads heterogamous, discoid or radiate, or homogamous in absence of the ray-florets. Anthers-cells terminating in a basal bristle or tail. Style-branches linear, obtuse and not appendaged (or the style undivided in the sterile florets). Leaves usually alternate.

* *Female flowers, if present, ligulate.*

× *Bristles of pappus all conform and almost equal, capillary, copious.*

ISULA, *Linnaeus.*

Flower-heads heterogamous. *Involucre-bracts* in many rows, narrow or leafy-appendaged. *Ray florets* few, in 1 or 2 rows, disk-florets numerous. *Anthurs* with double tails. *Achenes* not or 4-5-ribbed. Herbs or under shrubs.

× *Stems not winged. Villous or villous-pubescent under shrubs.*

- I. CAPPA, D.C. Upper Tenasserim at 4000 to 5000 feet, and Ava Hills.
I. pseudocappa, eriophora, and oblonga, D.C.
I. salviodora, Schultz.
Duhaldea Chinensis, D.C.

Bracts of the involucre narrow-linear. Flower-heads corymbose panicled.

× × *Stems leafy-winged from the decurrent sessile leaves. Densely woolly villous. Tall annuals.*

- I. POLYGONATA, D.C. All over Pegu and Martaban up to 2000 feet.

Flower-heads thick, woolly, and rather large, corymbose, the outer involucre-bracts leafy linear-oblong.

- T. OBLONGA (M.).

× × *Pappus unequal, the outer consisting of short bristles or more usually of minute scales, rarely no pappus at all.*

+ *Pappus present (rarely absent).*

PULICARIA, *Gaertner.*

Flower-heads heterogamous, the ray-florets in 1 or 2 rows, yellow. *Involucre* broad, the bracts narrow, in few rows, the outer ones herbaceous. *Achenes* ribbed or not. *Bristles* of inner pappus in a single row, the outer pappus of very short scales more or less connate into a crown or slit cup.

- P. GLAUDESCENS, Clark. Tenasserim (or Andamans).

Evidently no *Pulicaria*, and certainly not identical with the Persian plant. It looks more like *Pluchea*, but the pappus is different. The material at disposal is defective (Kurz).

VICOA, *Cass.*

Flowers-heads heterogamous or homogamous. *Involucre* usually broad, the bracts narrow, in many rows. *Achenes* hardly ribbed. *Bristles* of pappus very thin, in a single row, rarely intermixed with a few minute scales.

- V. (ISULA) INDICA, L. Prome.
V. aurita and auriculata, D.C.
Doronicum calcaratum, Roxb.

- V. INDICA, L.

Slender, more or less roughish. Leaves short. Flower-heads only 2-2½ lines across.

- V. APPENDICULATA, D.C. Ava.

More robust, more glabrescent. Leaves elongate-linear. Flower-heads ½-¾ inches in diameter.

** *Female flowers, if present, filiform.*

× *Style-branches of hermaphrodites usually truncate. Flower-heads androgynous or unisexual, or homogamous. Involucral bracts usually scarious, hyaline or petaloid (Gnaphaliæ).*

+ *Flower-heads 1-flowered. Pappus none.*

CIESLIA, Roxburgh.

Flower-heads clustered, axillary, of 2 bracts only, inserted on the broad receptacle and surrounded by a leafy involucre. *Aquatic* herbs, the leaves simple.

C. AXILLARIS, Roxb. Chittagong.
Meyera orientalis, Don.

++ *Flower-heads many-flowered.*

† *Flower-heads androgynous, usually with more female than hermaphrodite florets, or more or less unisexual, dioecious or monocious, clustered or distinct. Involucral-bracts rarely petaloid.*

° *Hermaphrodite florets all sterile, the style usually entire or scarcely and only very shortly 2-cleft.*

ANAPHALIS, De Candolle.

Flower-heads androgynous or incompletely dioecious, in corymbs, rarely few or solitary. *Bristles* of pappus free from the base. *Inflorescence* not involucred.

A. ROYLEANA, D.C. Ava Hills and hills east of Toung-ngoo
 at 4000 to 5000 feet.

Leaves adnate but not decurrent at the base, 1-nerved. *Flower-heads* peduncled, 3-4 lines in diameter, corymbose.

A. ADNATA, D.C. Martaban between 5400 and 7000 feet.

Leaves more or less decurrent at the base, 1-nerved. *Flower-heads* half the size, sessile and clustered, in corymbs. A densely white adnate-woolly stout herb.

°° *Most or all hermaphrodite florets fertile. Style deeply 2-cleft.*

GNAPHALIUM, Linnaeus.

Flower-heads more or less androgynous, usually small and clustered, rarely solitary, the involucre bracts scarious, often coloured. *Ray-florets* very numerous, disk-florets few. *Bristles* of pappus not feathery, free or united at the base into a ring.

* *Flower-heads corymbose, or the corymbs contracted and almost head-like.*

+ *Leaves linear, with a rounded base half-stem-clasping.*

G. HYPOLEUCUM, D.C. Hills of Ava and Martaban at 4000 to 6000 feet.
G. confertum, Bth.

Tall annual. *Flower-heads* laxly corymbose, the involucre bracts yellow or brown.

×× *Leaves more or less spatulate-linear to cuneate-obovate.*

G. LUTEO-ALBUM, L. All over Burma and its islands up to 4000 feet.
G. confusum, ramigerum, and Javanicum, D.C.
G. multiceps, Wall.
G. orizense, Roxb.
G. Reinwardtianum, Miq.

Silky-villous herb much branched from the base. *Flower-heads* densely clustered, forming leafless more or less lax corymbs, the involucre bracts bright yellow or greyish-pale-yellow.

G. FLACIDUM, Kz. Doab of the Hlein and Irrawaddy, in bamboo
 jungles (*B. arundinacea*).

Simple or almost simple tender herb, thinly viscid-pilose. Leaves obovate-cuneate, almost half-amplexicaul, thinly herbaceous. *Flower-heads* in dense terminal almost head-like corymbs, the involucre bracts almost membranous, often more or less steel-blue coloured.

** *Flower-heads clustered or rarely solitary in the axils of the leaves, and usually gradually passing into a leafy terminal spike or head.*

G. INDICUM, L.

All over Burma.

G. strictum and *multicaule*, Roxb.*G. Niliacum*, Raddi.

Erect or spreading from the base, more or less silky-pilose. Leaves elongate obovate-cuneate. Flower-heads only about a line long, leafy spicate.

G. CRISPATULUM, Del.

Pegu in cultivation.

Prostrate and spreading, the branchings only slightly leaved at the lower parts, more so upwards, the upper leaves forming stellate involucre to the densely crowded leafy heads.

†† *Flower-heads androgynous, with usually fewer female than hermaphrodite florets, or homogamous with the florets all hermaphrodite. Involucral bracts usually scarious.*

×× *Style-branches of hermaphrodite flowers not truncate, filiform. Flower-heads androgynous.*

+ *Female florets supported or enveloped by the scales of the receptacle or by the involucral bracts.*

ATHROISMA, De Candolle.

Flower-heads in dense terminal solitary clusters or short spikes. *Female florets* subtended by the scales of the receptacle. *Achenes* broad, dorsally compressed, ciliate on the margins. *Scales of pappus* very short, united into a ciliate-fringed ring. Herbs, the leaves pinnatisect.

A. LACINIATUM, D.C.

River-beds in Pegu and Tenasserim.

A. viscidum, Zoll.

+ + *Receptacle naked. Involucral bracts herbaceous, or scarious, linear.*

† *Flower-heads small, packed into dense globose or ovoid clusters.*

SPHERANTHUS, Linnæus.

Flower-heads in solitary terminal globular clusters. *Pappus* none. *Anthers* without tails or points at the base.

Sub-genus POLYCEPHALOS, Forsk.

Outer bracts of the flower-heads longer than the flower-heads themselves, scarious and long-awned.

S. PEGUENSIS, Clarke.

Waste spots in Ava and Prome.

Glandular-puberulous, the branches leafy- and serrate-winged; heads shortly peduncled, the empty bracts appressed bristly and ciliate.

Sub-genus EU-SPHERANTHUS.

Bracts shorter than the flower-heads and almost entirely hidden by them. Branches leafy-winged.

S. HIRTUS, Willd.

Fallow lands all over Burma.

S. mollis, Roxb.

Pubescent or hirsute. Heads globose, $\frac{1}{2}$ - $\frac{2}{3}$ inch thick, the involucral bracts tapering into a subulate ciliate point.

S. INDICUS, L.

Prome. Maulmain.

S. microcephalus, Willd.

Glabrous. Heads half the size, the involucral bracts scarious, often jagged at the ends.

PTEROCALON, Elliott.

Flower-heads sessile, in spiked clusters or rarely solitary. *Pappus* of capillary bristles. *Anthers* with short tails or points at the base.

P. BILLIARDIERI, F. Muell.

Fallow lands in Ava and Prome.

P. monticola spicatus, Labill.*P. cylindrostachyum*, Clarke.

†† Flower-heads separate, solitary, corymbose or paniced, rarely clustered.

° Pappus of a few rigid bristles or scales, or none.

EPALTES, Cassini.

Involucral bracts rigid. Anthers with simple tails. Pappus of the female florets none, of the disk-florets small.

E. (ETHULIA) DIVARICATA, L.

Prome Hills.

E. linearifolia and *pygmaea*, D.C.

°° Pappus consisting of copious capillary soft bristles or hairs.

BLUMEA, De Candolle.

Flower-heads racemose, spiked or paniced. Style of the disk-florets all 2-cleft. Involucral bracts narrow-linear, herbaceous or thin scarious. Herbs, rarely shrubs.

* Cauline leaves not decurrent on the branches. Florets golden to pale yellow (except in the white or blue-flowered *B. Wightiana*) (*Aptere*).

× Flower-heads on long peduncles arising singly from the axils of the leaves, or rarely appearing compound from the reduction of the leaves.

B. AMPECTENS, D.C.

In rubbishy spots, Chittagong. Introduced

B. arcnaria and *tenella*, D.C.

into the Andamans.

Conyza amplexicaulis, Lamk.

Shrubby annual. Leaves small, sessile, with broad base and almost half-stem-clasping. Involucral bracts narrowed into filiform tails. Peduncles almost glabrous.

B. BIFOLIATA, D.C.

Chittagong. Pegu.

B. anagallidifolia and *oligocephala*, D.C.

Conyza humifusa, Miq.

Low perennial, branched and ascending from the base, thinly pubescent. Peduncles spreadingly pubescent. Involucral bracts very acute. Leaves rather large, sessile, with a rounded base.

×× Flower-heads in panicles, racemes, or densely packed into shorter or longer spikes.

+ Serratures or teeth of the leaves spiny, indurated at their tips.

B. OXYDONTA, D.C.

Waste spots in the deltas of the Tsittoung and Irrawaddy.

Conyza spinidens, Miq.

Spreading perennial, branched from the base and procumbent, sparingly pilose. Leaves small, the serratures few and coarse. Flower-heads few, forming irregular depauperate panicles.

B. SPINELLOSA, D.C.

Prome.

Erect, simple or branched annual, more or less appressed silky-pilose; leaves rather large, doubled-spiny-serrulate. Flower-heads in regular panicles.

De Candolle's *B. spinellosa* seems to be a spiny-toothed form of the silvery silk-hairy form of *B. hircacifolia*; Clarke's is near *B. lacera* (with slender peduncles), or near *B. barbata*? (Kurz).

++ Serratures or teeth of the leaves various, but never spiny-indurated.

† Herbs, or biennials, simple or branched from the base, and more or less villous, pubescent, or viscid-pubescent, rarely almost glabrous.

° Flower-heads irregularly disposed and more or less peduncled, forming panicles, or rarely the panicle contracted.

△ Receptacle glabrous.

‡ Florets blue to violet, rarely bluish-white.

B. WIGHTIANA, D.C.

All over Burma and introduced into the Andamans.

B. trichophora and *hymenophylla*, D.C.

Tall herb, reduced and small, more or less viscid-pubescent. Leaves simple and petioled. Flower-heads only 2 lines long, on shorter and long filiform peduncles, forming lax panicles.

The colour of the florets and the much smaller size of the flower-heads combined with a viscid pubescence ought to remove all difficulties in distinguishing this species from *B. lacera*, with which Bentham and Thwaites are inclined to combine it. *B. hymenophylla* has pale blue or white florets and is certainly nothing but a slender shade-form which I found in all transitional states in company with *B. Wightiana*, not *B. lacera*, as Clarke states (Kurz).

‡‡ Florets all yellow. Flower-heads in lax panicles. Peduncles slender, although sometimes very short. Annuals, rarely becoming biennials.

B. LACERA, D.C. Waste spots near Akyab and elsewhere. Kamorta.

Erect, branched from the base, more or less silky-villous, but not viscid, the cauline leaves simple and sessile or nearly so. Flower-heads 3–3½ lines long, in panicles sometimes pretty contracted but elongate.

B. GLANDULOSA, D.C. Chittagong.

B. lacera, var. β *Heyneana* and γ *glandulosa*, Clarke.

Erect, branchy, thinly viscid-pubescent, the cauline leaves simple and petioled. Flower-heads about 4 lines long, on long slender glandular peduncles, forming lax panicles.

B. (COXYZA) DIFFUSA, Roxb. All over Burma and the Andamans.

B. virens and *lapsanoides*, D.C.

Erect, branchy, thinly puberulous, the cauline leaves (except in starved states) almost runcinate and petioled. Flower-heads about 3 lines long, with the involueral bracts green and glabrous, on spreading stiff capillary glabrous or glandular peduncles, in lax panicles.

B. LACTUCIFOLIA, D.C. All over Burma.

Erect, simple or branched, almost glabrous or usually more or less hirsute, the cauline leaves (especially the lower ones) more or less runcinate. Flower-heads nearly 4 lines long, with the involueral bracts and the long slender peduncles pubescent, in lax panicles.

var. β *subsimpler*, D.C.; *B. paucifolia*, D.C.; *A. cuneifolia*, D.C. More glabrous and almost simple, the leaves obovate-cuneate and not lobed, but often passing into the runcinate form.

var. γ *viscosula*, Clarke. Densely and shortly glandular-pubescent, the leaves small and rather rigidly runcinate.

var. δ *nudipes*. More hirsute instead of pubescent. Panicles more squarrose. Stem usually naked and destitute of leaves to ¼–½ feet from the ground.

Mr. Clarke refers var. δ to his *B. fasciculata*, but the long peduncled flower-heads and indeed the whole inflorescence are entirely different (Kurz).

△ △ Receptacle hairy. Peduncles slender.

B. LACINATA, D.C. Promé. Meaday.

B. runcinata, *sonchifolia* and *cinroscens*, D.C.

Branched or simple annual, shortly or rarely glandular-pubescent, the cauline leaves usually runcinate. Flower-heads about 3½ lines long, longer or shorter peduncled, forming lax leafless panicles.

◊◊ Flower-heads clustered in the axils of the upper leaves and passing more or less gradually into a contracted spike-like panicle, or crowded in a dense terminal spike, or the sessile clusters remote and in simple or paniced slender spikes.

△ Receptacle hairy. Flower-heads sessile, clustered, or rarely solitary simple or paniced spikes.

- B. (CONYZA) FISTULOSA, Roxb. var. α , β , γ , all over Burma, up to 4000 feet ;
var. δ on laterite in Martaban, and rare in
Prome, up to 3000 feet.

Erect, simple or branched annual, slightly or rarely densely pubescent or pilose, the cauline leaves narrow and simple. Flower-heads about 3 lines long, often pilose or almost woolly.

var. α *fasciculata*, D.C. (*B. fistulosa*, Roxb.). Spikes more or less paniced. Receptacle tawny velvety, the velvet sometimes intermixed with a few white soft hairs.

var. β *racemosa*, Clarke. Spikes almost simple or little branched. Receptacles yellowish velvety.

var. γ *glomerata*, D.C. (*Conyza Burmeana*, Miq.). Spikes more or less paniced. Receptacles velvety, the velvet intermixed with copious soft white hairs.

var. δ *holosericea*, D.C. More simple, thinly silky pilose, the spikes usually simple, rarely with a few additional basal ones, long-silky-pilose. Receptacle shortly white pilose.

The above varieties are, with the exception of δ , hardly worth keeping up. Bentham refers *B. holosericea*, D.C., to his *B. hieracifolia*; but a scrap of Wallich's authentic specimens shows small sessile heads, indeed represents the upper part of the form correctly referred by Mr. Clarke to the above species (Kurz).

$\Delta \Delta$ *Receptacle glabrous. Flower-heads more or less peduncled to almost sessile, clustered in the leaf-axils and forming leafy or leafless contracted spike-like panicles or spikes (rarely the panicle developed).*

- B. BARBATA, D.C. var. α Maulmain. var. β along the Zamayee stream
of the Pegu range and the Thou-kye-gat.

Erect slender annual, long silky-pilose, the leaves all cuneate-oblong to linear. Flower-heads silky-pilose, nearly 4 lines long, on longer or shorter slender peduncles or almost sessile, clustered in the upper leaf-axils and passing into a leafy spike-like contracted panicle.

var. α *genuina*. Leaves broader or narrower. Flower-heads on slender or short peduncles in a diffuse usually long-pilose panicle, or the panicle reduced and raceme-like but laxly contracted.

var. β *sericans*. Leaves more elongate-cuneate to almost linear, appressed silvery pubescent as in *B. lacera*. Flower-heads larger, almost sessile or thickly peduncled, clustered in the axils of the leaves and gradually passing into terminal dense spikes.

- B. HIERACIFOLIA, D.C. var. α Mergui. var. β Ava Hills.

Erect robust annual, villous to silky pubescent, the lower stem-leaves more or less spatulate-oblong or linear. Flower-heads $\frac{3}{4}$ -1 inch long, on short, thick, woolly-tomentose peduncles or almost sessile, forming dense spikes or spike-like (rarely lax) panicles, often accompanied by clusters of flower-heads in the upper leaf-axils.

var. α *typica*, Clarke. Little or not branched except from the base. Flower-heads clustered, forming dense terminal spikes. Radical leaves chiefly developed.

var. β *evolutior*, Clarke. Panicles more or less branched, larger or smaller. Radical leaves none or marcescent.

A species apparently very variable as to inflorescence and habit, the paniced form approaching *B. crinita* and *B. flexuosa* (if these be really distinct from one another), while the subscapiferous forms look somewhat like *Gnaphalium*. *B. lacera*, var. α *subcapitata*, Clarke, is in my eyes the same as Clarke's var. γ *Nilagirica* of this species.

†† *Erect or scandent shrubs or under shrubs, or tall shrub-like biennials.*

○ *Erect shrubs.*

Δ *Peduncles thick and short, densely tomentose. Leaves more or less villous or tomentose, especially beneath. Receptacle more or less hairy.*

B. MACROPHYLLA, D.C.

var. β Martaban at 3000 to 5000 feet,
and Khakyen Hills.

Leaves pubescent, especially beneath, decurrent and entire at the base. Flower-heads 4 lines long, the involucrel bracts narrow, almost glabrous. Pappus rufescent. Receptacle shortly pilose.

var. β *procera*, and *B. semivestita*, D.C. Flower-heads larger. Involucrel bracts densely pubescent. Pappus white.

B. (CONYZA) BALSAMIFERA, L. All over Burma up to 3000 feet. Kamorta.
B. densiflora, *excisa*, and *grandis*, D.C.

Leaves silky to silvery villous beneath, with one or two pairs of small dissevered pinnæ on the petiole. Flower-heads 4 lines long, the involucrel bracts densely pubescent. Pappus rufescent. Receptacle almost glabrous.

$\Delta \Delta$ *Peduncles long and slender, puberulous to glandular-pubescent. Leaves narrow.*

B. AROMATICA, D.C.

Tenasserim.

Glandular-pubescent, especially the leaves beneath, the cauline leaves all sessile, membranous. Flower-heads 4-5 lines long. Receptacle glabrous.

B. SENSIFOLIA, D.C. Martaban and the Andamans; also the Khakyen Hills.

B. myrioccephala, D.C. Kamorta. Trice, Track, and Great Nicobar.
B. squarrosa, Clarke.

Almost glabrous, or the thick almost coriaceous leaves beneath shortly hirsute, the lower cauline leaves long-petioled. Flower-heads 4-5 lines long. Receptacle densely silky pilose to glabrous.

var. *a genuina*. Receptacle more or less densely pilose. Leaves beneath and involucrel bracts often more hairy.

var. β *Conyza lanceolaria*, Roxb., *B. longifolia*, D.C., *B. Wallichii*, Clarke, *Conyza nitida*, Miq., teste Clarke. Receptacle glabrous, or sparingly pilose.

$\circ \circ$ *Scandent shrub. Leaves almost coriaceous, simple.*

B. RIPARIA, D.C.

South Andaman. Kamorta.

Almost glabrous. Flower-heads 5 lines long, in small axillary corymbs transforming into terminal pubescent panicles. Receptacle villous. Pappus white.

** *Cauline leaves decurrent and forming entire or interrupted-lacinate leafy wings. Flower-heads long peduncled. Florets purple or rose-coloured (Cauloptera, D.C.).*

\times *Leafy cauline wings cut or variously interrupted.*

B. AURITA, D.C.

Ava, Pegu, and Martaban.

Leaves pinnatifid-auricled at the base.

B. PTERODONTA, D.C.

Chittagong. Khakyen Hills. Pegu.
Martaban up to 7000 feet.

Leaves entire at the base.

$\times \times$ *Leafy cauline wings all entire and continuous.*

B. ALATA, D.C.

B. Vernonioides, D.C.

Conyza nutans, Bl.

The following doubtful species are also enumerated: *B. napifolia*, D.C., Tavoy; *B. membranacea*, D.C., Prome; and *B. viscosula*, D.C., Ava.

PLUCHEA, Cassini.

Flower-heads corymbose. Some or all of the disk-florets sterile, with a simple style. Involucrel bracts rigid, often broad. Shrubs or under shrubs.

* *Annuals, glabrous. Florets intensely yellow. Corymbs irregular, small.*

- P. (*BLUMEA*) *SENECIOIDES*, D.C. All over Burma. Kamorta (K.).
Erigeron falcatum, Don.
Laggera flava, Bth.
Conyza repanda, Roxb.
P. Doniana, Kz.

Erect, simple or branched, the cauline leaves sessile, with broad rounded base; flower-heads about $2\frac{1}{2}$ lines long, on rather short smooth peduncles.

I place this species only reluctantly in *Pluchea*. But I cannot find any ally to it in *Blumea*, while here it has a very near one in *P. linearifolia* (Kurz).

** *Shrubs or under shrubs. Florets purple to lilac. Corymbs dense, terminal. Receptacle glabrous.*

- P. (*BACCHARIS*) *INDICA*, L. Tidal forests from Chittagong to Tenasserim,
Conyza corymbosa, Roxb. the Andamans, and Nicobars.
P. foliolosa, D.C.

Leaves obovate, blunt or acute. Flower-heads $22\frac{1}{2}$ lines long, the bracts shortly pubescent, bluntnish to acute. Shrub.

°° *Anther-base obtuse, or only mucronate, or acute, but not tailed.*

Sub-tribe ASTEROIDIEÆ.

Flower-head heterogamous radiate, or discoid or homogamous in absence of the ray-florets. Involucral bracts in several or rarely only 2 rows. Anthers with obtuse almost entire base. Style-branches linear, more or less flattened, produced beyond the stigmatic lobes into lips or appendages, papillose on the outside. Receptacle usually naked. Leaves usually alternate.

- * *Female florets, if present, filiform or bell-shaped or 2-toothed.*
 × *Female florets, if present, filiform. Pappus bristly (Conyzice).*

MICROGLOSSA, De Candolle.

Female florets in 1 or several rows, with the corollas minutely ligulate, those on the disk fertile. Pappus-bristles elongate. Involucral bracts in many rows. Shrubs.

- M. (*SONCHUS*) *VOLUBILIS*, Rumph. Khakyen Hill, Martaban, and Tenasserim
Conyza pyriformis, Lamk. up to 3500 feet.
C. prolifera, Bl.

CONYZA, Lessing.

Female florets in many rows, with the corollas shortly filiform (rarely slightly and minutely ligulate), the hermaphrodite florets mostly fertile. Achenes compressed. Pappus-bristles elongate. Involucral bracts in 2 to many rows. Herbs or under shrubs.

* *Flower-heads very small, not above a line long, very numerous, corymbose.*

- C. *PINNATIFIDA*, Roxb. Khakyen Hills and Martaban from 2000
C. absinthifolia, D.C. to 5000 feet.

Erect branches annual, shortly pubescent, the leaves small, simple or 3-cleft. Pappus more or less rufescent.

** *Flower-heads 2-4 lines long.*

× *Pubescence not viscid nor glandular. Leaves serrate to almost lobed, cuncate at base.*

- C. *SEMPINNATIFIDA*, Wall. Banks of large rivers, the Irrawaddy, Tsittoung, etc.

Erect, more or less branched annual, more or less hirsute. Flower-heads spherical, corymbose. Pappus white.

C. VERONICEFOLIA, Wall. Nāt-toung in Martaban at 7000 feet.
C. Japonica, Less.

Erect, simple or more usually branched from the base, hirsute or pubescent. Flower-heads not spherical, in dense terminal corymbs or clusters. Pappus rufescent.

×× *Glandular, otherwise almost glabrous. Leaves almost entire, narrow.*

B. VISCIDULA, Wall. Pegu and Tenasserim between 3000 and 6000 feet.
C. striata, Wall.
C. polycephala, Edg.

Erect, branched. Flower-heads 2-2½ lines long, corymbose on glandular puberulous peduncles. Pappus pinkish to pinkish-white.

THESTIS, *De Candolle.*

Female florets in 2 to many rows, destitute of a corolla, the hermaphrodite florets sterile. *Pappus-bristles* short, somewhat dilated at the base. Herbs.

T. DIVARICATA, D C. Banks of Rivers, as the Megna, Irrawaddy and Tsittoung.

×× *Female florets* in 2 or more rows not exceeding the disk, 2-toothed at the apex or bell-shaped. Herbs (*Granginea*).

CYATHOCLINE, *Cassini.*

Receptacle almost contracted around the margin, raised, the disk concave. *Achenes* not beaked, compressed, bordered with a marginal nerve. *Flower-heads* panicled.

C. LYRATA, Cass. On mossy boulders in streams all over Burma.
Artemisia hirsuta, Rottl.
C. stricta, D.C.

GRANGEA, *Adanson.*

Receptacle convex or conical, naked. *Achenes* produced into a ring or neck, toothed or almost bristly on the margins. *Flower-heads* solitary.

G. (ARTEMISIA) MADERASPATANA, Roxb. A weed all over Burma.

** *Female florets, if present, ligulate.*

× *Ligulate female florets* not yellow (white or rose-coloured to purple).

+ *Pappus* none or very short (*Bellidica*).

MYRIACTIS, *Lessing.*

Involucre broad, the narrow bracts in few rows. *Ligules* in 2 or more rows, small. *Achenes* not or very shortly beaked, oily. *Pappus* none.

M. WALLICHI, Less. Nāt-toung in Martaban at 6000 to 7000 feet.

RHYNCHOSPERMUM, *Reinwardt.*

Involucral bracts in few rows, imbricate. *Ligules* in 2 or more rows, short and broad. *Achenes* beaked. *Pappus* of a few very caducous bristles or none.

R. VERTICILLATUM, Rwdt. Bhamo.

Leptocoma racemosa, Less.

Zollingeria scandens, Schultz.

++ *Pappus* of elongate bristles, rarely short, paleaceous, or awned (*Heterochromica*).

† *Pappus* consisting of very short bristles, scales, or awns, or absent in the ray-achenes.

BOLTONIA, *L'Heritier.*

Receptacle conical or convex. Bristles of *pappus* very short, almost paleaceous, often accompanied by 2-4 awls not exceeding the achene.

- B. (ASTER) INDICA, L. Khakyen.
Calimuris integrifolia, D.C.
Hisutsua Cantonensis, D.C.
H. serrata, Hook.
Chrysanthemum cuneatum, Roxb.

†† Pappus consisting of copious capillary bristles in a single or more rows (rarely depauperate in the ray-achenes).

‡ Ligules rather broad or ample.

CALLISTEPHUS, *Cassini*.

Involucre hemispherical, the outer bracts leafy, the inner ones membranously scarious. Achenes compressed. Outer bristles of pappus very short, and forming a small crown.

- * C. (ASTER) CHINENSIS, L. Cultivated.

†† Ligules numerous, in 2 or more rows, narrow or almost filiform or minute.

ERIGERON, *Linnaeus*.

Involucral bracts in 2 rows, narrow, somewhat unequal. Achenes compressed. Bristles of pappus in a single row, or with a few very short outer ones.

- E. AEGYPTIACUM, L. Pegu and Martaban.
E. asteroides, Roxb.
E. hispidum and *Blumea pubiflora*, D.C.
E. sublyratum, Roxb.
Coryza Jordoni, Clarke.

The ligulate ray-florets seem to be sometimes absent, at least in dried specimens they appear so. The Egyptian plant agrees in all parts with the Indian, but appears to be often ray-less.

Coryza angustifolia, Roxb., appears from the description and MS. figure to be a luxuriant form of *E. Canadensis*, L., or *E. linifolius*, Willd., and is, therefore, hardly an Andamanese plant (Kurz).

Sub-tribe SENECTIONIDIEE.

Flower-heads either heterogamous, with the female florets ligulate or rarely filiform, or sometimes homogamous, with all the florets hermaphroditic and tubular. Receptacle usually naked. Involucral bracts usually in a single row, with or without outer small ones, rarely in several rows and imbricate. Anthers obtuse or shortly 2-mucronate at the base. Style-branches of the hermaphrodites truncate and penicillate, or rarely with pubescent tips or appendages. Pappus of capillary bristles. Leaves alternate.

× Flower-heads radiate or homogamous. Bristles of pappus not feathery.

GYNURA, *Cassini*.

Flower-heads homogamous. Style-branches terminating in an elongate shortly hairy subulate appendage. Rest as in *Senecio*. Herbs, often tuberous-rooted.

- G. NEPALENSIS, D.C. Ava. Tenasserim at 4000 feet (P.).

Pubescent. Leaves rather small, ovate to linear-lanceolate, repand-toothed, acuminate. Peduncles and involucral bracts hoary pubescent.

- G. SINUATA, D.C. Tsittoung Valley.

Pubescent, the root tuberous. Leaves more or less lacinate to pinnatifid. Peduncles and involucral bracts less hairy.

As long as it is young, the plant looks almost scapiferous and the leaves are then simpler and smaller, but at the rate that the tuberous roots enlarge, the plant becomes more robust, larger, and branched from the base with the leaves up to 7 inches long (Kurz).

- G. BICOLOR (M.).

EMILIA, *Cassini*.

Flower-heads homogamous. *Style-branches* terminating in a short or rather long appendage. Rest as in *Senecio*. Herbs.

- E. (CACAËA) SONCHIFOLIA, L. Waste spots all over Burma.
Gynura ecalyculata, D.C.
E. sagittata, D.C.
E. flaccida, Miq.

Achenes papillose-rough. *Style-branches* erect, half-cylindrical, with a short conical appendage. Lower leaves more or less lyrate.

- E. PRENANTHOIDEA, D.C. Hills East of Bhamo.
E. angustifolia, D.C.

Achenes quite glabrous. *Style-branches* elongate, recurved, almost cup-shaped at the apex. Lower leaves elongate-spatulate.

NOTONIA, *De Candolle*.

Flower-heads homogamous. *Style-branches* of hermaphrodites terminating in an ovate appendage. Rest as in *Senecio*. Fleshy glaucous herbs.

- N. CRASSISSIMA, D.C. Hills of Seguin.

SENECIO, *Linnaeus*.

Flower-heads radiate or homogamous. *Involucre* wide or narrow, the bracts narrow, equal, blunt or shortly pointed, the outer ones small or wanting, or rarely gradually longer from below. *Style-branches* truncate or obtuse, or rarely shortly appendaged. *Achenes* 5-10-ribbed. Herbs or rarely shrubs, the leaves alternate or radical.

Sub-genus EU-SENECIO.

Anthems not tailed at the base. *Achenes* all with, or those of the ray without pappus.

* *Achenes all with pappus.*

- S. OBTUSATUS, Wall. Khakyon Hills.

Almost glabrous, the flower-stems almost scapiform. Lower leaves elongate-cuneate-oblong. Flower-heads short-peduncled, in dense corymbs. Achenes of the disk papillose-rough. Pappus white.

- S. GRIFFITHII, H. f. et Th. var. β Martaban Hill at 6000 to 7000 feet.

Almost glabrous or more or less hirsute. Leaves narrow-linear, with involute margins. Flower-heads long-peduncled, few. Achenes papillose-rough. Pappus more or less pubescent.

var. *a genuina*. Leaves longer and glabrous, or nearly so. Flower-heads longer peduncled, the involucre bracts nearly glabrous.

var. β *Kurzii*, Clarke. A fruticulose under shrub, the leaves hirsute on both sides or almost chaffy pilose along the midrib beneath. Flower-heads shorter peduncled, the involucre bracts more pubescent.

** *Achenes of the ray without pappus.*

- S. SAXATILIS, Wall. Ava. Taong-doung.

Roughish hirsute. Leaves elongate-linear, narrowed at the base. Flower-heads in lax corymbs. Achenes striate, glabrous. Pappus rufescent.

Sub-genus SYNOPSIS.

Anthems tailed, the tails free or adnate.

* *Erect shrubs or under shrubs.*

- S. DENSIFLORUS, Wall. Martaban at 3000 to 6000 feet.

S. angulosus and *unicellus* D.C.

Stem and leaves beneath white-tomentose. Flower-heads radiate, rather large, in dense corymbose panicles. Achenes glabrous. Pappus white.

S TRIANGULATUS, Ham.

S. vagans, Wall.

Glabrous or nearly so. Flower-heads small, glabrous, discoid, in small dense corymbs. Achenes glabrous. Pappus white.

** *Scandent shrubs or under shrubs.*

S. CHINENSIS, D.C.

Khakyen Hills.

Cineraria repanda, Lour.

S. campylodes, D.C.

S. Hindsii, Bth.

Stems almost zigzag-flexuose, slightly woolly and glabrescent. Flower-heads discoid, rather large, in divaricate corymbose panicles. Achenes difform, those of the disk 5-gonous with pilose corners and white pappus, the ray-achenes glabrous, almost trigonous.

× × *Flower-heads homogamous, all the florets regularly tubular, never yellow (usually purple, violet, or white).*

Sub-tribe EUPATORIACEÆ.

Anthor-base nearly entire. Style-branches almost terete, or very elongate-club-shaped, obtuse, only minutely papillose. Leaves opposite or alternate.

* *Anthers appendaged at the tip. Achenes 5-ribbed (Ageratiæ).*

Bristles of pappus copious, smooth or minutely hairy.

EUPATORIUM, Tournef.

Involucral bracts in several, rarely in 2-3 rows, somewhat unequal, always more than 5. *Flower-heads* usually many (rarely 1-4)-flowered, corymbose or panicled.

Leaves penninerved.

E. BIRMANICUM, D.C.

Segain.

Corymbs of few small few-flowered flower-heads.

E. PENDULUM, Wall.

Burma:

E. nodiflorum, Wall.

Flower-heads numerous, in corymbose, elongate panicles.

Bentham refers this species to the following, and the penninervation really seems to be a fallacious character (Kurz).

Leaves triplinerved.

E. WALLICHII, D.C.

Upper Burma.

E. cannabinum, Clarke.

Flower-heads numerous, in corymbs.

MIKANIA, Willdenor.

Involucral bracts 4 only, somewhat unequal. *Flower-heads* 4-flowered, racemose or panicled. Twining shrubs.

M. (EUPATORIUM) SCANDENS, Burm.

Attaran.

E. cordatum, Burm.

E. volubile, Vhl.

× × *Pappus entirely or partially chaffy or awned, or consisting of 5-10 rigid bristles, or minute and coronate, or none.*

AGERATUM, Linnæus.

Involucral bracts in 2-3 rows, somewhat unequal. *Pappus* of 5 short scales or long awns free or united into a shaggy crown, or of 10-20 stiff bristles chaffy or dilated at the base. Herbs.

* *Achenes 4-cornered.*

V. CHINENSIS, Less. In waste spots all over Burma.
Cyanopsis pubescens, Bl.
C. villosa, D.C.

Greyish puberulous or thinly pubescent. Flower-heads broad, in poor corymbs. Involucral bracts stiff, squarrose, acuminate.

** *Achenes terete.*

V. CINEREA, Less. All over Burma up to 4000 feet and
V. abbreviata and *physalifolia*, D.C. introduced into the Andamans,
V. lariflora, Less. Kamorta, and Tillangehong.
Chrysocoma purpurea, G. Forst.

Greyish puberulous. Flower-heads $2\frac{1}{2}$ -3 lines long, corymbose-panicled.

Sub-genus *EU-VERNONIA*.

Flower-heads rather large or rarely small. *Achenes* longitudinally ribbed. *Involucral bracts* all scarious, not leafy nor leafy-appendaged.

* *Under shrubs or herbs. Involucral bracts elongate, especially the inner ones, and usually narrow.*

× *Outer involucral bracts subulate and squarrose, passing on to the peduncle. Outer pappus consisting of numerous almost chaff-like bristles.*

V. BRACTEOLATA, D.C. Khakycen Hills.
V. subsessilis, D.C.

Slightly puberulous. Leaves narrow or broad, shortly petioled or almost sessile. Flower-heads rather large, on long stiff peduncles, corymbose-panicled. Achenes densely villous.

×× *Outer involucral bracts rather broad and short, more or less appressed-imbricate.*

+ *Outer series of pappus consisting of a few caducous bristles or almost wanting.*

† *Flower-heads large, many-flowered, solitary or few, or in poor corymbs. Involucral bracts very acuminate. Harsh-leaved under shrubs or shrubs (Xipholepis).*

V. BRACTEATA, Wall. Karen-ni (*vide* Mason).
Decaneuron Silhetense, D.C.

Flower-heads long-peduncled, in lax corymbs. Achenes 2 lines long, glabrous. Bristles of pappus bristly.

V. ROXBURGHII, Less. Hills East of Bhamo.
Eupatorium asperum, Roxb.

Flower-heads short-peduncled, in compact corymbs. Achenes 1 line long, sparingly pilose. Bristles of pappus smooth.

V. TERES, Wall. Ava. Prome. Pegu.
V. rigiophylla, D.C.
V. squarrosa, Less.

Flower-heads sessile or nearly so, clustered or solitary. Achenes 1 line long, appressed pilose. Bristles of pappus smooth.

†† *Flower-heads small or rather small, few- (not above 15-)flowered, in ample corymb-like panicles. Involucral bracts bluntish or hardly acuminate (Gymnanthemum).*

V. ASPERA, Ham. All over Burma.
V. multiflora, Less.
Decaneuron divergens, D.C.

Roughish puberulous. Leaves narrow, rarely broad. Flower-heads only 8 lines long, numerous, in axillary and terminal corymbs.

V. SELIGNEA, D.C.

var. *a* Chittagong and the Khakycn*V. longicaulis*, D.C.Hills. var. *β* Pegu Range.

Roughish puberulous. Leaves rather broad or narrow. Flower-heads 4-5 lines long, shortly peduncled, in axillary and terminal panicle-corymbs.

var. *a genuina*. Corymbs more or less panicle. Involucral bracts more acute to mucronate-acuminate, more glabrous.

var. *β Peguensis*, Clarke. A shade-form, panicles spreading, terminal, leafless. Involucral bracts more or less acute, usually more glabrous.

++ Outer series of pappus consisting of numerous or copious bristles. Involucral bracts acuminate (*Lepidaploa*).

V. KINGII, Clarke.

Khakycn Hills. Southern Slopes of Pegu Range and Martaban.

Leaves broad, roughish puberulous. Flower-heads peduncled, in small sessile pubescent axillary corymbs, or corymbose-panicle at the end of the branches. Involucral bracts white woolly.

V. ATTENUATA, D.C.

var. *a* Maulmain. var. *β* Radburi, Siam.

Leaves narrow, roughish puberulous, chartaceous. Flower-heads shortly peduncled or sessile, solitary or few in the leaf-axils, irregularly disposed raceme-like or forming terminal poor corymbs. Involucral bracts nearly glabrous.

var. *a genuina*. Flower-heads about half an inch across, longer or shorter peduncled, and usually in the axils of the leaves.

var. *β juncea*. Judging from the material at hand, the whole plant seems to be transformed into an ample leafless panicle, the flower-heads only half the size, all sessile and solitary, in very elongate slender poor spikes. Achenes only a line long or somewhat longer, the pappus pale rufous.

var. *β* may form a distinct species, but there are no leaves (Kurz).

** Large shrubs or trees, rarely scandent. Flower-heads usually small and few-flowered.

× Pappus more or less turny to red-brown. Involucral bracts elongate, especially the inner ones. Scandent shrubs.

V. BLANDA, D.C.

Pegu Range and Martaban.

V. blandula and *Andersonii*, Clarke.

Glabrous or nearly so. Flower-heads $\frac{1}{2}$ inch long, shortly peduncled, in small corymbs panicle at the end of the branches. Leaves petioled. Achenes pilose.

V. Andersonii has the receptacle densely hirsute, but in *V. blanda*, as well as in *V. blandula*, the same is also hispid, although much less so.

V. SCANDENS, D.C.

Pegu and Ava Hills up to 4000 feet.

Decaneuron obovatum, D.C.*V. vagans*, D.C.

As preceding, but shortly puberulous. Achenes glabrous.

×× Pappus white or whitish to pale straw-coloured. Involucral bracts short and rather broad. Flower-heads small (*Strobocalyx*).

+ Trees or erect shrubs.

Leaves sessile or very shortly petioled.

V. VOLKAMERLEFOLIA, D.C.

Khakycn Hills and Martaban from

V. acuminata, D.C. non Less.

2000 to 1000 feet.

V. Panduana, D.C.*V. cuspidata*, Buck.

Small tree, pubescent or puberulous. Leaves cuneate-narrowed, shortly petioled. Flower-heads shortly peduncled, corymbulose, in terminal leafless panicles. Involucral bracts slightly and fugaciously appressed pubescent.

Leaves rather long-petioled.

V. KURZII, Clarke. Hills East of Toung-ngoo at 2000 to 4000 feet.

Meagre shrub or small tree, softly tomentose. Leaves broad. Flower-heads shortly peduncled, corymbose-panicled. Involucral bracts densely white-tomentose.

V. ARBOREA, Ham. Tenasserim.

V. Blumeana, D.C.

Eupatorium Javanicum, Bl.

Trees. Leaves coriaceous, long-petioled, densely tomentose beneath, glabrescent above or rarely also beneath. Flower-heads sessile or nearly so, clustered, in corymb-like tomentose panicles. Involucral bracts thinly appressed pilose.

++ *Scandent shrubs.*

V. ELÆAGNIFOLIA, D.C. Maulmain and Siam.

Stem and leaves beneath appressed silvery pubescent. Flower-heads almost sessile, divaricate corymbose and panicled. Involucral bracts glabrous, ciliate.

Sub-genus HOLOLEPIS, D.C.

Outer involucre entirely leafy and large, or smaller and produced into a leafy appendage.

* *Outer involucral bracts large and leafy, entirely concealing the inner ones.*

V. CALYCINA, Wall. Prome.

Leaves broadly oval, almost sessile, rather glabrous. Flower-heads peduncled, corymbose.

** *Outer involucral bracts scarious, produced at the tips into a foliaceous linear appendage.*

V. (CONYZA) ANTHELMINTHICA, L. Ava. Taong-doung.

Shortly and thinly pubescent. Leaves petioled. Flower-heads corymbose. Pappus rufescent.

CYNAROCEPHALIEÆ, Vaillant.

Florets either regular and tubular, with the style usually thickened joint-like near or at the apex, or bilabiate with the style various. Herbs, rarely shrubs, not aromatic. Anther-base usually tailed or fringed.

Sub-tribe CYNAROIDIEÆ.

Flower-heads discoid, the florets all tubular and regular or nearly so, hermaphrodite, the lobes usually narrow. Anthers usually fringed or tailed at the base. Style usually thickened joint-like at or below the division into branches, which latter are narrow and obtuse, or slightly pointed and often erect. Leaves alternate, often spiny.

* *Flower-heads usually many-flowered, separate.*

× *Achenes usually glabrous, seated in the very oblique or lateral areoles of the receptacle.*

+ *Involucre without floral leaves or outer leafy bracts.*

TRICHOLEPIS, De Candolle.

Involucral bracts narrow, awned-acuminate, entire, not appendaged. Filaments shortly papillose-pilose. Anthers with rather long shaggy tails. Style-branches thin. Achenes glabrous, obtusely cornered or compressed. Leaves unarmed.

T. KARENSIUM, Kz. Martaban. Karen-ni (*vide* Mason).

The largest Indian species.

++ *Involucre surrounded by spiny-toothed floral leaves or outer leafy bracts.*

CARTHAMUS, Linnaeus.

Outer involucral bracts with a large leafy appendage, inner ones spiny-pointed.

Florets orange. *Pappus* none, or paleaceous. *Achenes* compressed or obtusely cornered. *Leaves* spiny-armed.

* *C. TINCTORIUS*, L.

Cultivated in Prome.

Hsu. Safflower. Bastard saffron.

There are two forms in cultivation, the one with almost entire leaves and involueral leaves and very slightly and shortly spiny, and the other, coming near *C. oxyacantha*, armed with long spreading spines (Kurz).

The Safflower is largely cultivated for its dye, *Carthamine*, which exists in its petals and is insoluble in cold water. The powdered petals are therefore first of all washed in cold water to remove a yellow colouring matter which is present. The Carthamine is now dissolved out by an alkaline solution, and then precipitated by an acid, lemon-juice being usually employed. Vegetable rouge is pure Carthamine precipitated on to finely powdered tale, or on to woollen 'crepons,' with which weak-minded or vicious women strive to heighten their charms.

×× *Achenes* usually glabrous, seated in the straight arcoles of the receptacle.

+ *Filaments* papillose-pilose, free. *Bristles* of pappus united at the base into a ring and both deciduous.

CNICUS, *Linnaeus*.

Outer *involueral bracts* usually spiny-armed, the innermost ones often unarmed. *Receptacle* densely covered with rigid bristles, often longer than the achenes themselves. *Bristles* of pappus feathery or shortly bearded. *Leaves* spiny-armed.

* *Corolla-limb* bell-shaped, 5-cleft to the middle. *Flower-heads* bisexual, the inner involueral bracts not in any way dilated at the tips, but terminating in spines.

C. (CARDUS) ERIOPHORUS, L. var. β Khakyen Hills and Karen-ni (*vide* O'Riley).

Leaves white-tomentose beneath, pinnatifid, spiny. Flower-heads large, hemispherical, arachnoid-woolly.

var. β *involueratum*, D.C. Leaves above covered with sharp, sometimes spine-like bristles. Involueral bracts glabrescent. Florets purple.

** *As above*, but the inner involueral bracts dilated into a terminal appendage.

C. (CIRSIUM) CHINENSIS, *Gard. et Champ.* Hills East of Blanno.

Slender but stiff. Leaves narrow, entire, or somewhat sinuate-lobed, shortly spiny, usually whitish tomentose beneath. Flower-heads rather small, not leafy-involuered at the base, long-peduncled.

+ + *Filaments* glabrous, free.

SATISUREA, *De Candolle*.

Involuere not prickly. *Pappus* of numerous feathery bristles in a single row with or without a few simple ones outside. *Receptacle* with bristles between the florets. *Leaves* not armed.

S. (APLOTAXIS) DELTOIDEA, D.C. var. α Nāt-toung in Martaban (*vide* Mason).

A. nivea, D.C. var. β Martaban Hills at over 6000 feet.

Leaves lyrate with a deltoid or hastate end-lobe, the upper cauline ones often entire or lobed, tomentose beneath. Flower-heads long-peduncled, laxly racemose and paniced, the involueral bracts nigrescent, often blunt and cross-toothed.

var. α *vera*, Clarke (incl. var. β *nivea*, Clarke). Flower-heads long-peduncled, laxly racemose, larger, the involueral bracts nearly entire at the tips. Upper leaves entire or the end-lobe deltoid and large.

var. β *polycephala*, Clarke. Flower-heads smaller, shorter peduncled, and more crowded, laxly racemose and paniced, the involueral bracts blunt and cross-toothed. Upper leaves or their end-lobe sagittate.

S. PEGUENSIS, Clarke.

Karen Hills.

Leaves pinnatifid, the end-lobe rather elongate, tomentose beneath. Flower-heads shortly peduncled or almost sessile, clustered and forming an elongate contracted almost raceme-like panicle, the involucrel bracts greyish villous, acute.

Sub-tribe MUTISIACIÆ.

Flower-heads either heterogamous, with radiating female florets, or homogamous, with the florets all hermaphrodite and tubular, in both cases some or all of the florets more or less 2-lipped. Anthers with pointed or tailed base. Style not or slightly thickened joint-like at the apex, the branches very short or elongate, rounded or truncate at the tips, not appendaged. Pappus bristly, paleaceous or rarely absent. Leaves radical or alternate, rarely opposite.

* *Flower-heads homogamous, the corollas tubular with the segments of limb narrow, equal or almost 2-lipped.*

× *Flower-heads usually many-flowered.*

DICOMA, Cassini.

Flower-heads usually almost sessile. Style-branches linear, long or shortened. Achenes densely villous. Scales or bristles of the pappus feathery, copious. Herbs.

S. TOMENTOSA, Cass.

Limestone hills of Segain.

D. lanuginosa, D.C.

×× *Flower-heads few-flowered.*

LEUCOMERIS, Don.

Receptacle naked. Style-branches very short, conniving or almost spreading. Achenes oblong, silky-villous. Bristles of pappus smooth. Flower-heads corymbose. Shrubs or small trees.

L. DECORA, Kz.

Promé district.

Flower-heads solitary, in dense terminal umbel-like corymbs, the involucrel bracts gradually shorter and passing into the thick short densely imbricate-bracted peduncle. Leaves membranous, glabrous.

AINSLIEA, De Candolle.

Style-branches very short. Bristles of pappus feathery. Flower-heads 2-5-flowered, sessile or peduncled, racemose or paniceled. Herbs.

* *Leaves narrowed at the base and decurrent wing-like on the petiole.*

A. PTEROPODA, D.C.

var. *a* Top of Moolyit (*fide* Parish) and Hills of Martaban from 5000 to 7100 feet.

Sparingly pilose, the flowering stems more or less sessile-leaved. Leaves membranous, obscurely crenate-toothed. Flower-heads sessile or peduncled, in lax spikes or diffuse narrow panicles.

var. *a genuina*; *A. pteropoda*, D.C.; *A. Silhetensis*, Clarke. Flower-heads sessile, usually clustered, forming a simple elongate lax spike.

var. *β effusa*, Clarke. Flower-heads slenderly peduncled, almost racemose, forming a spreading narrow panicle.

** *Leaves more or less cordate at the base, the petiole not winged.*

A. BRANDISIANA, Kz.

Martaban Hills between 2000 and 4000 feet.

Flowering stem radical and almost scapiform and leafless. Leaves almost coriaceous, entire, hirsute, often glabrescent above, densely villous fringed. Flower-heads peduncled, in diffuse panicles.

× × *Flower-heads usually radiate, the corollas ligulate-2-lipped, rarely ligulate.*

GERBERA, *Gron.*

Involucre turbinate or bell-shaped, the bracts unequal, imbricate. *Ray-florets* in 1 or 2 rows, 2-lipped, the ligules 3-4-nerved. *Achenes* usually beaked. *Pappus* reddish. Herbs, the leaves radical.

G. (ARNICA) PILOSELLOIDES, L.
G. ovalifolia, D.C.

Hills in Karen-ni (*vide* Mason).

The Cape-plant grows on sand-hills and has larger flower-heads and shorter, more robust scapes (Kurz).

Sub-order CICHORIACEÆ.

Flower-heads homogamous, all the florets ligulate and hermaphrodite. *Style* not thickened at the apex, the branches filiform, revolute, and puberulous. Herbs, tall or small, never woody, with fistulose stems, the sap always milky.

* *Pappus* paleaceous, awned, coronate or none.

HYOSERIDIEÆ.

Involucre various. *Achenes* truncate at the top. *Pappus* consisting more or less of small scales or scalelets alternating with bristles, or none.

CICHORIUM, *Linnaeus.*

Inner involueral bracts in 1-2 rows, almost equal, erect, the outer ones short, lax, or wanting. *Pappus* none or very minute. *Florets* large, blue. Rigid branched herbs.

C. INTYBUS, L. var. β cultivated in Prome and the drier districts.

var. β C. endivia, L. Floral leaves broadly ovate, half-stem-clasping with a cordate base, the lower leaves usually only sinuate.

** *Bristles of pappus* (at least those of the central achenes) capillary, smooth or feathery.

CREPIDIEÆ.

Involucre calyx-like or rarely imbricate. Achenes contracted at the base, rarely columnar. Herbs.

* *Hairs of indument* simple. *Innermost bracts of the involucre* usually thickening at the base.

CELPIS, *Linnaeus.*

Involucre of a single row of nearly equal bracts, with a few small outer ones. *Achenes* not at all or scarcely flattened, very shortly contracted at the top. *Pappus* sessile, of numerous simple capillary bristles or hairs. Herbs with leafy stems.

C. (PRENANTHES) JAPONICA, L. Ava and Martaban in cultivated land.
P. lyrata, Thbg.

Youngia Mauritiana, runcinata, Thunbergiana and napifolia, D.C.

Y. ambigua and poosia, D.C.

Prenanthes procumbens, Roxb.

P. striata, Bl.

** *Hairs of indumentum* (if present) stellate, often accompanied by simple ones, or the indument intricately woolly. *Innermost bracts of the involucre* not thickening.

HERACIUM, *Linnaeus.*

Receptacle naked or very shortly fibrillose. *Bristles of the pappus* rather stiff, fragile, persistent, simple. Herbs.

H. SILHETENSE, D.C.

Tenasserim.

LACTUCACEÆ.

Involucre calyx-like or rarely imbricate. Achenes contracted at both ends, or beaked. *Bristles of pappus* simple, the hairs if present simple. Herbs.

* *Achenes shortly or long-beaked.*

LACTUCA, *Linnaeus.*

Achenes more or less compressed, ribbed. Bristles of *pappus* persistent or deciduous. *Florets* yellow or blue.

* L. SCARIOLOA, L.

Cultivated in Prome and the drier districts.

Stout annual. Leaves runcinate and spinulose-toothed, half-stem-clasping with a sagittate base. Panicle large, furnished with auricled stem-clasping bracts. Flower-heads nearly $\frac{1}{2}$ inch long.

var. *a genuina*. Panicle pyramidal. var. β *sativa*, L. Panicle fastigiate.

L. (IXERIS) POLYCEPHALA, Cass.

Tapau, near Bhamo.

Ixeris fontinalis, D.C.

Slender annual. Leaves linear, entire or runcinately lobed, sessile with a sagittate base. Panicle lax and corymb-like, poor, the bracts subulate, small. Flower-heads rather broad, 3-3 $\frac{1}{2}$ lines long.

** *Achenes not beaked.*

PRENANTHES, *Linnaeus.*

Achenes almost terete or somewhat compressed, bluntish 3-5-cornered, not or scarcely ribbed. Bristles of *pappus* more or less persistent. *Florets* purple to white, never yellow.

Leaves simple.

P. ALATA, H. f. et Th.

Martaban at 5000 to 6000 feet.

Leaves sagittate, the petiole long and broadly-leafy-winged and sagittately or auricular-dilated at the base. Panicle lax, the flower-heads nearly $\frac{1}{2}$ inch long, nodding, on slender-bracted peduncles.

P. (SONCHUS) HOTHELE, Clarke.

Khakyen Hills.

Leaves, at least the cauline ones, sessile with a sagittate base. Flower-heads long and slenderly peduncled, forming a narrow terminal panicle.

The base of the involucrel bracts becomes slightly thickened and indurated in fruit, but the inflorescence and the narrow few and apparently purple-flowered flower-heads are those of a *Prenanthes*, not of *Sonchus* (Kunz).

SONCHUS, *Linnaeus.*

Achenes more or less compressed, ribbed. Bristles of *pappus* soft, white at base, united into a ring and deciduous with it. *Involucrel bracts* often incrassate-dilated in fruit. *Florets* yellow.

* *Involucrel bracts glabrous or puberulous, but not glandular-pilose or hispid.*

S. ASPER, Vill.

Burma (*vide* Clarke).

S. fallax, Waller.

Achenes much compressed, 3-ribbed on both sides, the ribs perfectly or almost perfectly smooth. Leaves usually runcinate-pinnatifid.

S. OLERACEUS, L.

Ava.

S. ciliatus, Lamk.

S. Wallichianus, D.C.

Achenes compressed, the ribs marked with transverse asperities, and mucicate. Leaves runcinate-pinnatifid or simple.

** *Involucrel bracts and peduncles glandular-hispid or glandular-pilose.*

S. ARVENSIS, L.

Waste spots round cultivation, about

S. oricensis, Roxb.

Bhamo and the Martaban Hills.

S. Wightianus, D.C.

Achenes hardly compressed, the ribs thick and transversely mucicate. Leaves more or less slightly runcinate, the upper ones simple.

MICRORHYNCHUS, *Lessing.*

Achenes columnar, truncate at both ends, bluntly 4-5-ribbed, sometimes narrowly 2-3-winged. *Florets* yellow.

M. (PRENANTHES) ACAULIS, Roxb. All over Burma.

M. glaber, Wight.

Leaves narrow, slightly-lobed or entire. Flowering stems erect. Achenes strongly 4-5-ribbed, the ribs smooth.

M. (PRENANTHES) ASPLENIFOLIUS, Roxb. Pegu in fields and the bed of the Irrawaddy.

Leaves pinnatifid with the lobes all rounded. Flowering stems divaricate and much dichotomously branched. Achenes strongly 10-12 ribbed, the ribs transversely wrinkled.

This huge Order embraces nearly a tenth of the Cotyledonous plants; but its value to man bears no proportion to its size, as it yields nothing which can be considered of importance. Among its most useful products may be enumerated *Cichorium intyhus*, or chicory, so largely used as a substitute for coffee, and *C. endivia* or endive. *Taraxacum officinale*, 'dandelion' (called also *Pissabel* by nursemaids and children, from the supposed results of little children handling the plant), a valuable tonic in hepatic complaints and dyspepsia, and the leaves of which form a wholesome addition to salad. *Lactuca sativa*, the common lettuce, the inspissated juice of which possesses narcotic properties, and which may in some cases be advantageously substituted for opium. *Sonchus*, or sow-thistles, which rabbits and cattle eat, and which in India are dressed as a pot-herb. All these belong to the tribe *Cichoraciæ*.

The tribe *Cynaroidicæ* yields various thistles, as *Carduus benedictus*, the Blessed-thistle, so called from its supposed alexipharmic powers. *Centaurea cyanus*, the corn-flower, once used to form an eye-water. *Cynara cardunculus* and *C. scolymus*, respectively the Cardoon and common artichoke. *Carthamus tinctorius*, the safflower, so largely cultivated for its valuable red dye, and *Serratule tinctoria*, which yields a yellow one.

In the tribe *Calendulicæ* occurs that common flower in every Indian garden, *Calendula officinalis*, the marigold. This name has no reference to Mary, but is derived from *Merse-mear gealla* 'Marsh, horse gowl,' or marsh marigold, *Caltha palustris*, whence the name was transferred to the garden plant.—Prior, Popular Names of British Plants, p. 118.

Another tribe, *Senecionidicæ*, embraces *Tussilago farfara*, or colt's-foot (so called from the shape of the leaves), which is used in compounding a sweetmeat, used for slight colds, but really inert, and *Arnica montana*, a nervine tonic, and favourite homœopathic medicine, which owes its power to an alkaloid, *Cysticine*, which it contains. The tribe *Anthemidicæ* embraces *Artemisia absinthium*, once in vogue as an anthelmintic, but now chiefly used for flavouring a pernicious liqueur, much esteemed on the Continent. *A. abrotanum*, or old man, as it is termed from its supposed invigorating properties, and *A. dracunculus*, or Tarragon, used to give flavour to vinegar.

The tribe *Helianthoidicæ* contains some useful plants, *Helianthus annuus*, or the common sunflower, and *H. tuberosus*, the tubers of which constitute Jerusalem artichokes. The word *Jerusalem* is, however, a mere corruption of the Italian name *Girasole*, or 'turn sun,' from an erroneous idea that the *Helianthus* (sunflower) turns towards the sun, an idea which has taken inveterate possession of the popular mind. The true origin of the term sunflower is the resemblance which its lusty disk with radiant yellow petals bears to the pictorial representations of the sun. The seeds of the sunflower are rich in oil, and are worth cultivating as oil-seeds.

¹ The following simple recipe is worth knowing: Take a quantity of fresh dandelion roots, wash them well, and slice up and bruise in a mortar, then express the juice through a cloth and add one-third the amount of rectified spirit, or good brandy, and filter. One or two teaspoonfuls of this mixture three times a day is an excellent tonic in hepatic derangements.

Order DIPSACEÆ.

Corolla monopetalous, epigynous, æstivation imbricate. *Stamens* 4, inserted on the tube of the corolla. *Ovary* 1-celled, 1-ovuled, adnate to the receptacular tube, throughout its length, or only at the top. *Ovule* pendulous, anatropous. *Embryo* albuminous.

* *Flowers* in terminal, rarely axillary, often peduncled heads.

DIPSACTS, *Linnaeus*.

Involucral bracts usually herbaceous, the paleas of the receptacle rigid or spinescent. *Corolla* 4-cleft. Rigid herbs, the flower-heads large.

D. STRICTUS, Don. Ava. Martaban (Yunzalin).
D. inermis, Wall.
D. longicaulis, Wall.

D. fullonum is the European Teasel, used to *tease* or dress woollen cloth. The Karens make a similar use of the fruit of the *Pandanus*.

CAPRIFOLIALES.

Flowers regular or irregular. *Stamens* as many as the corolla-lobes, inserted on the corolla. *Ovary* inferior, 2- or many-celled. *Seeds* generally albuminous. *Calyx* never papose. Shrubs or trees, rarely herbs.

Order RUBIACEÆ.

Calyx-tube adnate to the ovary, the limb entire or lobed or toothed. *Corolla* gamopetalous, inserted round the epigynous disk, 4-5- or sometimes more (rarely only 3)-lobed, the lobes imbricate or valvate. *Stamens* as many as corolla-lobes and alternating with them, inserted in the tube. *Anthers* versatile, the cells parallel, opening longitudinally. *Ovary* inferior, 2- or more-celled, with 1 or more ovules in each cell, rarely 1-celled, with parietal placentas, or reduced to a single 1-ovuled cell. *Styles* as many as carpels, high up, united or simple, with a thickened, entire, or lobed stigma. *Fruit* a capsule, berry, drupe, or indehiscent nut. *Albumen* fleshy or horny, copious, or rarely scanty or none. *Embryo* cylindrical, the cotyledons semi-terete. Trees, shrubs, or herbs, sometimes climbing, with opposite or whorled leaves. *Stipules* interpetiolar, either free, or united with the petiole in a sheath bordered by fringes, or leaf-like lobes or sheathing or annular, rarely reduced to 1 or 2 points on each side of the petiole. *Inflorescence* various, usually more or less cymose or paniced, axillary or terminal. *Flowers* occasionally polygamous or unisexual.

Sub-order CINCHONEÆ.

Fruit a dehiscent *Capsule*, dry, or very rarely succulent; very rarely a berry or drupe, and in this case the seeds always winged, or appendaged. *Ovary* 2- or more celled, with 1 to many ovules in each cell. *Seeds* various. *Stipules* interpetiolar.

NAUCLEIÆÆ.

Flowers inserted upon a thickened receptacle and forming heads. *Capsule* dehiscing from the base or otherwise, dry or rarely (*Sarcocephalus*) berry-like.

× *Capsule* berry-like, dehiscing from the base. Trees.

SARCOCEPHALUS, *Azalius*.

Capsule 2-celled, or the 2 cells augmented by 2 superposed empty cells, more or less united in a fleshy syncarp.

S. CADAMBA, Miq. Eastern Slopes of the Pegu Range.
Māu.

Capsules succulent and connate throughout. All parts glabrous, the young bractlets pruinose. Leaves more or less acuminate.

The wood is yellow, and recommended by Brandis for furniture. It is, however, shockingly liable to be wormed.

S. CORDATUS, Miq. Pegu and Tenasserim.

Māu-let-tau-shay (Kurz).

var. *α glabra*. Leaves and all parts glabrous.

var. *β pubescens*. Leaves beneath, petioles, stipules, and peduncles shortly and softly pubescent.

Wood worthless.

× × Capsule dry, dehiscing loculicidally or septucidally into 2 many-seeded cocci.

NAUCLEA, *Linnaeus*.

Flowers without bractlets. Capsule 2-celled. Trees, rarely erect shrubs.

Sub-genus *EU-NAUCLEA*.

Corolla slightly imbricate in bud.

Flowers without bractlets, solitary, or by threes, terminal.

* *All parts glabrous.*

N. EXCELSA, Bl. *E.T.* Myodwin, Pegu Range. Kamorta.

N. PEDUNCULARIS, Wall.

Leaves acuminate, the petiole $\frac{1}{2}$ –1 inch long. Flower-heads often by threes.

N. SESSIFOLIA, Roxb. Pegu Range and Tenasserim.

Hteing-kalā (Kurz).

Leaves blunt, almost sessile, flower-heads solitary.

** *All parts more or less pubescent.*

N. CORDIFOLIA, Roxb. Chittagong. Ava. Pegu. Martaban.

Nhing-pen or Nhan-ben (Kurz).

Leaves cordate, petioled. Flower-heads 1–3 axillary.

Wood brown, coarse. Recommended for furniture. Weight about 50 lbs.

Sub-genus *ADINA*.

Corolla valvate. Flowers surrounded by bractlets.

* *Flower-heads small, panicled.*

N. POLYCEPHALA, Wall. *E.T.* Chittagong. Tenasserim.

N. ARALIOIDES, Miq.

All parts glabrous. Leaves petioled.

** *Flower-heads larger, panicled. Bractlets angularly clavate.*

× *Petiole very slender and thin. Leaves thin membranous, acute at the base.*

N. PARVIFLORA, Roxb.

Hteing thē (Kurz).

var. *α genuina*. Bractlets only half as long as the calyx. Flower-heads more constantly solitary between 2 longer-persistent floral leaves.

var. β *diversifolia*, Wall. Leaves much larger, from 3 to 6 inches long, beneath more conspicuously pubescent. Stipules pubescent. Bractlets as long as the calyx.

var. γ *microphylla*. Leaves small, only 1-2 inches long, minutely and inconspicuously pubescent beneath. Stipules glabrous. Bractlets as long as the calyx.

var. α not yet found in Burma; var. β frequent in the mixed forests and in savannahs, all over Burma from Ava and Martaban down to Upper Tenasserim; var. β exclusively in the savannahs.

× × *Petioles very thick and pubescent. Leaves large, cordate at the base.*

N. ROTUNDIFOLIA, Roxb.

Chittagong to Tenasserim.

N. *Brunonis*, Wall.

Byn-gā.

Flower-heads dichotomously paniced. Leaves wrinkled above. Corolla-lobes as long as the short tube. Wood yellowish, or very pale yellowish-brown, close-grained and suitable for furniture. Weight 35 lbs. (W.F.).

UNCARIA, Schreber.

Flowers sessile or pedicelled, destitute of bractlets. *Capsule* dehiscing in longitudinal slits. Scandent shrubs with hooked tendrils.

* *Capsule long-stalked. Leaves more or less pubescent beneath.*

U. FERRUGINEA, D.C.

Tropical forests of Pegu Range and Tenasserim.

U. *speciosa*, Wall.

Flowers large, the pedicels 1-2 lines long, velvety. Calyx $\frac{1}{2}$ inch long. Corolla hirsute.

U. SESSIFOLIA, Roxb.

Tropical forests of Pegu range and Tenasserim.

Flowers almost sessile. Calyx 2 lines long. Corolla velvety.

** *Capsule sessile.*

× *Calyx-limb long-toothed.*

U. PILOSA, Roxb.

Tropical forests of Ava Hills, Pegu Range.
Tenasserim. Kaomrta.

All parts more or less woolly pubescent.

× × *Calyx almost truncate or obscurely 5-toothed. Leaves glabrous.*

U. LEVIGATA, Wall.

Tropical forests of Khaboung stream and Tenasserim.

Leaves green on both sides. Corolla glabrous.

U. SESSILIFRUCTUS, Roxb.

Tropical forests of Pegu, Tenasserim and
Khakyen Hills.

Leaves glaucous beneath. Corolla-lobes velvety.

EU-CINCHONIEÆ.

Flowers paniced or corymbose, never in heads. *Capsule* 2-celled, dehiscing septically into 2 valves or into 4 apical valves.

× *Capsule septically dehiscing into 2 woody valves.*

+ *Corolla imbricate.*

LEUCIA, Sweetner.

Calyx-limb deciduous. *Stamens* included. *Corymbs* terminal, without floral leaves. Trees.

L. GRATISSIMA, Swit.

Hills East of Bhamo.

++ *Corolla valvate.*

HYMENODICTYON, *Wallich.*

Inflorescence furnished with conspicuous discoloured floral leaves. Trees.

H. THYRSIFLOKUM, Wall. Chittagong and Pegu Range.
H. Horsfieldii, Miq.

×× *Capsule dehiscing at the apex into 4 valves. Corolla valvate.*

HYMENOPOGON, *Wallich.*

Inflorescence furnished with conspicuous discoloured floral leaves. Epiphytical shrubs.

H. PARASITICUS, Wall. Epiphytic on mossy trees on Kambalu Hill in the Pegu Range.

HEDYOTIDIÆ.

Ovary 2-4-celled, the cells many- or few-ovuled, the ovules laterally attached. *Capsule* dehiscing in various ways or separating into 2-4 cocci, rarely indehiscent.

× *Stipules connate or free, neither sheathing nor setaceously fringed (Rondeletiace).*
+ *Stigma* 2-lobed or 2-cleft. *Corolla* imbricate or twisted. *Anther-cells* blunt.

WENBLANDIA, *Barth.*

Corolla tubular, twisted. *Capsule* opening into two apical valves. Trees or shrubs. *Flowers* 5-merous, sessile or shortly pedicelled, in short spikelets, racemes, or clusters, forming thyrsoid panicles.

* *Calyx-teeth* short, triangular-acute.

W. SCABRA, Kz. Hills East of Bhamo.

All parts and leaves on both sides harshly and shortly pubescent.

W. TINCTORIA, D.C. Ava to Tenasserim up to 4000 feet.
Ta-ma-gouk.

Leaves beneath more or less shortly pubescent or almost glabrescent. Panicles pubescent or tomentose.

The bark is used for dyeing red. The wood is said to be dark-brown, fine-grained, and suitable for ornamental carpentry.

W. GLABRATA, D.C. Tenasserim, 2000 to 4000 feet.

All parts (also the panicle) quite glabrous. Flowers minutely pedicelled.

** *Calyx-teeth* subulate-acuminate, as long as or longer than the calyx-tube.

W. LIGUSTRINA, Wall. Ava, Taong doung. Khakyen Hills, Tenasserim
(a var. with longer corolla-tube).
Leaves coriaceous, glabrous.

W. GLOMERULATA, Kz. Mergui.

Leaves lanceolate, membranous, appressed, pubescent on the midrib below.

Sub-genus GREENIA.

Flowers 4- or 5-merous, in one-sided spikes forming divaricate corymbose panicles.

W. SECUNDA, Griff. Mergui.

All parts glabrous.

- W. CORYMBOSA, Jack. Tenasserim.
W. spicata, D.C.
Greenia Jackii, W. A.

SPIRADICLIS, *Blume*.

Corolla-tube short. *Capsule* dehiscing into 2 valves, which again separate into 2 valves inflexed with their margins. Erect annual herbs.

- S. BIFIDA, Wall. Martaban.
 Stem, petioles, and inflorescence, shortly pubescent. Capsule globular, 2-lobed.
 S. CESPITOSA, Bl. Martaban, along streams.
S. cylindrica, H.f.

AXANTHES, *Blume*.

- A. LONGIFOLIA, Wight (M.).

OPHIORRHIZA, *Linnaeus*.

Corolla funnel-shaped or tubular. *Placenta* free, erect. *Capsule* compressed, divaricately 2-lobed, opening loculicidally by an apical slit. Herbs.

- * *Cymes* all terminal, on peduncles 1-3 inches long. *Calyx-teeth* short, triangular.
 × *Bractlets* conspicuous, subulate, up to a line long.

- O. GRACILIS, Kz. Tenasserim.
 All parts glabrous. Leaves long-acuminate.

×× *Bracts* subulate, usually persistent, but the bractlets very minute, if any.

- O. MUNGOS, L. var. *a* along the coast. var. *β* in Martaban
 at 3000 feet. The Nicobars.

All parts (also the capsule) glabrous.

var. *a genuina*. Capsule about 3 lines across, emarginate, the lobes somewhat acute.

var. *β orthocarpa*. Capsule about 2 lines across, truncate at the apex, the lobes blunt or almost truncate.

Dr. Brandis' specimens are not sufficient to enable one to make out whether they should not rather form a distinct species. The true Linnean species is a sea-shore plant, growing chiefly in the beach-forests, most probably also growing along the Burmese coasts.

This plant is so called from its being supposed to be that one which the 'mongoose' seeks for and swallows as an antidote, after being bitten by a cobra. It is, however, now well known that there is no specific for snake poison, and that the fact even of the mongoose (*Herpestes*) seeking out and swallowing an antidote is merely one of the many fictions of the imagination with which the whole subject is surrounded. The *Herpestes* owes his immunity to his own agility, which secures him generally from being bitten, to his possessing a thick skin and hispid hair, more or less erected when angry, and which probably often foils an otherwise effective bite, and to his peculiar idiosyncrasy, in virtue whereof he probably sustains and survives a bite which to an animal of another family would be fatal.

- O. ARGENTEA, Wall. Chittagong and Boronga Island.
 Stems and petioles brown-pubescent. Leaves thick-membranous, whitish beneath. Capsule glabrous.

Probably not distinct from *O. canescens* (Kurz).

- O. VILLOSA, Roxb. Tropical forests of Ava. Chittagong.
O. rugosa and *hispidula*, Wall. Pegu and Tenasserim.
O. trichocarpa, Bl.

As preceding, but leaves only pale-coloured beneath, the inflorescence more hispid-pubescent. Capsule minutely hispid.

** *Cymes terminal and axillary, on very short peduncles, only 4-6 lines long, or almost sessile. Calyx-teeth lanceolate, acute.*

O. ERUBESCENS, Wall.

Tenasserim at 3000 to 5000 feet.

Stem, petioles and peduncles more or less shortly pubescent. Lateral branches all shortened.

+ + *Stigma capitate. Corolla valvate. Anther-cells prolonged into a setaceous sterile appendage.*

ARGOSTEMMA, Wallich.

Corolla almost rotate, the limb 3-5 cleft. Anthers dehiscing longitudinally or by 1 or 2 apical pores. Capsule dehiscing by 4 apical valves. Herbs of the habit of Sonerila.

* *Flowers 5-merous.*

× *Leaves reduced to bract- or stipule-like leaflets, of which only 1 or 2 are fully developed.*

A. UNIFOLIUM, Benn.

Attaran valley.

All parts glabrous. Leaf solitary. Anthers oblong, blunt.

A. TAVOYANA, Wall.

Tavoy.

Umbels stiff-hairy. Leaves two.

× × *Leaves all developed, but very unequal, whorled or crowded at the apex of the stem.*

A. VERTICILLATUM, Wall.

Maulmain district (*vide* Parish).

Glabrous or nearly so. Anthers free, linear, acuminate, opening by terminal pores.

** *Flowers 4-3-merous.*

A. SONERILOIDES, Kz.

On Pagodas in Rangoon.

Stem, inflorescence, and petiole villous-pubescent. Leaves sparingly pubescent, cordate, bluntish or acute. Flowers in peduncled or cymose umbels.

A. OLIGANTHA, Kz.

South Andaman.

Quite as preceding, but flowers solitary on a short pedicel, or by 2 or 3 on a very short peduncle, pale rose-coloured.

A small species of *Argostemma*, with slightly pubescent leaves solitary or by pairs, occurs on damp rocks of the tropical forests on Boronga Island, Arakan, but the specimens are too few and reduced to admit of description. Its calyx-lobes are blunt or rather retuse (Kurz).

× × *Stipules adnate to the petiole and sheathing at the base, setaceously fringed (Eu-Hedyotidae).*

DENTELLA, Forster.

Flowers 5-merous, the petals 2- or 3-toothed. Capsule indehiscent.

D. REPENS, Forst.

All over Burma, and introduced into the Andamans.

Lippaya telephioides, Endl.

HEDYOTIS, Linnaeus.

Flowers 4-5-merous, the petals entire. Capsule dehiscing loculicidally or septicidally, rarely almost indehiscent.

* *Capsule loculicidally dehiscent.*

Sub-genus OLDENLANDIA, L.

Capsule more or less hemispherical or obsolete 2-lobed, opening loculicidally. Annual, rarely perennial herbs.

* *Prostrate or diffuse herbs. Flowers solitary, or in cymes or clusters in the axils of the leaves (rarely also terminal). Root sometimes turning perennial.*

× *Leaves more or less oval, petioled.*

H. (OLDENLANDIA) TRINERVIA, Retz. Chittagong and Akyab.

Flowers solitary, sessile or nearly so.

× × *Leaves linear to narrow-linear, rarely lanceolate, more or less sessile.*

+ *Flowers solitary or by 2-3 on an axillary peduncle.*

H. RAMOSISSIMA, Spreng.

Along the course of the larger Rivers

Oldenlandia brachypoda, D.C.

(Irrawaddy, Tsittoung).

O. diffusa, Roxb.

Flowers solitary, on very short strong pedicels. Leaves membranous, flat.

H. (OLDENLANDIA) BIFLORA, L.

All over Burma.

Oldenlandia Burmanniana, R. Br.

O. HERBACEA, D.C.

var. β and γ in Ava, Pegu, and the Andamans.

O. diffusa, Willd.

O. corymbosa, L.

O. graminicola, Kz.

Kamorta.

O. ramosa, Roxb.

Flowers by 2-3, rarely solitary, on a capillary peduncle. Pedicels very long and capillary. Leaves membranous, flat.

+ + *Flowers by 4 or more, forming axillary and terminal clusters or cymes. Leaves more or less revolute on their margins, somewhat rigid.*

H. (OLDENLANDIA) UMBELLATA, L.

Ava (probably).

H. polygonoides, Wall.

Flowers in peduncled cymes or the cymes umbel-like.

The bark of the roots of this small biennial plant yields a durable scarlet dye for which it is extensively cultivated in India and Ceylon, and with it the celebrated red turbans of Madura are dyed. The wild plant is supposed to yield more colouring matter than the cultivated, which last sells for 20 rupees per candy of 500 lbs. It is good for dyeing at two years, but the quality of older roots is better. A test of its quality is to grind up some of the root with quicklime, when, if the root is good, the whole quickly assumes a fine red colour. It is extensively used for dyeing chintzes in India, but is said to deteriorate if shipped in bulk.

H. ANGUSTIFOLIA, Cham. et Schlecht.

Amherst.

H. pinifolia, Wall.

Flowers in small clusters.

** *Erect annuals. Flowers in terminal panicles or cymes, or solitary, rarely the inflorescence also axillary.*

× *Leaves sessile or nearly so.*

H. LINOIDES, Griff.

Tavoy. Mergui.

H. arguta, R. Br.

Leaves sagittate at the base, shortly bristly rough. Flowers pale-blue, by 3-4 terminal, and also singly from the leaf-axils. Pedicels long and capillary.

H. GRACILIS, Wall.

Ava; near Katha.

H. stricta, Wall.

H. fusca, Ham.

H. aspera, Heyne.

Leaves linear. Corolla about an inch long, brownish-purple.

× × *Leaves more or less petioled, more or less tapering at the base.*

+ *Calyx only $\frac{1}{3}$ - $\frac{1}{2}$ line long.*

II. WALLICHII, Kz.

Tenasserim. Kamorta.

H. galioides, Wall. (non F. Muell.).

All parts sparingly pilose. Leaves acute. Cymes peduncled, axillary and terminal. Pedicels capillary, 3-4 lines long.

II. (OLDENLANDIA) SPERGULACEA, D.C.

Pegu and Martaban.

H. ovalifolia, Miq.

H. scapigera, R.Br.

II. NUDICAULIS, W. A.

Stem villous-pubescent, the leaves often whorled at the end of the nude scape-like stem. Cymes divaricate, peduncled, terminal. Pedicels capillary, 2-4 lines long.

+ + *Calyx $\frac{3}{4}$ -2 lines long. Flowers in racemes or cymes, terminal and in the axils of the upper leaves.*

II. (OLDENLANDIA) PANICULATA, L.

In rubbishy spots all over Burma.

H. racemosa, Lamk.

Great Nicobar.

O. alata, Roxb. non Koen.

Glabrous, more or less succulent. Flowers slenderly pedicelled. Capsule not winged, the crowning calyx-lobes very short.

II. ANDAMANICA, Kz.

The Andamans. Kamorta.

Stems, and nerves beneath, shortly pubescent. Flowers sessile or nearly so. Capsule more or less compressed and winged, the crowning lobes nearly a line long.

A branched variety of this has the capsules more compressed and more keel-winged and the calyx-teeth still larger. As a species it is allied to *H. lanceifolia*, Dalz., and *H. alata*, L. (Kurz).

** *Capsules opening septically.*

Sub-genus DIMETIA, W. A.

Capsule opening septically at the apex by a gaping short slit, more or less truncate hemispherical and obscurely 2-lobed. Scandent, diffuse or erect perennials. *Flowers* in small heads, forming axillary and terminal peduncled cymes or panicles. *Corolla* often villous within.

II. CAPITELLATA, R. Br.

var. α , β Khakyen Hills and Tenasserim.

var. γ Tenasserim up to 3000 feet.

Glabrous or pubescent; flowers sessile or nearly so; nerves of leaves prominent.

var. α *genuina* (*Oldenlandia rubioides*, Miq.). All parts quite glabrous.

var. β *subpubescens*. Stems glabrous, the branchlets and the under surface of the leaves minutely pubescent.

var. γ *pubescens*. All parts densely pubescent, the leaves above roughish minutely, beneath softly and yellowish but shortly pubescent. Calyx-teeth often longer and larger.

This species has been identified with *H. fruticosa* of Linne, but the Ceylon plant of this name is certainly distinct (Kurz).

II. SCANDENS, Roxb.

Chittagong. Khakyen Hills.

Scandent or diffuse, quite glabrous, glaucous. Flowers pedicelled. Calyx-lobes acute.

II. FLEGANS, Wall.

Tavoy and Hills East of Toung-ngoo at 3000 to 5000 feet.

Erect, branched, quite glabrous. Flowers sessile. Calyx-lobes broad and blunt.

Sub-genus METABOLOS, Bl.

Capsule septically dehiscent or nearly so, hemispherical and more or less truncate at the apex, often obscurely 2-lobed. *Diffuse* or half-scandent, rarely erect perennials. *Flowers* in axillary (very rarely terminal) clusters or cymes.

* *Flowers in axillary peduncled cymes. Prostrate or diffuse perennials.*
 × *Flowers pedicelled, in loose cymes.*

H. ULMIFOLIA, Wall. Hills East of Toung-ngoo at 4000 to 6000 feet.
 All parts more or less pubescent. Calyx-lobes longer than the tube.

H. (SPERMACOCE) GLABRA, Roxb. Tenasserim.
 All parts glabrous. Calyx-teeth minute.

× × *Flowers sessile or nearly so, in little heads collected into peduncled cymes or clusters.*

H. (SPERMACOCE) COSTATA, Roxb. Southern portion of Pegu Range,
H. caerulea, Korth. non L. Tenasserim, and Kamorta.
H. capituliflora, Miq

Flowers minute, pale blue. Capsule only about $\frac{1}{2}$ line across.

** *Flowers sessile or very shortly pedicelled, in axillary or terminal clusters or heads.*

H. AURICULARIA, L. Hills East of Bhamo.
H. venosa, Korth.
H. idoneura, Miq.
H. lineata, Roxb.

Prostrate or diffuse, all parts more or less pubescent. Clusters axillary.

H. SCABRA, Wall. Upper Tenasserim.
 Erect, slightly pubescent. Clusters terminal, involucred by the 4 or 5 uppermost leaves.

Two doubtful species are *H. argentea*, Wall., Ava; and *H. Merguensis*, H. f. et Bth., Mergui (Kurz).

Kurz adds from the Nicobar group:

H. RIGIDA, Miq. Tropical forests of Kamorta.

Very close to *H. hispida*, Retz, but the corolla more than twice as large. Capsules globose, as in *Odentlandia*. Stems hispidulous. Leaves glabrous above, puberulous beneath.

H. APPROXIMATA, W. A. Kamorta.
Spermacoce tubularis, R. Br.

SCLEROMITRION, Wight and Arnott.

As preceding, but capsule separating into 2 or 4 several-seeded cocci.

Sub-genus EU-SCLEROMITRION (FERGUSONIA, H. f. ?).

Capsule loculicidally separating into 2 many-seeded cocci. *Calyx* more or less obovoid, crowned by the converging calyx-limb. *Stigmatic lobes* 2. *Diffuse* perennials.

* *Flowers in terminal sessile heads or clusters.*

S. CORONARIUM, Wall. Tavoy. Attaran Valley.

Flower-heads half-included in the embracing bases of the involucre-like uppermost leaves. Calyx-teeth large.

S. (RONDELETIA) TETRANDRUM, Roxb. Tenasserim.
Hedyotis macrophylla, Wall.
H. nodiflora, Wall.

** *Flowers in axillary clusters or heads.*

× *All parts glabrous or nearly so.*

S. (HEDYOTIS) RIGIDA, Miq. Tenasserim.

Leaves linear, not nerved, quite glabrous. Flowers in dense clusters. Calyx-tube glabrous or nearly so. Capsule glabrous or shortly hispid.

S. NITIDUM, W. A. Pegu and hills East of Toung-ngoo.

Leaves ovate to ovate-oblong. Flowers by 2-3 or few in the leaf-axils. Capsule glabrous.

Very probably only an extreme, broad-leaved form of *S. hispidum*, while *S. approximatum* (*Hedyotis approximata*, W. A.), may be an extreme narrow-leaved variety of it.

× × *All parts, more especially the stems and capsule, more or less shortly hispid.*

S. HISPIDUM, Retz. Ava and Pegu.

All parts, also the leaves, shortly scabrous-pubescent. Capsule ovoid, about a line long or longer.

S. PARADOXUM, Kz. Andamans. Great Nicobar.

Stem shortly hispid. Leaves glabrous above, minutely puberulous beneath. Corolla half the size, pubescent at the throat. Capsule globular (as in *Oldenlandia*), with short calyx-lobes.

** *Ovules and seeds solitary in each cell.*

SPERMATOCYTES.

Capsules distinct, dehiscing, or separating into cocci, rarely indehiscent. Flowers not in heads. Corolla without toothlets between the lobes valvate. Radicle inferior.

SPERMATOCYTES, *Linnaeus.*

Ovule attached to or below the middle of the cell. *Capsule* dehiscing septically from the apex. Herbs.

S. STRICTA, L. Ava, Pegu and Upper Tenasserim.

Flowers in dense whorl-like clusters or heads, white, about a line long. Capsules 1 line long.

S. HISPIDA, L. var. β from Ava to Tenasserim up to 1500 feet.

S. scabra, Willd.

var. *a hispidata*. Whole plant hispid-pubescent, the leaves usually of a softer texture and undulate. Corolla-tube only $1\frac{1}{2}$ -2 lines long. Capsule greyish or whitish villous. Seeds opaque, black.

? var. β *S. articularis*, L. (*S. Arana*, and *longicaulis*, R. Br.). Whole plant more scabrous, and short pubescent, the leaves rigid and not undulate. Corolla-tube about 3 lines long, slender. Capsule shorter and hispid. Seeds often glossy black or brownish.

KNOXIA, *Linnaeus.*

Ovule attached at or below the summit of the cell. *Capsule* dehiscing from the base into two deciduous cocci, leaving the persistent setaceous axis. Herbs.

* *Stem leafy, without radical leaves, more or less branched.*

K. CORYMBOSA, Willd. Ava. Pegu and hills East of Toung-ngoo.

Spermatocoea tores, Roxb. Trice and Track.

S. Sumatrensis, Retz. non Roxb.

Leaves petioled. Flowers spiked, forming corymbs.

K. MICROCARPA, Kz. Pegu. Yunzalin. Zwa-ka-bin (*vide* Parish).

Leaves sessile or nearly so. Flowers corymbose, forming corymbs.

There are specimens with a short wide corolla-tube and others with a slender tube nearly twice the length (Kurz).

** *Leaves all crowded at the base. Stem scape-like, with narrow small cauline leaves only.*

K. PLANTAGINEA, Wall.

Prome, North of Myodwin.

More or less hairy while young. Calyx-tube densely villous. Corolla nearly $\frac{1}{2}$ an inch long.

CEPHALANTHIEÆ.

Capsules indehiscent, usually united into a syncarp. Corolla imbricate. Radicle superior.

CEPHALANTHUS, *Linnaeus.*

Corolla-lobes with toothlets in their sinuses. Capsules berry like, connate. Flowers in heads.

C. NAUCLEOIDES, D.C.

Ava (probably).

Nauclea tetrandra, Roxb.

Sub-order EU-RUBIACEÆ.

Fruit a more or less fleshy drupe or rarely a berry 1 to many-celled. Ovary-cells 1 to many-ovuled. Seeds never winged nor appendaged. Stipules interpetiolar or developed into leaves, or rarely none.

* *Stipules interpetiolar, various.*

+ *Seeds inclosed in pyrenes of a coriaceous, crustaceous, or chartaceous texture. Ovules solitary in each cell. Radicle inferior.*

PEDERIEÆ.

Orule and the seed pendulous. Drupe dry, crustaceous or chartaceous, irregularly rupturing.

PEDERIA, *Linnaeus.*

Corolla valvate. Cerei thin-chartaceous, expanded into wings. Twiners, the leaves opposite or whorled.

* *Ripe seeds not winged. Capsule globular.*

P. TOMENTOSA, Bl.

Arakan Hills.

P. barbulate and *densiflora*, Miq.

Glabrous or pubescent. Corolla scurfy-tomentose or velvety outside.

** *Ripe seeds broadly winged. Capsule more or less compressed.*

× *Corolla mealy or scurfy-tomentose or velvety outside.*

P. FETIDA, L.

Chittagong. Ava. Upper Tenasserim.

P. ovata, Miq.

Quite glabrous. Calyx-lobes shorter than the calyx-tube. Seed-wings pale-coloured.

var. β *microcarpa*. Capsule compressed ovoid-orbicular, only about 3 lines long.

P. CALYCINA, Kz.

Tavoy.

Sparingly and shortly puberulous. Calyx-lobes longer than the tube. Seed-wings blackish.

×× *Corolla not tomentose, but only sparingly and shortly pilose.*

P. LANUGINOSA, Wall.

All over Burma.

P. macrocarpa, Wall.

All softer parts, and more especially the under surface of the leaves, villous-tomentose. Seed-wings corky, pale-coloured.

COFFEEÆ.

Ovary 2-9- (very rarely 1-)celled, the solitary ovules erect or attached to the middle of each cell. Berry consisting of 2 or more (rarely a single) 1-seeded coriaceous or chartaceous pyrenes.

† Ovules erect and basal. Albumen often fleshy. Corolla valvate.

× Ovary 4-9- (rarely 2-)celled (*Lasianthiceæ*).

LASIANTHUS, Jack.

Calyx more or less toothed. Styles and ovary-cells 4-9. Flowers clustered or cymose, axillary. Shrubs.

* Flowers in clusters or short peduncled cymes, the bracts very minute and usually deciduous.

L. LUCIDUS, Bl.

Upper Tenasserim.

Flowers sessile. Calyx glabrous, the lobes about as long as the tube. Drupes crowded by the linear-lanceolate calyx-teeth.

L. CONSTRICTUS, Wight.

Tropical forests of Tenasserim and the Andamans.

Flowers very shortly pedicelled or almost sessile. Calyx puberulous, the limb broad with very short teeth. Drupes crowned with the cyathiform contracted almost truncate calyx-limb.

Habit of *L. stercorarius*, but differs in the inflorescence and in the shape of the calyx-limb (Kurz).

** Flowers in densely bracted sessile clusters, the bracts more or less conspicuous and often persistent.

× Calyx-segments about a line long or shorter. Stipules small.

L. STERCORARIUS, Bl.

Upper Tenasserim and the Andamans.

Leaves shortly petioled, puberulous beneath. Outer bracts broad and blunt, but short. Calyx-lobes lanceolate.

L. (MLPHITIDÆ) WALLICHII, W. A.

Upper Tenasserim and the Andamans.

Sparingly stiff-hairy. Leaves almost sessile, oblique. Bracts all linear-subulate, hirsute.

× × Calyx-segments linear to linear-subulate, 3-5 lines long, hirsute.

+ Stipules very large and leafy, oval.

L. STIPULARIS, Bl.

Tenasserim (or the Andamans).

Leaves glabrous or nearly so. Stipules persistent, infolding the flower-heads.

+ + Stipules more or less lanceolate, small, not leafy.

L. CYANOCARPA, Jack.

Chittagong. Tropical forests of South Andaman.

L. bracteatus, Wight.

Triosteum hirsutum, Roxb.

L. Roxburghii, Wight.

All parts brown-hirsute. Outer bracts very large, leafy, ovate, acuminate.

L. LEVICULIS, Kz.

Tropical Forests of Kamorta.

× × Ovary 2- (very rarely 4-)celled (*Psychotriææ*).

CERNAËIS, Linnæus.

Corolla funnel-shaped, the tube long. Calyx 4- or 5-toothed or lobed. Flowers in heads or solitary, axillary. Herbs or under shrubs.

C. (PSYCHOTRIÆ) HERBACEA, L.

Southern Pegu Range, Tenasserim, and the Andamans.

Geophila reniformis, Don.

HYDNOPHYTUM, Jack.

Calyx-limb entire. *Corolla-tube* short. *Flowers* sessile, clustered. Epiphytcal shrubs with tuberous trunks.

II. FORMICARUM, Jack.

On trees in Mangrove swamps in the Andamans.

PSYCHOTRIA, Linnæus.

Corolla-tube short, the throat bearded. *Pyrenes* flat or entire on the inner face. *Flowers* cymose or cymosely panicled. Shrubs, rarely scandent.

Sub-genus LEUCOPYRENGS.

Seeds plano-convex without ribs or dorsal keel, inclosed in a white thin membranous pyrene.

P. CALOCARPA, Kz.

Khakyen Hills. Pegu. Upper Tenasserim.

Small decumbent under shrub, the stems and often also the nerves beneath shortly tomentose.

Sub-genus EU-PSYCHOTRIA.

Pyrenes hard, with a more or less distinct dorsal rib, or ribbed and furrowed.

* *Pyrenes* not ribbed and furrowed, but dorsally more or less distinctly keeled or trigonous.
 × *Pyrenes* plano-convex, with an obsolete longitudinal dorsal rib. *Albumen* spiruously ruminant.

P. CONNATA, Wall.

Pegu Range. Tenasserim. The Andamans. Car Nicobar.

Grumilea elongata, Wight.

Pæderia erecta, Roxb.

Glabrous. Panicles elongate and raceme-like.

P. PLATYNEURA, Kz.

Tropical forests of the Andamans.

As preceding. Leaves larger. Panicle thyrsoid or corymb-like. Berries obovoid.

Much resembling *P. robusta*, Bl., from which it differs in the stipules, glabrous inflorescence, and glabrous corolla (Kurz).

×× *Pyrenes* 3-gonous, the inner face flat, the 2 lateral ones more or less concave and meeting in a longitudinal ridge.

+ Quite glabrous.

P. SYMLOCIFOLIA, Kz.

Hills East of Toung-ngoo at 5000 to 7000 feet.

Habit of *P. connata*. Cymes small, in slightly puberulous peduncled panicles. Calyx about a line across, obsoletely 5-toothed. Albumen equable.

++ Tawny or rusty hairy. *Flowers* sessile, clustered or in heads.

P. POLYNEURA, Kz.

Tropical forests of South Andaman.

Flower-heads very small. Leaves glabrous above.

P. HELFERIANA, Kz.

Tenasserim (or the Andamans).

Flower-heads rather large, compact. Leaves hirsute on both sides. Albumen equable.

** *Pyrenes* longitudinally ribbed and furrowed (ribs usually 3-5).

× *Flowers* clustered or in heads.

P. MONTICOLA, Kz.

Martaban between 3500 and 6000 feet.

Leaves opaque. Cyme compact, somewhat tomentose. Bracts subulate. Albumen ruminant.

P. ADENOPHYLLA, Wall.

Tenasserim (or the Andamans).

Leaves glossy. Panicle thyrsoid, glabrous, the branchings whorled. Bracts broadly ovate.

Wallich describes his plant as having racemes of the thickness of the little finger. My plant agrees with his herbarium specimens and belongs in the vicinity of *Grumilea Garducri*, Thw., a very near ally to *Psych. leucocoma*, Teysm. and Binn.

× × *Flowers pedicelled, in lax cymes or corymbs.*

+ *Small erect shrubs.*

× *Leaves thick membranous, turning more or less brownish in drying.*

† *Drupe 4-5 lines long.*

P. (GRUMILEA) VIRIDIFLORA, Miq. var. β Chittagong.

Glabrous. Cymes rusty-puberulous. Albumen ruminant.

var. α *genuina*. Stipules broad and rather large. Leaves entire. Cymes puberulous. Calyx-teeth inconspicuous.

var. β *undulata*. As preceding, but leaves undulate, the calyx-teeth about $\frac{1}{2}$ line long.

? var. γ *calophylla*, Wall. and Griff. Stipules small and subulate. Cymes glabrous. Calyx-teeth about $\frac{1}{2}$ line long.

P. picta, Wall., from Tavoy, seems to belong to var. γ, but the specimens are too imperfect for identification (Kurz).

† † *Drupe only 2-3 lines long. Albumen ruminant.*

P. ASIATICA.

Cymes rusty puberulous on a peduncle $\frac{1}{2}$ -1 inch long. Calyx-teeth distinct, linear. Berries crowned by the calyx-lobes.

P. (GRUMILEA) DIVERGENS, Miq. Tenasserim; rare in Pegu Range.

Cymes glabrous. Leaves narrower.

This may possibly be a form only of *P. asiatica*.

P. ANDAMANICA, Kz. Tropical forests of the Andamans. Katchall and Kamorta.

Cymes rusty puberulous, almost sessile. Calyx almost truncate. Berries truncate-crowned.

× × *Leaves thin membranous, remaining green in drying.*

P. VIRIDISSIMA, Kz. Tropical forests of Tenasserim and hills East of Toung-ngoo.

All parts glabrous.

+ + *Large scandent shrubs. Albumen equale.*

P. SARMENTOSA, Bl. Amherst.

Corymbs furnished at the lower branchings with two opposite narrow floral leaves.

Kurz adds from the Nicobars:

P. NICOBARICA, Kz. Katchall.

P. TYLOPHORA, Kz. Katchall.

CHASALIA, Commerson.

Corolla-tube elongate, the throat naked. *Pyrenes* carved out on the inner face along the central placenta. *Inflorance* of *Psychotria*. Shrubs or under shrubs.

C. (PSYCHOTRIA) CURVIFLORA, Wall. Tenasserim. The Andamans.

P. ophiophloides, Wall.

C. lurida, Miq.

P. ambigua, W.A.

SAPROSMA, Blume.

Corolla funnel-shaped, velvety, often almost oblique. *Berry* 1, rarely 2-seeded. *Flowers* terminal and axillary. *Stipules* free. Shrubs or trees.

* *Flowers sessile, terminal.*

S. CONSIMILE, Kz.

Upper Tenasserim from 3000 to 5000 feet.

Flowers solitary. Stipules cut and fringed.

Much resembles *S. fruticosum*, Bl., but differs in the flowers and stipules (Kurz).

** *Flowers solitary or by 3 or more in peduncled, axillary cymes.*

S. (PÆDERIA) TERNATUM, Wall.

β in Tropical forests of the Andamans.

Cymes poor-flowered, long-peduncled, glabrous, axillary by 2-4. Upper leaves usually ternary. Corolla 4-merous.

var. *a genuina*. All parts quite glabrous.

var. *β puberula*. Stipules, petioles, and nerves beneath more or less pubescent.

†† *Ovules attached to the middle or above the middle of the septum. Corolla twisted. Albumen often horny (Loricæ).*

COFFEA, *Linnaeus*.

Corolla funnel-shaped, the limb 4-7-parted. *Berry* 2 or rarely 1-seeded, the pyrenes chartaceous. *Flowers* terminal and axillary. *Stipules* free.

* *Corolla funnel-shaped.*

* C. ARABICA, L.

Occasionally cultivated.

All parts quite glabrous and glossy. Flowers very shortly pedicelled, in axillary clusters.

** *Corolla salver-shaped.*

× *Berries peduncled.*

C. TETRANTRA, Roxb.

Tropical forests of Martaban up to 3000,
also Chittagong and the Andamans.

All parts quite glabrous and glossy. Flowers on pedicels, $\frac{1}{2}$ -1 inch long, usually terminal, rarely axillary.

C. BENGALENSIS, Roxb.

Tropical forests of Martaban and Tenasserim.

× × *Berries sessile.*

Young shoots and nerves beneath sparingly pubescent. Flowers sessile, terminal and axillary.

Kurz adds :

AMARACARPUS PUBESCENS, Bl.

Tropical forests of Ulala Bay, Nicobars.

IXORA, *Linnaeus*.

Corolla salver- or nearly funnel-shaped, the limb 4- or 5-parted. *Flowers* corymbose or paniced. *Stipules* connate.

Sub-genus PAVETTA, L.

Flowers 4- or 5-merous. *Style* exerted to the same or nearly the same length of the tube, the stigma simple and spindle-like.

◦ *Corolla more funnel-shaped, the tube only 3 lines long.*

+ *Flowers sessile or nearly so, in a dense head.*

I. COMPACTIFLORA, Kz.

Upper Tenasserim at 2000 feet.

Glabrous, turning black in drying. Habit of *I. Pavetta*.

++ *Flowers in cymes or corymbs, shortly pedicelled.*

I. (PÆDERIA) RECURVA, Roxb.

Chittagong.

Glabrous, the corymbs puberulous and recurved. Berries crowned by the calyx-lobes.

- I. (PAVETTA) WEBEREFOLIA, Wall. Ava, Segain. The Andamans. Katchall.
P. cerberaefolia, Miq. Kamorta. Great and Car Nicobar.

Glabrous, also the erect or nearly erect corymbs. Berries marked by the circular scar of the fallen calyx-limb.

"Resembles *Webera Asiatica*, Bodd., to such a degree that it is frequently mistaken for it. My *Stylocoryne Webera* also belongs here" (Kurz).

° ° *Corolla-tube slender, $\frac{1}{2}$ - $\frac{3}{4}$ inch long. Flowers pedicelled.*

- I (PAVETTA) INDICA, L. The Andamans.

All parts (also the corymbs) glabrous, in drying remaining green.

- I. TOMENTOSA, Roxb. All over Burma.

Pavetta subclutina, Miq.

P. Rothiana, DC.

P. montana, Rwdt.

All parts more or less puberulous to tomentose, usually turning black in drying. Corymbs short puberulous.

Pavetta Brunonis, Wall., seems to be that tomentose harsh-leaved form of the above species which is also frequent on calcareous substrata in Ava. Miquel confounds *Pavetta Brunonis*, Wall., and *Ixora Brunonis*, Wall., two perfectly different species (Kurz).

- I. NAUCLEIFLORA, Wall. Maulmain Hills.

All parts villous pubescent, in drying not blackening. Corymbs villous from spreading short hairs.

Sub-genus EU-IXORA.

Flowers 4-merous.

* *Flowers in sessile or peduncled cymes or corymbs.*

× *Corymbs trichotomous, short peduncled or sessile, and in this case consisting of 3 or more terminal peduncled cymes. Flowers and fruits conspicuously (1-2 lines) pedicelled, as in true Pavetta.*

+ *Leaves acuminate or acute at the base, on a petiole $\frac{1}{2}$ -1 inch long.*

- I. MACROSIPHON, Kz. Tropical forests of the Andamans and Great Nicobar.
 Exactly as preceding, but corolla-tube nearly an inch long.

- I. ROSFLA, Kz. Tropical forests of the Andamans.

Leaves pale-coloured beneath. Flowers pale-rose. Corolla-tube an inch long.

+ + *Leaves sessile or nearly so, the base rounded or cordate.*

- I. BRUNNESCENS, Kz. Beach forests of the Andamans,
 Katchall and Car Nicobar.

Tree. Corymbs on a peduncle 1-1 $\frac{1}{2}$ inch long.

× × *Cymes or corymbs short peduncled or sessile, the flowers sessile or shortly and stoutly pedicelled.*

+ *Flowers white or rarely pale rose-coloured (never orange or scarlet), the corolla-lobes often comparatively narrower.*

° *Corolla puberulous or pubescent outside.*

- I. BRUNONIS, Wall. Tropical forests of the Eastern slopes of the Pegu Range.

All parts more or less pubescent. Cymes rather small, almost sessile. Leaves pubescent.

° *Corolla glabrous, rarely the throat bearded.*

† *Flowers sessile. Corolla-tube $\frac{1}{2}$ - $\frac{3}{4}$ inch long, the throat naked.*

- I. MEMECYLIFOLIA, Kz. Upper Tenasserim.
Shrub. Leaves sessile with a rounded or cordate base. Corymb glabrous.
The inflorescence and flowers are suspiciously like those of *I. sessiliflora*, Kz.,
and, despite the very different leaves, may only be a variety of it (Kurz).
- I. SENSIFLORA, Kz. Hills East of Toung-ngoo, at 3000 to 4000 feet.
Shrub. Leaves petioled, the base acute or obtuse. Corymb glabrous.
Very near to *I. subsessilis*, Wall., but differs in the sessile flowers, calyx, etc.
- I. RUGGULA, Wall. Tropical forests of the Pegu Range and the Attaran.
Tree. Leaves petioled, the base acute or obtuse. Cymes puberulous.
- †† Flowers shortly pedicelled. Corolla-tube $1\frac{1}{2}$ –2 inches long, the throat bearded.
- I. BRANDISIANA, Kz. Upper Tenasserim.
Glabrous, also the inflorescence. Leaves sessile or nearly so.
- I. COCCINEA, L. Generally planted, but elsewhere wild.
Pau-sa-yeik.
I. grandiflora and *I. propinqua*, R. Br.
I. bandhuca, Roxb.
Glabrous. Calyx-teeth acute. Corolla-lobes more or less acute.
- ††† Inflorescence glabrous.
- I. STRICTA, Roxb. Tropical forests in Pegu and Upper Tenasserim.
I. coccinea, Curt.
I. alba, Roxb.
I. blanda, Ker.
Glabrous. Calyx-teeth blunt. Corolla-tube $1-1\frac{1}{4}$ inch long, the lobes orbicular.
var. *a Roxburghiana*. Corymbs sessile or nearly so, rarely shortly peduncled.
Leaves usually almost sessile and often rounded at the base.
var. β *Blumeana*, Bl.; *I. amara*, Wall. Corymbs more lax on a $1-1\frac{1}{2}$ inch
peduncle, leaves usually acute at the base. Petiole 1–2 lines long. Flowers larger.
- I. (PAVETTA) GLAUCINA, Teysm. et Binn. Upper Tenasserim.
Glabrous. 2 of the calyx-teeth acute, the 2 others blunt. Corolla-lobes acute or
almost acuminate.
This differs from *I. fulgens*, Roxb., chiefly in the corolla-lobes; these are figured
in Roxburgh's drawings as very acute, while Wallich's specimens of this name have
them blunt. The leaves are now rather opaque, now very glossy above, and they
seem to vary in shape also. *Pavetta Lobbii*, Teysm. and Binn., is also very near
to it, but really distinct in my eyes. *Pavetta Teysmanniana*, Miq., and *Pavetta*
macrophylla, Teysm. and Binn., are both the same and probably not specifically
different from *Ixora congesta*, Roxb. *Ixora alba* of the Botanical Gardens at Buitenzorg
(not of Roxb.) appears to me to be the same as Korthals' *Pavetta calycina*, and has
exactly the calyx of *I. calycina*, Thw., but otherwise the two species are entirely
different. In order to avoid confusion, I suggest that the Malayan species should be
called *Ixora Korthalsiana*. *Ixora jucunda*, Thw., and *Pavetta Wyckii*, Hask., appear
to me conspecific (Kurz).
- °° Calyx-teeth $1-1\frac{1}{2}$ line long.
- I. KORTHALSIANA, Kz.
Glabrous. Calyx-lobes erect. Flowers white.
- ** *Corymbs panicled, the panicles thyrsoid, brachiato-trichotomous.*
× *Panicle thyrsoid, long-peduncled, furnished at the base or above the base of the*
peduncle with a pair of sessile cordate or oval floral leaves.
† *Corolla-throat naked, the tube 5–6 lines long.*

I. PAVETTA) NIGRICANS, Miq. In swampy spots in Pegu and Tenasserim.
I. affinis, Wall.

Leaves thin, turning black in drying. Panicle glabrous. Pedicels 1-2 lines long.
 var. *a genuina*. Corolla-lobes acute.
 var. *β erubescens*, Wall. Corolla-lobes blunt.

I do not think that varieties *a* and *β* can be retained as distinct species; both forms occur as well in Malaya as in Hindustan (Kurz).

I. DIVERSIFOLIA, Wall. Marshy spots in Tropical forests of Tenasserim.
 Leaves membranous or chartaceous, one-coloured. Pedicels 1-2 lines long.
 Panicle glabrous.

I. SPECTABILIS, Wall. Tropical forests of Arakan and Tenasserim.
 Leaves coriaceous, pale-coloured beneath. Flowers sessile. Panicle puberulous.

†† *Corolla-throat bearded.*

I. BARBATA, Roxb. The Andamans and Great Nicobar.
 Glabrous. Corolla-tube an inch long.

× × *Panicle longer or shorter peduncled, without floral leaves.*
 + *Style hairy. Panicle minutely puberulous.*

I. PARVIFLORA, Vhl. Prome district.
I. decipiens, Griff.

Tree. All parts glabrous. Flowers sessile, the corolla-tube only 2-2½ lines long.

++ *Style glabrous. Panicle pubescent.*

I. VILLOSA, Roxb. Sources of the Khaboung stream; Pegu Range. Kondul.
 Shrub. Leaves puberulous beneath. Corolla-tube 1-1¼ inch long.

I. CUNEIFOLIA, Roxb. vars. *a* and *β* in Tropical forests of Pegu
I. oblonga, Wall. and Tenasserim. var. *γ* in the 'Eng'
Pavetta Ackeringe, Teysm. et Binn. forests of Martaban. var. *macrocarpa*
 on Pulu Milu.

A glabrous shrub. Corolla-tube ½ inch long. Berries the size of a large pea.
 var. *a Roxburghii*. Panicle sessile or short-peduncled. Leaves glabrous.
 var. *β I. puberula*, Wall. Panicle usually longer peduncled. Leaves minutely
 puberulous beneath.

var. *γ pumila*. Only 1-3 feet high, simple or nearly so. Flowers often pale
 rose-coloured. Corymbs small and short, more slender. Leaves glabrous.

A very variable plant, of which some forms closely approach *I. villosa*. I
 identify Roxburgh's species from the Wallichian specimens thus named, which have
 pubescent inflorescences, while Roxburgh's drawings exhibit sessile glabrous corymbs.
 Var. *γ* may form a distinct species, but (being a laterite plant) it shows no other
 differences, except such reductions and modifications of growth as can be explained
 by the influence of the peculiar substratum on which it grows (Kurz).

I. (PENTADIUM) HELPERI, Kz. Tenasserim.

Flowers 5-merous. Panicle long-peduncled. Leaves glabrous, membranous.
 The specimens before me are incomplete, but very much resemble the following
 species.

I. LONGIFOLIA, Don. Tropical forests of Toukyeghat.
I. macrophylla, R. Br. non Bl. nec aliorum.

Leaves almost coriaceous, more or less shortly pubescent beneath.

Kurz adds from the Nicobars :

I. PAVETTA, Roxb.

Katchall.

I. KURZIANA, T. et B.

Katchall.

MORINDIÆ.

Ovary 2-4-celled, the solitary ovules attached to the middle or below the middle of the cell. Corolla calvate. Berries free or often united in a syncarp.

* Berries free, not connate.

GYNOCITODES, Blume.

Calyx-limb truncate. Style 2-cleft. Ovary 4-celled. Flowers clustered, axillary. Scandent shrubs.

G. MACROPHYLLA, Kz.

Along the coasts of the Andamans.
Katchall and Nankowry.

** Berries united into fleshy syncarps.

MORINDA, Linnaeus.

Berries fleshy. Pyrenes appendaged. Trees or shrubs.

Sub-genus MORINDA, L.

Corolla-limb 5- rarely 6-lobed. Stamens as many. Erect shrubs or trees.

* Stamens included in the corolla-tube.

× All parts more or less tomentose or pubescent.

M. LEIANTHA, Kz.

Maulmain district.

All parts shortly and roughish pubescent. Corolla glabrous.

M. TOMENTOSA, Heyne.

Prome.

M. multiflora, Roxb.

All parts (also the corolla) softly and shortly tomentose.

×× All parts (also the corolla) glabrous.

+ Flower-heads solitary and leaf-opposed.

† Flower-heads longer or shorter peduncled.

* M. CITRIFOLIA, L.

var. *a* planted all over Pegu and Martaban.

Nyā-gyi. Ni-pa-hsac.

var. *β* of the Andamans.

Stipules rounded or blunt. Corolla-throat hairy. Berries united into a fleshy greenish white syncarp.

var. *a genuina*. Stipules blunt. Syncarps the size of a hen's egg, or larger.

var. *β bracteata*, Roxb. Stipules often acute. Syncarps much smaller.

M. ANGUSTIFOLIA, Roxb.

Khakyen Hills and Tenasserim, often cultivated.

Stipules acute or acuminate. Corolla-tube naked. Berries purplish-black, only few developed on the thick torus.

var. *bracteata*, Roxb.

Kamorta. Katchall and Car Nicobar.

†† Flower-heads sessile or nearly so.

M. PERSICIFOLIA, Ham.

Ava down to Martaban. var. *β* in dry forests in Prome.

Low shrub. Quite glabrous or minutely scabrous.

var. *a genuina*. All parts quite glabrous.

var. *β seabra*. All softer parts more or less rough from a minute indistinct pubescence.

M. WALLICHI, Kz.

Tenasserim (*vide* Parish).

††† Flower-heads in a peduncled eyne.

Quite glabrous. Corolla-tube only $\frac{1}{4}$ inch long, the lobes as long.

Sub-genus LUCINEA, DC.

Corolla-limb 4-parted. *Stamens* 4. Scandent shrubs.

* *Calyx truncate.*

M. TETRANDBA, Jack. Tenasserim.

As preceding, but leaves glossy on both sides, the net-venation prominent.

** *Calyx 4-toothed. All parts glabrous.*

M. (RENNELIA) SPECTIOSA, Bth. et H. f. Upper Tenasserim.

Calyx sulcate. Flower-heads by threes in a peduncled poor brachiate terminal cyme.

++ *Seeds free, not inclosed in distinct pyrenes.*

VANGUERIEÆ.

Ovary many-celled, the cells with a solitary pendulous ovule attached above the middle or near the apex of the cells. Fruit a drupe, the putamen 1 to many-celled. Albumen usually fleshy. Radicle superior.

Δ *Corolla valvate. Ovule attached laterally or below the summit of the cell.*

VANGUERIA, Commerson.

Stigma discoid. *Ovary* usually 5-celled.

+ *Unarmed.*

* V. EDULIS, Vhl. Chittagong (cultivated).

V. *Commersonii*, Desf.

All parts glabrous. *Stigma* mitre-shaped.

× × *Armed with opposite sharp spines.*

V. SPINOSA, Roxb. Prome.

All parts glabrous. Berries about an inch thick.

V. PUBESCENS, Kz. Ava to Pegu.

All softer parts (also the corolla) pubescent. Berries up to $\frac{1}{2}$ inch thick.

PLECTRONIA, Linnaeus.

Ovary 2-celled, the stigma capitate, oblong or mitre-shaped. *Drupe* didymous or occasionally almost 4-celled by abortion.

* *Pyrenes quite smooth, triangular and almost keeled.*

P. (CANTHIUM) GLABRA, Bl. Tropical forests of the Pegu Range,
Canthium recurvum, Wall. Tenasserim and the Andamans.

Unarmed, glabrous. Flowers in dichotomous elongate-branched cymes.

** *Pyrenes more or less wrinkled and tubercled, rounded on the back.*

+ *Unarmed shrubs or trees.*

P. (CANTHIUM) DIDYMU, Gaertn. Tenasserim.

Canthium umbellatum, Wight.

C. spirostylum and *lucidulum*, Miq.

All parts glabrous and glossy. Flowers cymose.

Two different species may really be included in the above synonymy. *Canthium oliganthum*, Miq., and *Canthium umbelligerum*, Miq., Ann. Mus. Lugd., are both referable to *Canthium lucidum*, Hook. and Arn. (Kurz).

P. (CANTHIUM) GRACILIFES, Kz. Tropical forests of the Andamans.

Branchlets and nerves of leaves pubescent. Flowers on long capillary pedicels, solitary or paired. Much resembling *Vangueria Miqueliana*, but differs in the absence of spines, in its larger leaves, and in the different fruits.

× × × *Armed with opposite (rarely ternary) sharp spines.*
 + *Branchlets more or less rusty or tawny pubescent.*

P. (CANTHIUM) PARVIFOLIA, Roxb. Chittagong and Southern Pegu.
C. scandens, Bl.

Leaves pubescent on both sides, or hispid above. Drupes the size of a pea.

P. (CANTHIUM) HORRIDA, Bl. Tavoy.

Leaves glabrous, or the mid-rib beneath slightly pubescent. Drupes the size of a small cherry.

++ *All parts perfectly glabrous.*

P. (CANTHIUM) ANGUSTIFOLIA, Roxb. Chittagong Hills.
C. Leschenaultii, W. A.

Leaves glossy, caudate-acuminate. Flowers clustered.

P. PARVIFLORA, Bth. et H. f. (?).

Leaves more or less blunt, glaucescent beneath. Flowers in peduncled cymes.

I have found another small-leaved glabrous unarmed shrub in the swamp-forests of Pegu apparently belonging to this genus, but unfortunately without flower or fruit. In habit it somewhat resembles *P. parviflora*, Bth. and H. f.—*Gardenia parvifolia*, Wall. Cat. 8256 from Tavoy, of the habit of *Dammacanthus*, is sterile and, therefore, indeterminate (Kurz).

△ △ *Corolla imbricate. Ovule suspended from the summit of the cell.*

GUETTARDA, *Linnaeus.*

Stigma simple, thick. *Drupe* globose, rather large, the putamen many-celled.

G. SPECIOSA, L. Coast of Tenasserim and the Andamans. Trice and Track.

POLYPHRAGMON, *Desfontaine.*

Stigmata as many as ovary-cells. *Berry* 5–10-celled, the seeds pyrene-like. Anomalous genus. (*Timonius*, Rumph.)

P. (HELOSPORA) FLAVESCENS, Jack. var. β Tropical forests of South Andaman, Kamorta and Car Nicobar.

var. β *macrocarpum*. Leaves larger and of thinner texture; drupes the size of a small cherry. Seeds oblong, about 2 lines long.

var. β may be distinct, but the species of *Polyphragmon* belonging to the immediate affinity of *P. flavescens* are difficult to understand (Kurz).

Grows to 30 feet in Kamorta, but is dwarfed to a shrub on the grass plains of the same island. What authors (except Miquel) take to be cells are in reality the ovules, which are attached usually in two rows to the inner angles of the 4–7 cells of which the ovary consists. The seeds have a crustacean testa. The berries of the Nicobar trees are larger and usually 6-celled, and many pertain to a distinct species (Kurz).

RANDIÆ.

Ovary 1-celled, with parietal placentas or more usually 2- or more-celled, with numerous ovules in each cell.

△ *Corolla imbricate or twisted.*

× *Ovary* 1-celled, with 4 or 5 parietal placentas (*Gardeniæ*).

GARDENIA, *Linnaeus.*

Flowers often conspicuous. *Stigma* entire, sulcate-twisted. *Berry* usually large, many-seeded, the seeds imbedded in pulp.

Sub-genus EΓ-GARDENIA.

Unarmed. *Stipules* more or less connate into a sort of sheath. *Flowers* showy, salver-shaped, the tube long. *Calyx* various.

* *Flowers and berries sessile or nearly so.*

G. OBTUSIFOLIA, Roxb. Prome to Upper Tenasserim.
G. suavis, Wall.

Leaves almost sessile, scabrous. Berries globular, in the forks of the branchings.

** *Flowers (and berries) on short pedicels 3-5 lines long.*

G. RESINIFERA, Korth. Chittagong.
G. lucida, Roxb.

Leaves glabrous, with a tuft of hairs in the nerve-axils beneath. Calyx-limb deeply 5-cleft. Berry oblong, terete.

var. *glutinosa*, T. et B. Kamorta.

G. CORONARIA, Ham. Chittagong, Pegu and Tenasserim.

G. costata, Roxb.

G. carinata, Griff.

Yen-khat.

Leaves glabrous. Calyx-limb laterally cleft and more or less spathaceous. Berry oblong, more or less distinctly ribbed.

Sub-genus CAMPANULARIA.

Unarmed. *Stipules* connate or almost free. *Corolla* campanulate-funnel-shaped with a ventricose-inflated tube. *Leaves* glossy.

G. PULCHERRIMA, Kz. Tropical forests of the Andamans.

Tree. Leaves coriaceous, with a gland in the nerve-axils beneath. Flowers large and showy.

G. HYGROPHILA, Kz. Swampy places in Pegu.

Low shrub 1-3 feet high. Leaves membranous. Flowers middling-sized, white.

Sub-genus RANDIOIDES.

Randia-like trees or shrubs, armed with opposite sharp spines (abortive branchlets). *Stipules* free, very deciduous. *Flowers* comparatively small.

* *All parts (also the leaves) glabrous. Calyx-lobes herbaceous or leafy.*

G. CAMPANULATA, Roxb. Tropical forests of Chittagong, Pegu and Martaban.

Leaves more or less lanceolate. Flowers pedicelled, by 2 or more clustered. Calyx about 2 lines long.

** *All parts more or less pubescent, villous, or tomentose.*

× *Fertile flowers sessile, hermaphrodite-sterile ones in cymes. Calyx-lobes herbaceous or leafy. Flowers green.*

G. SESSILIFOLIA, Wall. All over Burma.

Bark grey. Fertile and sterile flowers on the same plant. Berries plumply beaked, terete.

G. ERYTHROCLADA, Kz. Ava, Pegu and Martaban.

Bark red. Fertile and sterile flowers usually on separate trees. Berries ribbed.

×× *All flowers fertile, or at least the fruits all conform and equally well developed. Calyx truncate or minutely toothed. Flowers white or yellow.*

G. CUNEATA, R. Br. Ava.

Calyx puberulous. Berry smooth. Branches silvery white. Leaves glabrous.

G. TURGIDA, Roxb. Irrawaddy Valley.

Calyx minutely pubescent. Berry roughish, glabrous. Leaves pubescent beneath.

G. DASYCARPA, Kz. Prome and Martaban.

G. tomentosa, Wall. non. Bl.

Calyx velvety-tomentose. Berry densely brown-velvety.

× × Ovary 2-celled (*Eu-Randia*).

RANDIA, *Linnaeus*.

Stigma 2-lobed. *Style* thickened spindle-like. *Berry* large, the seeds imbedded in pulp. Trees or shrubs, erect.

* *Corolla* almost rotate, large (up to nearly 1½ inch across).

R. UGINOSA, DC.

Ava. Pegu. Martaban.

Leaves glossy, glabrous. Berries large, sessile or peduncled.

This species, and most likely all true species of *Randia*, exhibits the same peculiar dimorphism of the fruit as some species of section *Randioides* of *Gardenia*. But here the peduncled fruits differ only in size, while they produce perfect seeds (Kurz).

** *Corolla* salver-shaped, rather small (about 4 lines in diameter or less).

R. LONGISPINA, DC.

Tropical forests of Pegu Range, Southern Slopes.

Calyx glabrous or nearly so. Berries glabrous or sprinkled with minute hairs.

R. NUTANS, DC.

Pegu and Martaban.

More or less shortly puberulous. Calyx densely pubescent or almost villous. Berries tawny-velvety.

The following are doubtful species :

R. EXALTATA, Griff.

Mergui, with Mangroves.

R. POLYSERMA, Roxb.

Chittagong.

No *Randia*, but indeterminable for the present (Kurz).

The mucus of some species of *Randia* (*R. dumetorum*) is an excellent substitute for *Ipecacuanha*, and Dr. Moodeen Sheriff¹ gives the following directions for preparing it for use :

“After breaking and removing the shell, the seeds and mucus will be found as a hard lump, and the two latter cannot be separated from each other, except by dissolving in water, or powdering and passing through a sieve. The lump of two or three nuts is generally a dose of the medicine as an emetic. They should be bruised, macerated for ten or fifteen minutes in two or three ounces of water, rubbed with the fingers, and then strained through cloth. The mucus being very soluble in water, passes off with it, and the numerous and extremely hard seeds, of a reddish-brown colour, with some resinous and other insoluble matter, remain on the cloth. The draught is now ready for use; given to a patient it produces nausea and vomiting in about ten minutes, and very free emesis is produced if assisted with warm water. The whole of this draught, or half of it, with 30 or 40 minims of tincture of opium, is to be given in dysentery, three or four times in 24 hours, according to the emergency of the symptoms.

“The best and most convenient way of using this medicine is in powder, which is prepared as follows: the lumps of seeds should be well bruised, and passed through an ordinary sieve, or thin cloth. By this means all the seeds will be separated. The coarse powder thus obtained should be powdered again and sifted through a fine sieve or very fine cloth. The powder is now fit for use, and should be kept in a stoppered bottle.” In doses of 40 to 50 grains this is said to be fully equal to *Ipecacuanha*. Dr. Moodeen Sheriff adds the following prescription for use in dysentery.

R. Pulpæ Randiæ dumetorum	gr. xxx to lx
Tinet Opii	m. xxx to lx
Aquæ	ʒi-ii.

Mix and give three or four times in the 24 hours according to symptoms. Or this pill :

R. Pulpæ Randiæ dumetorum	gr. x. to xx
Opii	gr. i. to ii.

Make into a pill and give every three, four or six hours, as the case may require.

¹ Madras Monthly Journal of Medical Science, 1870, p. 119.

WEBERA, Schreber.

Stigma simple. *Style* not thickened, filiform. *Berries* small, not pulpy. Erect trees or shrubs, unarmed.

* *Cymes terminal or in the forks of the branchings.*

W. GLOMERIFLORA, Kz. Pegu Range. Sources of the Toung-nyo stream.
Glabrous. Inflorescence grey pubescent. Unarmed evergreen tree.

** *Cymes or corymbs leaf-opposed.*

W. OPPOSITIFOLIA, Roxb. Chittagong, Pegu, Tenasserim, the
W. densiflora, Wall. Andamans and Katchall.
Gynopachys axilliflorus, Miq.

All parts glabrous. Cymes puberulous. Unarmed evergreen tree.

var. *a genuina*. Calyx 2 lines long or somewhat longer, the limb more bell-shaped, almost glabrous. Flowers in shorter cymes. Berries the size of a large pea.

? var. *β floribunda*. Calyx about 1½ lines long or shorter, densely pubescent, the limb shorter. Flowers in densely pubescent slender divaricate corymbs. Berries half the size.

Sub-genus GRIFFITHIA, W. A.

Stigma 2-lobed. Shrubs, often scandent, armed with straight or recurved spines.

* *Spines recurved. Scandent shrubs.*

× *Inflorescence quite glabrous.*

W. (RANDIA) LONGIFLORA, Lamk. Tropical forests of Chittagong,
Griffithia fragrans, Miq. Tenasserim, and the Andamans.

Corolla-tube ¾–1¼ inch long.

This, as other species of *Griffithia*, has the cymes not strictly axillary, but arising from the end of, or laterally from, the transformed spine-like branchlets (Kurz).

W. (GRIFFITHIA) SIAMENSIS, Miq. Upper Tenasserim.

Corolla-tube hardly longer than the calyx (2 lines long).

× × *Inflorescence and calyx appressed-pubescent.*

W. (STYLOCORYNE) BISPINOSA, Griff. Tropical forests of Pegu Range,
Eastern slopes, and Tenasserim.

Corolla-tube about 3 lines long.

W. (RANDIA) FASCICULATA, DC. Maulmain (fide Parish).

P. rigida, Wall.

** *Spines straight. Erect or straggling shrubs.*

W. FASCICULATA.

Flowers sessile or almost sessile between 2 connate bractlets.

W. (GARDENIA) MYRTIFOLIA, Wall. Swampy forests of Pegu and Tenasserim.

Flowers solitary, on a slender bractless pedicel.

Kurz adds:

W. (GRIFFITHIA) CURVATA, Kz. Kamorta and Katchall.

DIPLOSPOBA, De Candolle.

Style 2-cleft. *Berries* rather large, not pulpy. *Seeds* in 2 rows in each cell. Erect trees or shrubs, unarmed.

D. SINGULARIS, Korth. Tropical forests of the Pegu Range, Eastern
Discospermum sphaerocarpum, Dalz. slopes. Tenasserim and the Andamans.

HYPOBATHRUM, *Blume*.

Styles 2-lobed. *Berry* small, stalked or sessile, not pulpy. *Seeds* in a single row in each cell. Erect shrubs or trees.

Sub-genus PETUNGA, DC.

Flowers 5-merous; the calyx-limb persistent. *Berry* contracted into a longer or shorter stalk (the elongating pedicel).

H. (RANDIA) RACEMOSUM, Roxb.

Marshy forests of Pegu and Martaban.
Katchall and Great Nicobar.

Petunga variabilis, Hassk.

Glabrous. Flowers in axillary spikes.

Sub-genus HYPTIANTHERA, W. A.

Flowers 5- rarely 4-merous, the calyx-limb persistent. *Berry* sessile.

H. (RANDIA) STRICTA, Roxb.

Chittagong. Blume.

Glabrous. Flowers in axillary clusters.

BRACHYTOME, *Hooker, f.*

Flowers polygamously diceious. *Corolla* funnel-shaped, glabrous. *Style* shortly 2-lobed. *Berry* small, not pulpy. *Seeds* very numerous. Erect shrubs.

B. WALLICHII, H. f.

Khakyen Hills. Ava.

Inflorescence, flowers, and berries very like those of *Saprosma ternatum*, but the last are many-seeded (Kurz).

MORINDOPSIS, *Hooker, f.*

Flowers diceious, in peduncled heads. *Calyx-limb* cupular or 4-toothed. *Corolla-throat* villous. *Style* hirsute. *Berry* elongate, cylindrical, the numerous seeds imbricately pendulous, almost appendaged. Trees.

M. (PSILOBIUM) CAPILLARIS, Kz.

Swampy forests of Pegu and Tenasserim.

* *Corolla* valvate.

× *Ovary* 2-celled, the placenta 2-cleft. *Corolla* reduplicate-valvate (*Mussaendia*).

MUSSENDIA, *Linnaeus*.

The one or other calyx-lobe of the outer flowers extended into a discoloured leaf. Connective not mucronate. Style-branches 2.

* *Calyx-limb* deciduous, leaving an angular scar at the top of the berry.

× *Calyx-teeth* $\frac{1}{2}$ -1 line long.

M. GLABRA, Vhl.

Hills East of Toung-ngoo at 3000 to 4000 feet.

Calyx-teeth erect, lanceolate. Branchlets puberulous or velvety.

var. *a genuina*. More glabrous, especially the leaves and branches.

var. β *Wallichii*, Don. Leaves pubescent beneath and along the nerves above, petioles shorter.

M. VARIOLOSA, Wall.

Arakan, Pegu and Tenasserim, more common south of Maulmain.

Calyx-teeth as in preceding, but reflexed. Branchlets hirsute.

M. parva, Wall., from Tavoy, possibly belongs here, but the only specimen seen by me is not sufficient for a correct identification.

M. JELINEKII, Kz.

Great Nicobar.

Calyx-teeth $\frac{1}{2}$ line long.

Allied to *M. longifolia*.

× × *Calyx-lobes* 2-4 lines long.

M. PAVETTEFOLIA, Kz.

Tropical forests East of Toung-ngoo.

Calyx-lobes filiform, 2-2 $\frac{1}{2}$ lines long, all conform and none expanded leaf-like.

M. MACROPHYLLA, Wall. non Schum. Tropical forests of the Andamans,
Kamorta and Nankowry.

Calyx-lobes linear, 2-3 lines long. Corolla-lobes nearly half as long as the
corolla-tube.

M. CALYCINA, Wall. Ava and Pegu.

Calyx-lobes lanceolate, about $\frac{1}{2}$ inch long. Corolla-lobes about $\frac{1}{4}$ as long as the
corolla-tube.

** *Calyx-limb persistent, crowning the berry.*

M. CORYMBOSA, Roxb. Valley of the Koladyne and Upper Tenasserim.

Calyx-teeth linear-subulate, about 4 lines long. Corymbs rather compact.

M. WALLICHI, G. Don. (M.).

ACRANTHERA, *Arnott.*

Calyx-teeth all conform, not appendaged. Connective mucronate-produced.
Stigma clavate.

A. (MUSSENDA) UNIFLORA, Wall. Maulmain and Tavoy.

× × *Ovary usually 5-6- (rarely 2-3-)celled, the placentas simple (Urophyllice).*

ADENOSACME, *Wallich.*

Calyx 5-4-cleft. *Corolla-throat* naked. *Ovary* 5-3-celled. *Cymes* or corymbs
terminal or nearly so, rarely lateral.

A. LONGIFOLIA, Wall. Pegu Range and more frequent in Tenasserim
up to 3000 feet. Great Nicobar.

In the tropical forests of the valleys of the Nāt-toung hills (Martaban) grows
another species, apparently new, which has very short thick petioles and the uppermost
leaves almost sessile; but the specimens are too bad for description (Kurz).

MYRIONEURON, *R. Brown.*

As preceding, but ovary 2-celled.

M. NUTANS, R. Br. Chittagong.

Glabrous. *Cymes* compact and head-like, densely bracted, nodding. Bracts
subulate, rigid.

M. HIRSUM, Kz. Hills East of Bhamo.

Branches hirsute. *Cymes* corymb-like, trichotomous, hirsute, erect. Bracts
broad, membranous, hirsute.

UROPHYLLUM, *Jack.*

Calyx entire or minutely toothed. *Corolla-throat* bearded. *Flowers* clustered
or cymose, axillary.

* *Ovary and berry 5-6-celled. Flowers in simple or decomposed umbels or cymes.*

U. GLABRUM, Wall. Mergui.

Leaves and shoots glabrous. *Calyx* about 2 lines across.

U. STRIGOSUM, Koeth. Tenasserim (or Andamans?).

Leaves beneath and shoots more or less pubescent. *Calyx* a line across.

** *Ovary and berry 2-celled. Flowers in sessile clusters.*

U. BILOCULARE, Kz. Tropical forests East of Toung-ngoo.

All parts glabrous. *Flowers* minute.

** *Stipules transformed into leaves and forming whorls, or rarely the leaves opposite and the stipules wanting.*

STELLATE.

Calyx entirely adnate to the calyx or the calyx-limb 4-6-cleft. Corolla valvate. Ovary 2-celled, the ovules solitary, erect or ascending. Drupe indehiscent, often didymous.

RUBIA, *Linnaeus.*

Flowers 5-merous. Drupe sappy. Erect or twining herbs.

R. *CORDIFOLIA*, L.

var. β Ava, or Taong-doung.

R. munjista, Roxb.

R. scandens, Zoll. et Mor.

R. purpurea, Dene.

Leaves more or less cordate-ovate, long-petioled, 3-5-nerved.

var. *a genuina*. Leaves various, more or less scabrous on the upper side and on the margins and on the nerves beneath, but not pubescent.

var. *affinis*, Wall. Leaves scabrous above, softly but shortly pubescent beneath.

R. *ANGUSTISSIMA*, Wall.

Ava or Taong-doung.

R. charafolia, Wall.

Leaves narrow-linear, sessile, 1-nerved.

GALIUM, *Linnaeus.*

Flowers 4-merous. Drupe didymous or globose. dry. Herbs or under shrubs.

G. *ASPERIFOLIUM*, Wall. Khakycen Hills and Nät-toung in Martaban at 7000 feet.

A large Order of great importance, including tonics, febrifuges, emetics, purgatives, poisons, and valuable dyes. Cinchona as a febrifuge is already too well known to require special notice, and thrives well in the Karen Hills east of Toung-ngoo, where it is cultivated by the Forest Department. As substitutes for Peruvian bark may be mentioned *Rondeletia febrifuga*, *Hymenodictyon*, *Ophiorrhiza mungos*, and others. Gambier is the product of *Uncaria gambir*. Ipecacuanha (*Cephaelis ipecacuanha*) is now cultivated in Burma, and similar, although inferior properties obtain in *Richardsonia*, some species of *Spermacoces*, and the indigenous *Geophila reniformis*. The powdered fruit of *Randia dumetorum* is a powerful emetic, and its root bruised is used for poisoning fish. The root bark of the Brazilian *Chiococca angui-fuga* and *Ch. densifolia* produces the most violent emetic and drastic effects. Only a few species yield edible fruits, as *Fouquieria edulis*, which is now introduced into India. Coffee is the produce of *Coffea Arabica*, and thrives well in Burma, but is unfit for cultivation on a large scale unless it be in the southern parts of Tenasserim. Madder-dye is obtained from *Rubia cordifolia* and *Hedyotis umbellulata*, and a very inferior dye, but one much used in Burma and India, is the product of various species of *Morinda*. The timber of most rubiaceaceous trees is rather inferior, and the best is that derived from *Xaualea* and allied genera.

Order CAPRIFOLIACEÆ.

Flowers regular or almost irregular. Calyx-tube adnate to the ovary, the limb truncate or 4-5 or more lobed or toothed. Corolla gamopetalous, tubular, funnel-shaped, or rotate, inserted round the epigynous fleshy disk, 4- or 5- rarely 3-lobed, imbricate. Stamens as many as corolla-lobes and alternating with them, inserted in the tube. Anthers versatile, the cells parallel, opening longitudinally. Ovary inferior, 2-5- rarely 1-celled, with 1 or more pendulous ovules in each cell. Stigmas as many as ovary-cells, united into one, sessile, or on a filiform simple style. Fruit an indehiscent berry, or rarely a dry dehiscent capsule, nude or crowned by the calyx-limb, 1-5-celled. Seeds solitary, or several in each cell, the testa crustaceous or bony, rarely membranous. Albumen fleshy. Embryo axial, radicle superior, cotyledons oval or oblong. Trees or shrubs, sometimes climbing, rarely herbs, with

opposite, simple or pinnate leaves. *Stipules* usually none. *Flowers* small or middling-sized, variously arranged, but usually cymose.

The Elder (*Sambucus nigra*) and the Honeysuckle (*Lonicera caprifolium*) belong to this Order. The flowers of most exhale a sweet odour, especially after sunset.

All Burmese species are woody plants.

SAMBUCIÆ.

Corolla rotate or shortly tubular. *Stigmas* 3, sessile or on a very short style. *Raphe* introrse or lateral.

VIBURNUM, *Linnaeus*.

Ovary 1- rarely 2- or 3-celled. *Berry* 1-celled and 1-seeded. *Leaves* simple.

V. FETIDUM, Wall. var. *a* Ava, Taong-doung.

Leaves more or less stellately pubescent beneath. *Corymbs* terminal.

var. *β* *premuera*, Wall. *Corymb* involucred by 3 or 4 small leaves.

var. *γ* *Griffithianum*. All parts more robust and more densely stellate-pubescent. Leaves about 4 inches long, acuminate, 6-7-nerved on each side, the lower nerves not meeting at the base (in var. *a* and *β* the leaves are trinerved at the base and, besides, have only 2-3 lateral nerves on each side). Most probably a good species (Kurz).

V. COLEBROOKEANUM, Wall. Khakyen Hills.

Leaves glabrous. *Corymbs* usually on axillary short branchlets. *Berries* about 2 lines long, broadly ovate.

SAMBUCUS, *Linnaeus*.

Ovary 3-5-celled. *Berry* with 3 to 5 pyrenes. *Leaves* unpaired, pinnate or pinnatisect.

S. THUNBERGIANA, Bl. Khakyen Hills.

LONICERIÆ.

Corolla-tube more or less elongate. *Style* filiform. *Raphe* extrorse.

LONICERA, *Linnaeus*.

Corolla tubular. *Ovary* and *berry* 2-3-celled, or the berry 1-celled by absorption of the septa.

L. LEIANTHA, Kz. Khakyen Hills.

* L. JAPONICA, Thunb. (M.).

SCYPHIFLORA, *Gaertner*.

Corolla tubular-funnel-shaped, regular. *Ovary* 2-celled, with a parietal 2-ovuled placenta protruding into the cells so as to form a spuriously 4-celled ovary. *Fruit* a drupe.

S. HYDROPHYLLACEA, Gaertn. Andamans, in mangrove swamps.

Epithinia Malayana, Jack. Kamorta.

"This genus is generally ascribed to *Rubiaceæ*; but the structure of the ovary and the position of the ovules are tell-tale marks of its Caprifoliaceous descent" (Kurz).

Division III. POLYPETALOUS.

Flowers with both a *Calyx* and a *Corolla*, the latter of separate *Petals*.

Series I. CALYCIFLORÆ.

Sepals connate, rarely free, often adnate to the ovary. *Petals* uni-seriate, perigynous or epigynous. *Disk* adnate to the base of the calyx, rarely tumid or raised into a torus, or gynophore. *Stamens* perigynous, usually inserted on or beneath the outer margin of the disk. *Ovary* frequently inferior.

UMBELLALES.

Flowers regular, usually hermaphrodite. *Stamens* usually definite. *Ovary* inferior, 1-, 2-, or many-celled. *Ovules* solitary, pendulous in each cell from its top. *Styles* free or connate at the base. *Ovules* with the coats confluent with the nucleus. *Seeds* albuminous. *Embryo* usually minute.

Order CORNACEÆ.

Flowers unisexual or hermaphrodite, regular. *Calyx-tube* adnate to the ovary, the limb forming a raised border, persistent, truncate, or with as many teeth as petals. *Petals* 4 or 5, rarely more, (imbricate or) valvate, inserted round an epigynous disk or on the calyx-border, rarely wanting. *Stamens* as many or rarely 2-4 times as many as petals, and inserted with them. *Filaments* filiform or complanate. *Anthers* with parallel cells, opening longitudinally. *Disk* epigynous or central, variously shaped. *Ovary* inferior, 1-4-celled, with 1, or rarely 2, anatropous pendulous ovules in each cell. *Style* simple, with a terminal entire or rarely lobed or 2-3-cleft stigma. *Fruit* an indehiscent drupe, with a 1-4-celled stone, or rarely 2 bony or crustaceous pyrenes. *Seeds* pendulous. *Albumen* fleshy. *Embryo* straight, nearly as long as the albumen, the radicle superior, and shorter than the flat usually leafy cotyledons. Trees or shrubs, rarely herbs, with opposite or rarely alternate, simple or slightly-lobed leaves. *Stipules* none. *Flowers* usually small in axillary or terminal heads, cymes, or corymbose panicles.

The Burmese species are all woody plants.

CORNIÆÆ.

Flowers hermaphrodite.

* *Petals* narrow-linear, valvate. *Anthers* basifixed. *Style* elongate. *Leaves* alternate.

ALANGIUM, Lamarck.

Stamens usually 2 to 4 times the number of the petals. *Ovary* 1-celled. *Albumen* ruminant. *Flowers* clustered or fascicled.

A. DECAPETALUM, Lamk. Burma (fide Mason).

A. hexapetalum and *tomentosum*, Lamk.

A. Lamarckii, Bedd.

A tree, spiny-armed. Petioles 6-8 lines long. Petals 10-6. Filaments densely pilose at the base. Bracts and bractlets broadly ovate, very deciduous.

The above synonymy probably includes two different species. I suspect that Thwaites' *A. Lamarckii* is a climber. The calyx-tube is apparently sulcate-ribbed (Kurz).

A. SUNDANUM, Miq. Katchall. var. β Tropical forests of the Andamans.

A large climber, unarmed. Petioles shorter. Petals 6. Filaments sparingly pilose at the base. Bracts and bractlets linear-oblong, longer persistent.

var. α . Flowers on pedicels $\frac{1}{2}$ to $\frac{2}{3}$ inch long.

var. β . Pedicels only 2-3 lines long.

MARLEA, Roxburgh.

Stamens as many as petals. *Ovary* 1-3-celled. *Albumen* homogeneous. *Flowers* cymose-panicled.

M. BEGONLEFOLIA, Roxb. Tropical forests East of Toung-ngoo and Bhamo Hills.
Styrum Javanicum, Bl.

Petals about $\frac{1}{2}$ an inch long or shorter. Anthers with a glabrous connective. Leaves glabrous.

M. TOMENTOSA, Endl. Tropical forests of Tenasserim (Thoung-yeen).

Diacarpium rotundifolium, Hassk.

** *Petals short, valvate. Anthers dorsifixed. Style short.*

CORNUS, *Linnaeus.*

Petals 4. Ovary 2-celled, with a simple stigma. Leaves usually opposite.

C. OBLONGA, Wall. Hills East of Toung-ngoo at 4000 to 7000 feet.

Order ARALIACEÆ.

Flowers hermaphrodite or polygamous, regular. *Calyx-limb* forming a slightly raised line or short cup round the summit, truncate or toothed, or quite inconspicuous. *Petals 5* or more, rarely 4, valvate, shortly inflexed at the tip, and often cohering (very rarely blunt and imbricate). *Stamens* as many as petals or sometimes more. *Anthers* versatile, the cells parallel and opening longitudinally. *Ovary* inferior, 2- or more celled, rarely by abortion 1-celled, with a single anatropous ovule in each cell, suspended from the summit. *Styles* as many as cells, either distinct with small terminal stigmas, or united in a cone, or more or less reduced to a slight protuberance with inconspicuous stigmas. *Fruit* more or less drupaceous and indehiscent, the epicarp succulent, rarely almost dry and thin. *Seeds* solitary, pendulous, inclosed in pyrenes. *Albumen* homogeneous or ruminant. *Embryo* minute, near the apex, with a superior radicle. *Trees*, often palm-like, shrubs or climbers, with alternate compound or rarely simple leaves. *Stipules* none. *Flowers* small, in umbels or heads often collected into panicles.

This Order contains few species of economic value. It comprises, however, the famous Ginseng (*Panax ginseng*) so extravagantly esteemed in China, Japan, and other parts of the East for its restorative qualities. The substance known as rice-paper is the pith of *Fatsia papyrifera*, cut into thin slices. The only other noteworthy plant is the Ivy (*Hedera helix*).

ARALIEÆ.

Petals more or less imbricate, broad at the base.

ARALIA, *Linnaeus.*

Gynacium 2-5-merous. Styles free. Fruit angular in a dried state. *Pedicels* jointed. *Leaves* usually pinnate or decomposed.

A. (PANAX) ARMATA, Wall. Tavoy.

HEDERIEÆ.

Petals valvate in bud.

* *Stamens as many as petals.*

× *Albumen homogeneous (Panacivæ).*

+ *Ovary 2- (rarely 1-, 3-, or 4-) celled, the cells usually fewer than the petals.*

† *Styles distinct from the base or from a conical base.*

PANAX, *Linnaeus.*

Fruits laterally compressed or didymous, rarely 3-4-angular. *Filaments* filiform. *Styles* distinct, at length recurved, the stigmas more or less decurrent on the inner side. *Umbels, heads or racemes* forming compound inflorescences, rarely simple. *Leaves* various.

* P. FRUTICOSUM, L. Cultivated in Pegu.

†† *Styles united into a cone or column.*

BRASSAIOPSIS, *Donn. et Planch.*

Flowers 5-merous. Fruits terete. *Ovary 2-1-celled. Pedicels* not jointed. *Umbels* forming large terminal racemes. *Leaves* palmatifid, rarely digitate.

B. (PANAX) PALMATA, Roxb. Chittagong and the Andamans.

++ Ovary 5- or more (rarely by abortion 3-4-)celled.

HEPTAPLEURUM, Gaertner.

Flowers 5-6- (rarely 4- or 7-8-)merous. Drupes angled and ribbed in a dried state. Umbels, heads, or racemes forming large compound inflorescences. Pedicels not jointed. Stigmas immersed on the ovary, dot-like.

H. (PARATROPIA) VENTUOSA, W. A. All over Burma and the Andamans.

Arulia digitata, Roxb.

Ba-loo-let-wa (Mason).

Climber. Leaves and inflorescence glabrous.

H. ELLIPTICUM, Seem.

Kamorta, Katchall and Great Nicobar.

Sub-genus AGALMA, Miq.

Styles united into an elongate column.

H. (AGALMA) GLAUCUM, Seem.

Hills East of Toung-ngoo at 6000 feet.

Leaflets on thick rather short petiolules, entire.

H. HYPOLEUCUM, Kz.

Hills East of Toung-ngoo at over 6000 feet and the Khakyen Hills.

Leaflets on very long, slender petiolules, usually pinnati-lobed.

TREVESIA, Visconti.

Flowers 8-12-merous. Drupes globular, sulcate or ribbed. Umbels paniced. Leaves palmatifid, digitate or pinnate. Pedicels not jointed.

T. (GASTONIA) PALMATA, Roxb.

Tropical forests all over Burma up to 4000 feet.

T. Burmanica, T. And.

The leaves in this species vary very much in cut, the base of the lobes being often abruptly reduced to the midrib only.

×× Albumen ruminat (*Hedericæ*).

+ Ovary 1-celled.

ARTHROPHYLLUM, Blume.

Pedicels not jointed. Umbels compound. Leaves pinnate or simple.

A. JAVANICUM, Bl.

Tropical forests of Western coast of South Andaman and Kamorta.

A. ellipticum, Bl.

A. Blumeanum, Zoll. et Mor.

A palm-like tree up to 30 feet high.

++ Ovary 2- or rarely 3-celled.

† Pedicels not jointed with the calyx.

HETEROPANAX, Seem.

Styles distinct, filiform. Umbels racemose, in panicles. Leaves pinnately decompound.

H. (PANAX) FRAGRANS, Roxb.

Chittagong, Ava, and Pegu up to 3000 feet.

†† Pedicels jointed under the calyx.

MACROPANAX, Miquel.

Styles united into a cone or column. Umbels or heads forming panicles. Leaves digitate.

M. OREOPHYLLUM, Miq.

Khakyen Hills and Bhamo at 4000 feet.

** Stamens numerous, and more numerous than the petals. Styles none or connate. Petals calcate or firmly cohering (*Pleurandricæ*).

TUPIDANTHUS, *Hooker, f. et Thomson.*

Petals firmly cohering into a thick mitre. *Gynœcium* poly- (up to 100-)merous. *Leaves* digitate.

T. CALYPTRATUS, H. f. et Th.

Arakan Hills (*vide* Theobald).

Order UMBELLIFERÆ.

Corolla polypetalous, epigynous, isostemonous, valvate in bud. *Petals* 5, inserted on an epigynous disk. *Stamens* 5, alternate with the petals. *Ovary* inferior, of two 1-ovuled cells. *Ovules* pendulous, anatropous. *Fruit* dry. *Embryo* albuminous apical; radicle superior. *Leaves* alternate.

* *Umbels* simple or irregularly (very rarely regularly) compound. *No rittle* in the furrows of the mericarp.

HYDROCOTYLIEÆ.

Fruits laterally compressed, the mericarps rounded or acute on the back (not sharply angular).

HYDROCOTYLE, *Linnaeus.*

Fruits much compressed. *Calyx-teeth* minute or obsolete. *Petals* concave, valvate or imbricate. *Umbels* simple. Creeping herbs with simple leaves.

* *Leaves* entire or crenate. *Umbels* bracted.

H. ASIATICA, L.

In grass lands and cultivation all over Pegu up to 2500 feet. Introduced into the Andamans.

H. CORNIFOLIA, H. f.

Flowers by 3-4 in the head, sessile. Fruits nearly 2 lines in diameter, each mericarp with 2 hardly prominent ribs.

** *Leaves* more or less lobed, the lobes acute or blunt, crenate or serrate. *Umbels* without bracts.

× *Peduncles* and *petioles* more or less puberulous.

H. JAVANICA, Thunb.

In betel gardens on the hills east of Toung-ngooc at 3000-4000 feet.

H. *Nepalensis*, Hook.

H. *polyccephala*, W. A.

Flowers numerous, almost sessile or very shortly pedicelled, forming rather crowded terminal head-like umbels, the lower ones solitary and axillary.

×× *All parts* quite glabrous.

H. BIRMANICA, Kz.

Upper Tenasserim. Thonng-yeen at 5000 (*vide* Parish).

Flowers on slender pedicels, forming slender solitary umbels in the axils of the leaves.

SANICULIEÆ.

Mericarps almost terete or laterally compressed, the commissure broad. *Calyx-teeth* or lobes usually conspicuous.

SANICULA, *Linnaeus.*

Mericarps ciliate from bristles which are often hooked. *Flowers* pedicelled, polygamous. *Bracts* small. *Umbels* very small, usually paniced. *Leaves* dissected, toothed.

S. EUROPEA, L.

Khakycen Hills.

S. *montana*, Rein.

S. *Javanica*, Bl.

S. *ata*, Ham.

** Umbels regularly compound.

× Primary ribs of the mericarp more or less conspicuous, secondary ones none. Vitta in the furrows usually conspicuous or obscure, very rarely none.

AMMINIEÆ.

Fruits laterally compressed, or narrowed or sulcate on both sides of the commissure.

* Seeds with a convex or almost flat face.

× Leaves simple. Flowers yellow.

BUTLEURUM, *Linnaeus*.

Umbels compound or rarely the flowers in heads. *Calyx-teeth* obsolete. *Disk-lobes* almost flat. *Leaves* entire, flat.

B. TENUE, Don. Nāt-toung and Hills East of Toung-ngoo at 7000 feet.

× × Leaves variously compound. Flowers usually white, rarely yellow.

APIUM, *Linnaeus*.

Carpophore simple or 2-cleft at the apex. Fruit didymous or ovate, the mericarps almost straight. *Petals* entire, blunt or acute.

* A. GRAVEOLENS, L.

Cultivated in Prome and Ava.

CARUM, *Linnaeus*.

Carpophore 2-cleft or 2-parted. Fruit ovate or oblong, the ribs rather prominent. *Involucral bracts* few and small, or none. *Petals* notched or 2-lobed. *Calyx-teeth* obsolete or slightly prominent. *Disk-lobes* conical, or the disk convex.

* Fruits glabrous.

* C. PETROSELINUM, Bth. et H. f. Cultivated in the drier districts.

Flowers yellowish or greenish yellow.

** Fruits hirsute or puberulous. Flowers white.

* C. ROXBURGHIANUM, Bth. et H. f. var. *a* cultivated all over the country up to 2000 feet. var. *β* near Prome and the Pegu Range.

Leaves ternati-sect, lobes of the segments oblong-linear.

var. *a genuina*. All parts minutely puberulous. Fruits greyish hirsute.

var. *β glabriuscula*. All parts less puberulous or almost glabrous. Fruits slightly puberulous.

Carum Carri, L., Sa-mwöt, and *C. Copticum*, Bth. et H. f. (*Ptychotis Ajowan*, DC.), are enumerated by the Rev. F. Mason in his list of Burmese plants as introduced.

PIMPINELLA, *Linnaeus*.

Carpophore 2-cleft or 2-parted. Ribs of the mericarps narrow, the vitta numerous, conspicuous or very thin. *Involucral bracts* few and small, or none, very rarely numerous. *Petals* white or yellow. *Disk-lobes* thick, cushion-like or conical. *Calyx-teeth* obsolete or very rarely small.

P. HEYNEANA, DC.

Pegu Range.

Anethum trifoliatum, Roxb.

Slender almost glabrous annual. Peduncles filiform. Umbels without bracts.

P. PARISHIANA, Kz.

On Zwakabin Hill (*vide* Parish).

Robust pubescent herb. Peduncles stout. *Involucral bracts* linear, $\frac{1}{2}$ – $\frac{1}{3}$ as long as the peduncles. Habit of *P. diversifolia*.

* P. (APIUM) INVOLUCRATA, Roxb. (M.).

Cultivated.

Sa-mung-sa-bā.

Kurz does not include this species in his list, though it is cultivated in Burma and used both for culinary and medicinal purposes.

SESELINIEÆ.

Fruits transversely terete or compressed from the back, the commissure broad, the lateral ribs distinct, or united to the nerve-like or thickened undilated margin.

* *Fruit transversely sub-terete or more or less compressed from the back, the primary ribs not winged.*

× *Primary ribs of the mericarps almost equal, not winged.*

FENICULUM, *Adanson.*

Fruits not beaked, the primary ribs thin or thick, but not corky, the secondary ones wanting. Calyx-teeth obsolete. Petals entire, yellow.

* F. (ANETHUM) VULGARE, L. Cultivated in Prome.

× × *Lateral ribs of the mericarps not winged, confluent with the thick, often corky margin, entire after the dehiscence. Vitta solitary in the furrows.*

OENANTHE, *Linnaeus.*

Petals notched or 2-lobed. Carpophore absent. All ribs of the mericarps very blunt and almost corky. Leaves usually pinnate or dissected. Umbels compound.

(E. STOLONIFERA, DC. Swampy spots in Pegu.

Leaves pinnate (rarely bipinnate). Umbels on very long peduncles.

** *Fruits compressed from the back or almost terete, all the primary ribs, or only the keeled ones, more or less expanded into thick wings, the wings equal, or the lateral ones broader.*

SELINUM, *Linnaeus.*

Fruits ovate, somewhat compressed from the back, the ribs equally winged or the lateral ones broader. Disk-lobes conical or depressed. Flowers white or yellowish-green.

A species apparently of this genus is not unfrequent on the hill-pastures of the Martaban Hills East of Toung-ngoo, above 6000 feet elevation, but the plants were too much dried up to permit of identification (Kurz).

PEUCEDANIEÆ.

Fruit much compressed from the back, the lateral ribs dilated into wing-like or broadly swollen margins, remaining entire after the dehiscence.

PEUCEDANUM, *Linnaeus.*

Mericarps more or less convex on the middle (rarely nearly flat), the margins rather thick and sharp, or broadly winged. Vitta solitary in the furrows and conspicuous, or rarely by 2-3 and obsolete, reaching the base of the fruit or sometimes shorter.

P. (ANETHUM) SOWA, Roxb. Cultivated up to 2000 feet.

Sa-myeik.

Glabrous, glaucous. Leaves pinnately decomposed, the lobes filiform.

P. (PASTINACA) SATIVA, L. Cultivated.

P. pastinaca, Bth. et H. f.

Leaves pinnate, the leaflets puberulous beneath, broadly oblong, serrate, often lobed.

HYRACLEUM, *Linnaeus.*

Petals often radiate. Mericarps flat-compressed or hardly convex at the middle,

the margins wing-like. *Vittæ* solitary or rarely by twos in the furrows, often clavate, reaching the base of the fruit or more usually shorter.

H. BIRMANICUM, Kz.

Pegu Range at 2500 to 3000 feet.

This plant forms a very conspicuous feature on the ridges referred to, but, unfortunately, all the specimens were so perfectly dried-up and withered that it was impossible to give a full description of the species. It is nearest to *Meracleum*, No. 5, of H. f. and Th. collection from the Khasi Hills, and eventually may be referable to it (Kurz).

× × *Secondary ribs of the mericarps filiform, somewhat prominent or winged, rarely all the ribs more or less inconspicuous. Vittæ in the furrows or below the secondary ribs conspicuous or obsolete.*

CAUCALINIEÆ.

Fruit almost terete or slightly compressed from the sides, or more so from the back, not winged, or rarely the primary ribs expanded into deeply lobed wings or divided into spines.

* *Mericarps glabrous, the ribs blunt, smooth or wrinkled.*

CORIANDRUM, *Linnaeus.*

Fruits almost globose, the broad very blunt secondary ribs hardly prominent. Involucre none.

C. SATIVUM, L.

Bhamo and Ava. Cultivated (?).

Nān-nān.

The seeds are aromatic and carminative, and as such are largely used in certain sweetmeats and liquours. In their unripe state their odour is said to resemble that of bugs (whence the name, from *κοπος*, a bug); but this did not prevent its being a favourite garden herb with the Roman labourers, who used the seeds to flavour, what we should call a 'clutncy,' to be eaten with his unleavened bread at noon.

"Ac primum, leviter digitis tellure refossa,
Quatuor educit cum spissis allia fibris;
Inde comas apii graciles rutamque rigentem
Vellit, et exiguo coriandra trementia filo."

And in some previous lines we have enumerated the plants found in an ordinary kitchen garden in the days of Augustus—

"Hic *Olus*, hic late fundentes brachia *Bete*,
Fecundusque *Rumex*, *Malvaque*, *Inulaque* virebant;
Hic *Cicer* et capiti nomen debentia *Porra*;
Hic etiam nocuum capiti gelidumque *Papaver*,
Grataque nobilium requies *Lactuca* ciborum,
Et gravis in latum demissa *Cucurbita* ventrem."

Virgil, *Morctum*, 72.

** *Mericarps hirsute, bristly or aculeate.*

DAUCUS, *Linnaeus.*

Seed with rather flat face. Involucral bracts usually dissected.

* D. CAROTA, L.

Cultivated in the drier districts.

CUMINUM, *Linnaeus.*

* C. CYMINUM, L. (M.).

Zi-ya. Cumin.

The seeds are warm, bitterish, and aromatic, and much esteemed in the East as a condiment and carminative. De Gubernatis says,¹ "Le cumin symbolisait, chez les

¹ *Mythologie des Plantes*, vol. ii. p. 115.

Grees, ce qui est petit," and adds a variety of curious superstitions, which need not be reproduced here. One of its reputed virtues was as a philtre or love-charm, whence the popular saying "Maudite sorcière! elle m'a donné le *cumin*, et je ne puis plus m'en délivrer."

This Order yields many plants useful to man, and some virulent poison. Among the former may be enumerated Celery (*Apium graveolens*), Parsley (*Petroselinum sativum*), Caraway (*Carum Carvi*), Aniseed (*Pimpinella anisum*), Skirrets, Water parsnips (*Sium Nisi* and *Sisarum*), Fennel (*Feniculum vulgare*), Samphire (*Orithimum maritimum*), Bastard Fennel (*Anethum graveolens*), Parsnip (*Pastinaca olivacea*), Cumin (*Cuminum cyminum*), Carrots (*Daucus carota*), Sweet Cicely (*Myrrhis odorata*), Chervil (*Anthriscus cerefolium*), Coriander (*Coriandrum sativum*); and among poisonous plants Water hemlock (*Cicutaria virosa*), Lesser hemlock or Fool's parsley (*Ethusia cynapium*), Lovage or Mountain hemlock (*Livisticum officinale*), and Hemlock (*Conium maculatum*). A strong-smelling resin (Assafœtida)¹ is also produced by some Persian or Western Thibetan umbelliferous plant allied to *Perula*, and is in great esteem in the East as a condiment—and is not disagreeable to many Europeans if used sparingly—else the *bon vivant* may incur the fate with which Mæcenas was threatened if he touched garlick—

“ At, si quid unquam tale concupiveris
 Jucose Mæcenas, precor
 Mamam puella savio opponat tuo,
 Extremâ et in spondâ eubet.”

FICOIDALES.

Flowers regular or sub-regular. *Ovary* syncarpous, inferior, semi-inferior, or superior, 1-celled, with parietal placentas. or 2- to many-celled, with basilar or axile placentas. *Embryo* albuminous and curved, or cyclical, or exalbuminous and oblique.

Order FICOIDÆÆ.

Flowers hermaphrodite or unisexual. *Calyx-lobes* 4-5. *Petals* many, or small, or none. *Stamens* few or none. *Ovary* 2- to many-celled. *Styles* free or connate. *Leaves* quite entire. Herbs or under shrubs.

AIZOIDÆÆ.

Calyx free, but with a distinct turbinate tube bearing the stamens at or below the summit. *Fruit* a capsule, circumsciss. *Leaves* opposite.

SESUVIUM, *Linnaeus*.

Stamens 5 to many. *Ovary* 3-5-celled, with axillary many-ovuled placentas.

S. PORTULACASTRUM, L.

Tidal jungles of Pegu, Tenasserim,
and the Andamans.

TRIANTHEMA, *Linnaeus*.

Stamens 5 or 10, or many. *Ovary* 1-2-celled, with basilar 1- or many-ovuled placentas.

* *Ovary and capsule* 2-celled. *Styles* 2.

T. DECANDRA, L.

Ava.

Flowers clustered. *Stamens* 10 or 11. *Ovary* 4-ovuled.

** *Ovary and capsule* 1-celled. *Style* 1.

T. OBCORDATA, Roxb.

Rubbishy spots near Akyab.

¹ For an account of the production of *Assafœtida*, consult 'Afghanistan and its People,' by H. W. Bellew, p. 270.

Leaves obovate, rather large, glabrous or slightly pubescent. Flowers solitary. Ovary many-ovuled. Stamens about 15. Style long

Requires comparison with *Trianthema monogyna*, L. (Kurz).

T. CRYSTALLINA, Vhl.

Ava.

Leaves linear, small, with crystalline dots. Stamens 5. Style short, simple.

MOLLUGINIÆ.

Calyx free, divided to the base or nearly so. *Petals* 3-5, or none. *Stamens* hypogynous or almost perigynous. *Fruit* a capsule or divided into 2-3 cocci.

* *Fruit* a capsule. *Leaves* usually with stipules.

MOLLUGO, *Linnaeus*.

Petals 3-5, or none. *Ovary* 3-5-celled, with many ovules in each cell. *Leaves* usually spuriously whorled.

Sub-genus GLINUS, L.

Seed with a strophiole dilated into a small arillus.

M. (GLINUS) LOTOIDES, L.

var. *a* common in Ava and Pegu.

Tryphera prostrata, Bl.

M. (*Glinus*) dictamnoides, L.

Pharnaceum pentagynum, Roxb.

Softly pubescent or tomentose. Flowers rather large, in axillary clusters. Stamens about 10-15.

var. *a*. Branches often white tomentose. Flowers sessile or nearly so.

var. *β*. Leaves pubescent but greenish. Flowers usually pedicelled.

M. SPERGULA, L.

All over Burma up to 4500 feet.

M. stricta, Roxb.

M. parviflora, Ser.

Glinus mollugo, Fenzl.

Alsine erecta, Burm.

Glabrous or slightly pubescent. Flowers rather small, on long slender pedicels, forming axillary clusters. Stamens fewer than 10.

Sub-genus MOLLUGO, L.

Seeds without a strophiole.

M. STRICTA, L.

var. *β* in Martaban and Pegu.

M. pentaphylla, L.

M. triphylla, Lour.

Glabrous, the stem angular. Flowers minute, on capillary pedicels, forming cymes. Leaves thin and green, linear-lanceolate, usually acuminate at both ends.

** *Fruit* 2-3-coccos, the cocci 1-seeded. *Leaves* without stipules.

GISEKIA, *Linnaeus*.

Petals none. *Carpels* 3-5, free. *Utricules* 5-3. *Leaves* opposite or spuriously whorled.

G. PHARNACEOIDES, L.

Ava, near Yē-nan-choung.

Order CACTEÆ.

Petals numerous, multi-seriate, epigynous, free or cohering below. *Stamens* numerous, multi-seriate, inserted at the base of the corolla. *Ovary* inferior, 1-celled, with many-ovuled parietal placentas. *Berry* pulpy. *Seeds* numerous. *Albumen* scanty or none. *Leaves* generally none, or rudimentary, rarely normal.

OPUNTIEÆ.

Calyx-tube not produced beyond the ovary. Stem branched, jointed.

OPUNTIA, *Müller.*

*O. DILLENI, Ham. Cultivated in Prome and the drier parts of Burma.
Cactus Indicus, Roxb.

Ka-lā-zoung.

The 'Cactus' makes an admirable hedge, and is easily propagated by cuttings. Snip off a piece and bury its end in the ground, and it will generally grow. Some nervous people, however, object to it, for its supposed property of harbouring snakes or vermin, and the authorities in some places wage a war of extermination against this useful plant. A sort of 'Cacticide' epidemic raged some years ago in Madras, and a native medical officer won both honourable mention and a tangible reward by divulging to the authorities his discovery that the 'Coccus,' or Cactus bug, was the natural and appointed destroyer of the cactus tree, and should be therefore enlisted for its destruction! The suggestion was rapturously received. The labours of gangs of 'convicts' employed in grubbing up and burning the plant were dispensed with, and in lieu thereof a departmental issue of Cactus bugs was at once ordered on the most profuse scale. For months the luckless postal runners groaned beneath the weight of parcels of the cactus plant, with healthy 'cocci' adhering, pieces of which infected plant were to be distributed in spots where the Cactus was plentiful, that the great battle of *Coccus* versus *Cactus* might be fairly fought out. It reads like a scheme disinterred from the archives of the Philosophers of Laputa, but was actually conceived and carried out in Madras, and is too curious an example of intellectual idiosyncrasy to be passed over in silence by the conscientious historian!

*O. COCHILLINIFERA, Ham. (M.).

Ka-la-zoung-let-wā.

PASSIFLORALES.

Flowers usually regular, hermaphrodite or unisexual. *Ovary* usually inferior, syncarpous, 1-celled, sometimes 3- or more celled by the produced placentas. *Placentas* parietal. *Styles* free or connate.

Order DATISCACEÆ.

Flowers regular, dicious, rarely hermaphrodite or polygamous. *Males*: *Calyx-tube* very short or hemispherical, lobes 3-9, short, equal or unequal. *Petals* none or 8. *Stamens* 1-25, opposite the calyx-lobes. *Anthers* 2-celled. Rudiment of ovary minute or none. *Females and hermaphrodites*: *Calyx-tube* adnate to the ovary, lobes 3-8. *Stamens* as in the males, or reduced to staminodes. *Ovary* 1-celled, open or closed at the summit, placentas parietal, with many anatropous ovules in 2 or more series. *Styles* as many as placentas, simple or 2-parted, stigmatic inside, or terminated by capitate stigmas. *Capsule* membranous or coriaceous, dehiscent between the styles, many-seeded. *Seeds* minute, the testa punctate or striate. *Embryo* cylindrical, imbedded in the axis of the scanty albumen, radicle elongate, next the hilum.

TETRAMELES, *R. Brown.*

Flowers dicious. *Petals* none. *Stamens* 4, inserted round a depressed disk, filaments elongate. *Anthers* didymous. *Calyx-tube* almost t-angular, with 4 short lobes. *Staminodes* none. Large trees.

T. NUDIFLORA, R. Br. var. α all over Pegu and Tenasserim.
T. Grahamiana, Wight. var. α and β the Andamans.
 var. α *genuina*. Leaves more or less pubescent beneath.
 var. β *glabra*. Leaves glabrous.

Wood brown, valueless.

Order BEGONIACEÆ.

Flowers monoecious. *Stamens* numerous. *Anthers* extrorse. *Ovary* inferior, 3-celled, many-ovuled. *Capsule* with 3 cells, winged on the back, and 3 loculicidal valves. *Seeds* numerous. *Albumen* scanty or none. *Embryo* straight, axile.

BEGONIA, *Linnaeus*.

Sub-genus CASPAREA, DC.

Capsule fleshy and berry-like, dehiscing on the angles or broad thick wings.

B. ROXBURGHII, DC.

Chittagong.

Casparya oligocarpa, DC.

B. Malabarica, Roxb.

A robust rather glabrous branched herb. Styles 4. Berry 4-celled and 4-cornered, the angles produced into as many horn-like appendages.

Sub-genus BEGONIA, DC.

Capsules dry, dehiscing in a semi-circular line along their sides near the wings or angles.

* *Styles* 2, each branch 2-cleft or variously dilated or branched. *Capsule* 2-celled. *Placentas* consisting of 2 longitudinal ovule- or seed-bearing blades.

× *Stamens* free. *Capsule* unequally 3-winged, the 2 lateral wings often reduced to a membranous rib.

B. LACINIATA, Roxb.

Hills East of Toung-ngoo at 6000 to 7000 feet.

A robust branched herb, softly palaceous-pilose. Leaves long-petioled, lobed.

B. MEGAPTERA, DC.

Nāt-toung in Martaban (*vide* Mason).

As preceding, but more slender and quite glabrous.

B. NEMOPHILA, Kz.

Hills East of Toung-ngoo at 3000 to 4000 feet.

Robust rather simple herb, softly palaceous-pilose. Leaves long-petioled, not lobed. Petals pale rose-coloured, only about $\frac{1}{3}$ inch long. Capsules stipitate-hirsute, the lower wing broad and rounded, $\frac{2}{3}$ inch long.

× × *Stamens* monadelphous.

+ *Male perianth* 5-lobed, the *female* one 5-6-lobed. *Capsule* unequally 3-winged.

† *Inflorescence* axillary or arising from the base of the leaf, or an axillary bud.

‡ *Leaves* alternate or whorled, rarely reduced to a single one. *Flowers* small, white.

○ *Glabrous*.

B. PROCRIDIFOLIA, Wall.

Tavoy.

Leaves alternate, the petioles 1-2 lines long.

B. VERTICILLATA, Hook.

Maulmain (*vide* Parish).

Leaves whorled, longer petioled.

○ ○ *Stems* and *petioles* pubescent.

B. MARTABANICA, DC.

Tenasserim.

Inflorescence glabrous. Leaves alternate, long-petioled, sparingly and minutely hirsute above.

‡ ‡ *Leaves* solitary radical or few and alternate. *Flowers* small, white.

B. SINCATA, Wall.

Tenasserim and the Andamans.

Diploclinium biloculare, Wight.

B. Andamanensis, Parish.

More or less stellate-velvety. *Inflorescence* glabrous. Leaves alternate or rarely solitary.

B. PROLIFERA, DC. Maulmain (*vide* Parish).

Glabrous. Leaf solitary, from the base of which 2 or more flowering peduncles arise.

B. PALEACEA, Kz. Upper Tenasserim.

Stems, etc., and the conspicuously bracted inflorescence paleaceous-pilose, the indumentum often intermixed with soft gland-hairs.

†† *Leaves and inflorescence radical.*

B. NIVEA, Parish. Maulmain.

Leaves contracted into a petiole 2-3 lines long, ciliate, hispid above. Flowers nearly an inch in diameter, white.

+ + *Perianth of both sexes 2-sepalled, apetalous.*

B. FLACIDISSIMA, Kz. Zwā-ka-bin Hill (*vide* Parish).

Very tender herb. Leaves alternate, minutely and sparingly pilose above. Flowers small.

** *Styles 3, free or connate. Capsule 3-celled and 3-winged.*

× *Placentas entire and simple.*

B. BRANDISIANA, Kz. Attaran Valley.

Glabrous, the inflorescence radical or nearly so. Leaves radical, deeply lobed. Perianth 2-sepalled, apetalous.

× × *Placentas 2-cleft.*

+ *Caulescent herbs, with alternate cordate leaves.*

B. PARVULIFLORA, Kz. Upper Tenasserim (*vide* Lobb).

All parts (also the inflorescence) glabrous. Capsule 3 lines long, the wings truncate at the apex. Stamens monadelphous.

B. MODESTIFLORA, Kz. Boronga Island up to 1000 feet.

Leaves sparingly and minutely bristly and glossy above, in other respects very similar to the preceding. Capsule $\frac{1}{2}$ an inch long. Stamens free, the anthers mucronulate. Styles free.

B. SCUTATA, Wall. Bhamo.

Like preceding, but leaves opaque and more pilose. Stamens monadelphous, the anthers terminated by the broad truncate connective. Styles united up to the middle.

B. SURCULIGERA, Kz.

Leaves minutely and sparingly pilose. Inflorescence glandular-puberulous. Stamens monadelphous. Capsule-wings half-sagittate, produced into blunt basal lobes.

+ + *Scapigerous herbs, the leaves and inflorescences radical and usually solitary.*

B. SUBPERFOLIATA, Parish. Maulmain district.

Leaves very long-petioled, peltate at the base, papillose-dotted and glabrous.

B. VELUTINA, Parish. Maulmain district.

Leaves very long-petioled, cordate (not peltate), papillose and minutely pilose above. Stamens free.

Habit of *B. subpeltata*, Wight, but differs in the 2-lamellate placentas (Kurz).

Order CUCURBITACEÆ.

Flowers monœcious, diœcious, or polygamous. *Corolla* 5-merous, imbricate. *Stamens* 5-3, of which one is usually 1-celled. *Ovary* inferior, 1-several-celled, 1-many-ovuled. *Fruit* a berry. *Albumen* none. *Embryo* straight. *Stem* furnished with tendrils. *Leaves* alternate.

CUCURBITIÆ.

Anthers 2-celled, the cells straight, curved or flexuose. *Ovary* with 3 (rarely 2 or 5) placentas. *Ovules* horizontal, numerous.

* *Anther-cells* flexuose or folded up (very rarely straight or only curved).

× *Corolla* rotate or bell-shaped, 5-petalled or 5-parted at the base. *Filaments* usually free.

+ *Petals* fringed.

HODGSONIA, *Hooker, f. et Thompson.*

Ovules 12, in pairs attached to each side of the 2 parietal placentas. *Seeds* large, united by pairs. *Leaves* lobed, coriaceous.

H. (TRICHOSANTHES) HETEROCLITA, Roxb. Tropical forests. Chittagong and Pegu.

TRICHOSANTHES, *Linnaeus.*

Ovules and *seeds* very numerous, the latter variously shaped, small or large. *Petals* fringed or rarely entire or nearly so, white. *Leaves* entire or lobed.

Sub-genus EU-TRICHOSANTHES.

Petals conspicuously fringed. *Male flowers* racemose.

* *Male racemes* without or with minute bracts, the bracts hardly a line long and inconspicuous. *Seeds* imbedded in a red or yellowish pulp, grooved or tubercled, with thickened, crenate, or waved margins.

× *Leaves* more or less deeply palmately lobed.

+ *Male racemes* without bracts.

* T. CUCUMERINA, L.

Cultivated all over Burma.

Tha-bwôt-khā.

Fringes of the petals simple and straight. Fruits ovate, acuminate. Margin of seeds thickened and crenate.

+ + *Male racemes* minutely bracted.

T. LOBATA, Roxb.

Chittagong.

Fringes of petals jagged. Fruits oblong, acuminate. Seeds thick and irregularly tubercled.

* T. ANGUINA, L.

Cultivated (*fide* Mason).

Peh-len-mywē.

Fringes of petals simple, curled. Fruits elongate, spindle-shaped.

× × *Leaves* cordate, not lobed.

T. RENIFORMIS, Miq.

Rutland Island. Andamans.

Leaves pubescent. Seeds with a central longitudinal ribbon, the lateral lobes truncate.

** *Male racemes* conspicuously bracted, the bracts leafy, 3 lines to 1½ inch long or longer. *Seeds* imbedded in a dirty dark-green pulp, smooth, with entire margins.

T (MODECCA) BRACTEATA, Lamk.

All over Burma.

Fringes of petals very long and simple. Bracts of male flowers usually smaller. Calyx-lobes broadly ovate, serrate. Leaves angular or palmately lobed. Fruits globose.

T. GRANDIBRACTEATA, Kz.

North of Mandalay and the Khakyen Hills.

Petals fringed with very long simple curled cilia. Bracts of male flowers large and broad, 1-1½ inch long. Calyx-lobes lanceolate, entire. Leaves usually palmately and very deeply lobed. Fruits large, oval-oblong, compressed.

T. CORDATA, Roxb.

The Tsittoung Valley.

Petals to near their middle cut into numerous jagged segments, not fringed. Female flowers not tubular. Fruits globose. Leaves cordate, usually not lobed.

T. MACROSIPHON, Kz.

Attaran Valley.

As preceding, but leaves larger and slightly angular, the tube of the female flowers $1\frac{1}{2}$ inch long.

Sub-genus PSEUDO-TRICHOSANTHES.

Flowers dioecious, of both sexes solitary in the leaf-axils, the female ones very shortly peduncled or almost sessile, the males on slender pedicels.

* *Petals with very long curled and branched fringes.*× *Corolla-lobes entire or only slightly lacinate.*

T. INTEGRIFOLIA, Roxb.

Ava and all over Burma.

Leaves reniform. Fruits globular or nearly so. Seeds elliptically oblong.

** *Petals entire.*

† *Calyx-tubes of males elongate. Stamens inserted in the calyx-tube, included, the anthers cohering into an oblong head.*

GYMNOPETALUM, Arnott.

Stigmatic lobes of female flowers linear, simple. *Tendrils* simple. *Fruit* small, pulpy within. *Corolla* yellow.

Sub-genus SCOTANTHUS, Naud.

Monœcious. Male flowers in bracted racemes. *Fruit* ribbed. *Flowers* white.

Leaves cordate, 3-5-angular. Female flowers long peduncled. Fruits ovoid.

G. BRYONIA (COCHIN-CHINENSE, Lour.

Arakan.

Momordica tubiflora, Roxb.

G. HETEROPHYLLUM, Kz.

Tenasserim, the Andamans and Kamorta.

Leaves palmately and deeply 3-5-lobed, the lobes blunt. Fruits clavate-cylindrical.

Possibly a smaller bracted form of *G. quinquelobum*, Miq. (Kurz).

"The difference between *Trichosanthes* and *Gymnopetalum* is very slight indeed. The corolla in *T. integrifolia*, Roxb., is as often entire as it is irregularly and more or less deeply cut; the colour of the corolla thus alone remains as a distinguishing mark between the two genera!" (Kurz.)

LAGENARIA, Sering.

Stigmatic lobes of female flowers 2-lobed. *Tendrils* 2-cleft. *Fruit* with a woody rim. *Petiole* 2-glanded at the apex.

* L. (CUCURBITA) LAGENARIA, L.

Cultivated all over Burma, especially

L. vulgaris and *idolatrica*, Ser.

Ava and Prome.

var. *a.* All parts softly, but not viscidly pubescent. Fruits flask-shaped.

var. *β.* All parts viscid-pubescent. Fruits pear-shaped.

Kurz adds from the Nicobars:

L. VULGARIS, Savi. (var. ?).

Katchall.

The fruits are the size and shape of billiard-balls.

†† *Male calyx-tube short (very rarely long). Stamens inserted at the mouth or in the tube of the calyx, usually exerted, the anthers free or slightly cohering.*

‡ *Stamens inserted at the mouth of the calyx. Filaments exerted, recurved. Anthers free, the cells bordering the broad connective.*

LUFFA, Cucurbitæ.

Male flowers racemose. *Fruit* dry, with a woody-fibrose endocarp, deliscing by an apical circumsciss opercle. *Petiole* without glands.

* *Fruit smooth, at least not muricate or echinate.*

- * L. (MOMORDICA) CYLINDRICA, L. Common all over Burma, the Andamans,
L. petola and *Cattu-Picina*, Ser. and Kamorta.
L. Aegyptiaca, Mill.
L. pentandra, Roxb.
L. leiocarpa, Naud.
L. hederacea, Wall.

Tha-bwöt.

Fruit terete, or only with obscure darker-coloured longitudinal streaks.

- * L. (CUCUMIS) ACTANGULA, L. Chittagong, cultivated.
L. fatida, Cav.
Petola Bengalensis, Rumph.

Fruit sharply 10-angular.

Luffa amara, Roxb., with oblong fruits only 3-4 inches long and tapering at both ends, is probably only a variety of the above (Kurz).

** *Fruit echinate or muricate.*

- L. GRAVEOLENS, Roxb. Chittagong.
 Flowers monoëcious, yellow, the males and females from the same leaf-axil, very shortly pedicelled. Fruit muricate.

- L. ECHINATA, Roxb. Arakan.
L. bindaul, Roxb.

Flowers dicecious, white, the males in racemes, the females solitary. Fruits densely echinate, the bristles spreadingly fibrillose or rarely ciliate.

Dr. Hooker states that the flowers in Indian specimens of this species are always yellow, not white, as Roxburgh describes and figures them. The species is common enough in the plains of Northern Bengal; but never have I seen the flowers of it other than white (Kurz).

The fruits of *Luffa*, after the fleshy matter has decayed, present a firm fibrous skeleton, which is exposed for sale in some chemists' shops in England as 'Egyptian bath-sponge,' and a very efficient abrader of the cuticle it no doubt makes.

BENINCASA, Savi.

Male and female flowers solitary. Fruit fleshy, berry-like, pulpy inside. Tendrils 2-3-cleft. Petiole without glands.

- * B. CERIFERA, DC. Cultivated all over Burma and Kamorta.
Cucurbita Pepo, Roxb.

°° Stamens inserted below the mouth of the calyx. Anthers conniving or cohering.
 † Calyx furnished with 1-3 scales at the bottom.

MOMORDICA, Linnaus.

Calyx with 2 or 3 scales. Male flowers usually furnished with a large complicate bract subtending the pedicel. Tendrils simple.

× Monoëcious. Bracts only 2-3 lines long, at about the middle of the filiform peduncle.

- * M. CHARANTIA, L. Cultivated all over Burma.
M. muricata, Willd.
M. Senegalensis, Lamk.
Cucumis Africanus, Ldl.
Amara Indica, Rumph.

Leaves palmately 5-lobed. Calyx-lobes oblong, acute. Bracts entire, at the apex of the peduncle. Fruit few-seeded, small.

× × *Diocious*. Bracts of the male (and sometimes of the female) flowers just below the flower and embracing the calyx, $\frac{1}{2}$ –1 inch long or longer.

Leaves 3- to 5-lobed. Calyx-lobes linear, acuminate. Seeds about 3 lines long.

M. SUBANGULATA, Bl. Chittagong and Pegu.

Leaves cordate, not lobed, or only angular. Bracts pubescent or velvety. Calyx-lobes oblong, blunt. Seeds about 3 lines long.

M. (MURICIA) COCHINCHINENSIS, Lour. Tropical forests of Pegu and Tenasserim.
Zucca Commeriana, Ser.

Leaves 3- rarely 5-lobed, with the lobes acuminate. Bracts often hirsute. Calyx-lobes oblong, acuminate. Seeds about an inch long.

* M. BHOICA, Roxb. Burma (*vide* Mason).

Sa-byet.

THLADIANTHA, Bunge.

Calyx with a single scale. Bracts of male flowers dimorphous, the inner ones smaller and imperfect.

T. DUBIA, Bunge. Pegu Range.

Gymnopetalum Horsfieldii, Miq.

‡ ‡ Calyx without scales.

CUCUMIS, Linnæus.

Connective produced beyond the anther-cells. Tendrils simple.

× Flowers on slender pedicels, several together in the axils of the leaves.

* C. SATIVUS, L. Cultivated.

C. momordica, Roxb.

Ovary muricate, spindle-shaped. Male flowers by 3–6, females solitary.

* C. MELO, L. var. *a* Chittagong. Ava and Pegu.

C. flexuosus, *chate* and *dudaim*, L. Kamorta.

C. deliciosus, Roth. var. *β* cultivated generally.

C. conomon, Thbg.

C. utilissimus, Roxb.

C. cicatristriatus, Stocks.

Ovary densely villous or pubescent, usually oblong or elliptical. Male and female flowers usually mixed.

var. *a* *C. pubescens*, Willd.; *C. Melo agrestis*, Naud.; *C. trigonus*, Bth.; *C. Maderaspatanus*, Roxb. non L. All parts much smaller. Fruits only as large as a plum, from oblong to turbinate, not edible. Flowers smaller and shorter pedicelled, usually only by 2–3 in the leaf-axils. Considered by Naudin to be the wild stock of the cultivated melons.

var. *β* *culta*. All parts more robust. Fruits larger and often very large, variously shaped. Flowers nearly an inch across, on long filiform pedicels, usually by 3–5 from the leaf-axils.

CITRULLUS, Schrader.

Connective not prolonged. Stigmas reniform. Tendrils usually 2–3-cleft.

* C. VULGARIS, Schrad. Cultivated generally.

Cucurbita citrullus, L.

C. fistulosus, Stocks.

Auguria Indica, Rumph.

× × Corolla bell-shaped, 5-lobed to the middle or somewhat further down.

CEPHALANDRA, Schrader.

Male flowers solitary or nearly cymose. Stigmas narrow, 2-lobed or -parted. Tendrils simple.

- C. (BRYONIA) GRANDIS, L. In rubbishy places all over Ava, Arakan,
Momordica monodelpha, Roxb. and Pegu.
Coccinia Indica, W. A.
 Ken-bung (M.).

CUCURBITA, *Linnaeus*.

Flowers solitary. *Calyx-lobes* spreading. *Filaments* free. *Stigmas* 3, 2-lobed or 2-forked. *Tendrils* usually 2- or more-cleft.

× *Calyx-lobes leafy*.

- * C. MOSCHATA, Duch. Cultivated in Arakan and Pegu.

Leaves more or less lobed. Petiole scarcely prickly.

** *Anther-cells* straight or curved, not flexuose.

× *Style* inserted on a cupular or annular disk.

BRYONIA, *Linnaeus*.

Male flowers racemose or clustered. *Filaments* short, the connective not produced. *Berry* spherical, short peduncled.

- B. LACINIOSA, L. Rubbishy spots in Chittagong and Prome.

MUKIA, *Arnott*.

Male flowers solitary or clustered. *Calyx* bell-shaped. Connective produced beyond the anther-cells. *Berry* spherical, sessile. *Seeds* scrobiculate.

- M. (CUCUMIS) MADERASPATANUS, L. DON Roxb. All over Burma.

M. scabrella, Arn.

Tha-bwöt-khä (M.).

ZEHNERIA, *Endlicher*.

Male flowers usually corymbose. *Filaments* elongate. *Anthers* orbicular, the connective not produced, villous on the back. *Berry* shortly peduncled.

Sub-genus KARIVIA, Arn.

Berry large, nearly 2 inches long. *Seeds* numerous, almost globular.

- Z. UMBELLATA, Klein. All over Burma.

Leaves polymorphic, almost chartaceous, glabrous.

- Z. HOOKERIANA, W. A. Khakyen Hills.

Berry small, globose. *Seeds* few, compressed-oblong. *Leaves* herbaceous, flaccid, cordate, repand-toothed.

MELOTHRIA, *Linnaeus*.

Male flowers usually racemose. *Anthers* almost sessile, the connective produced beyond the anther-cells and usually 2-lobed. *Berry* usually long- and slender-peduncled.

- M. (ÆCHMANDRA) INDICA, Arn. Chittagong.

Bryonia tenella, Roxb.

Cucumis marinus-iridis, Rumph.

× × *Disk at the base of the style* absent or obsolete.

RHYNCHOCARPA, *Schrader*.

Ovary with 1-3 placentas. *Berry* few-seeded, beaked. Connective produced beyond the anther-cells.

- R. (BRYONIA) ROSTRATA, Rottl. Paghā-myo.

Bryonia pilosa, Roxb.

All parts more or less pubescent. *Leaves* cordate, with rounded basal lobes. *Berry* striate, hairy.

R. DELTOIDEA, Kz.

Pegu and Tenasserim.

Leaves deltoid, with spreading acute basal lobes, rough above. Berries glabrous.

CREMOSPERMIEÆ.

Anthers 1-celled. *Ovary* 1- or 3-celled. *Ovules* 2 to many, suspended.* *Seeds* not winged.

Sub-tribe GOMPHOGYNIEÆ.

Stamens 5. *Filaments* free. *Ovary* 1-celled, with 2-6 ovules suspended from, or near, the summit of the cell.

GOMPHOGYNE, Griffith.

Petals oblong, erose. *Fruit* turbinate, broadly 3-angular and 3-valved at the apex. *Leaves* 5-7-foliolate.

G. (ZANONIA) HETEROSPERMA, Wall.

Ava. Taong-doung.

Capsule club-shaped, rather narrow. Seeds usually 4, about a line long, rounded, obscurely tubercled-wrinkled.

A simple-leaved species of *Actinostemma*, or more probably *Gomphostemma*, is not unfrequent along choungs in the tropical forests of the eastern slopes of the Pegu Yomah, especially at the head-waters of the Swā-choung, but I did not succeed in finding either flower or fruit of it (Kurz).** *Seeds* winged.

Sub-tribe ZANONIEÆ.

Stamens 5. *Filaments* free. *Anthers* oblong. *Ovary* 1-celled, with 3 thick parietal placentas. *Ovules* numerous. *Fruit* dry, 1-celled, with a broad open 3-angular mouth at the top.

ALSOMITRA, Rom.

Calyx-lobes 5. *Stamens* 4, perfect. *Styles* 3, the stigmas 2-lobed. *Leaves* 3-foliolate.

A. (ZANONIA) SARCOPHYLLA, Wall.

Waste spots from Ava to Prome.

Kyi-ā (M.).

ZANONIA, Linnæus.

Z. ZEHNERIA, Endl. (M.).

This Order embraces a few grateful fruits, as the different sorts of melons, and some useful and wholesome though not very nutritious vegetables in the various sorts of pumpkins, gourds, and cucumbers, which from their cheapness enter largely into the dietary of the poorer classes.

The 'Colocynth,' *Citrullus colocynthis*, yields a pulp possessing highly purgative properties, and similar properties exist in the roots of several species of Bryony, e.g. *Bryonia alba* and *dioica*. The fruits of *Luffa* and *Trichosanthes* are largely used for food in India, but become purgative when ripe. The fibrous skeleton of the fruit of *Luffa* is what is familiarly known in London shops as 'Egyptian Bath-sponge.' The white gourd, *Benincasa cerifera*, presents a waxy exudation on its fruits, and is regarded as a symbol of fertility, and as such often presented in India to newly-married couples.

Order TURNERACEÆ.

Corolla polypetalous, perigynous, isostemonous, contorted in bud. *Stamens* 5, sub-hypogynous. *Ovary* free, 1-celled, with 3 parietal placentas. *Capsule* with 3 semi-semiferous valves. *Seeds* strophiolate. *Embryo* albuminous.

TURNERA, Linnæus.

* T. ULMIFOLIA, L.

Introduced and now feral round villages.

Order SAMYDACEÆ.

Flowers regular, usually hermaphrodite. *Calyx* coriaceous, persistent, 3-7-lobed, the lobes imbricate or valvate. *Petals* 3-7, rarely more, usually resembling the calyx-lobes in consistence, perigynous and imbricate in bud, or none. *Disk* cupular, annular, or glandular. *Stamens* perigynous, indefinite, or rarely definite, usually opposite the petals and alternating with small glands or scales. *Ovary* superior, or more or less inferior, 1-celled, with 2-3 or more several-ovuled parietal placentas. *Style* simple, or 2-3- or more cleft. *Fruit* indehiscent or capsular, and opening into valves. *Seeds* often arillate, with a fleshy albumen. *Embryo* straight or nearly so, the radicle next the hilum. *Cotyledons* flat. *Leaves* usually alternating, simple. *Stipules* small or none. *Flowers* inconspicuous, in racemes, panicles, or clusters. Trees or shrubs.

CASEARIAE.

Calyx free, 5- or 4-merous. *Petals* none. *Stamens* 6-30, inserted in a single row to the calyx-tube, usually alternating with as many staminodes.

GUIDONIA, Plumier.

Stamens 6-15, alternating with as many short staminodes. *Flowers* clustered or in corymbs.

G (CASEARIA) CANZIALA, Wall.

Pegu and Martaban.

* *Filaments* very slender, many times longer than the anthers.

† *Stamens* and *staminodes* 8 each, separately inserted.

All parts glabrous. *Leaves* coarsely crenate. *Flowers* about 2 inches across. *Pedicels* and *calyx* glabrous.

G. GLOMERATA, Roxb.

var. β Chittagong.

Young shoots, calyx, and pedicels, and also often the nerves beneath of the serrulate leaves, puberulous. *Flowers* only a line across.

var. α *glabriuscula*. *Leaves* almost glabrous.

var. β *puberula*. *Leaves* beneath on the nerves, the petioles, etc., puberulous.

†† *Stamens* and *staminodes* 8 each, united at the base and forming a broad disk round the ovary.

** *Filaments* only as long as the anthers.

G. VARECA, Roxb.

Khakyen Hills.

All parts more or less puberulous. *Stamens* 8.

CASEARIA, Jacqueminot.

C. GLABRATA, Bl. (K).

Kamorta.

var. with leaves larger and broader at the base, which is rounded or almost corlate on the one side, in this respect resembling those of *angustata*, T. and B., which may turn out to be only a form of it. *Capsules* fleshy elliptical, nearly an inch long, smooth and glabrous. A tree of the tropical forests.

HOMALIEÆ.

Calyx free or adnate to the ovary, 4-15-merous. *Petals* as many. *Stamens* 4-15, or if more arranged in clusters, but always opposite the petals.

HOMALIUM, Jacqueminot.

Petals as many as sepals. *Ovary* more or less adnate to the ovary and inferior.

* *Stamens* solitary and opposite to the petals. *Flowers* racemose or spiked, often collected into panicles.

× *Flowers* about 2 lines in diameter. *Ovary* villous.

H. (BLACKWELLIA) TOMENTOSA, Vent.

Arakan and Pegu up to 2000 feet.

B. spiralis, Wall.

Leaves coriaceous, tomentose or puberulous beneath. Flowers tomentose, sessile. Spikes robust, tomentose.

II. (BLACKWELLIA) DASYANTHUM, Turcz. Mergui.

II. Griffithianum, Kz.

Leaves thin chartaceous, pubescent on the nerves. Flowers tomentose, shortly pedicelled. Racemes pubescent, slender.

× × Flowers less than a line in diameter. Spikes collected into panicles.

II. MINUTIFLORUM, Kz. Martaban?

All parts, also the spikes, quite glabrous. Flowers sessile. Ovary villous.

Habit of *II. fetidum*, but the flowers very minute.

* * Stamens by 2 or more opposite to the petals.

II. SCHLICHII, Kz. Chittagong.

Quite like *II. Nepalense*, but stamens by threes. Ovary tomentose. Flowers longish pedicelled, in divaricate terminal glabrous panicles.

II. FETIDUM. Mergui.

Glabrous. Stamens by twos. Ovary glabrous. Racemes slender, glabrous.

Sub-order PASSIFLOREÆ.

Flowers hermaphrodite, or rarely unisexual, and in this case the male and female corollas conform. Corona conspicuous, simple or double.

PASSIFLORIEÆ.

Corona of the corolla simple or double, and usually conspicuous. Petals usually herbaceous or coriaceous, rarely none.

PASSIFLORA, Linnaus.

Calyx-tube short. Petals 4-5, rarely none. Stamens 4-5. Styles 3. Leaves simple.

Sub-genus GRANADILLA, DC.

Involucre 3-leaved, the leaflets entire or toothed, or dissected. Sepals and petals 5 each. Peduncles 1-flowered, arising together with the simple tendrils from the same leaf-axil.

* Involucral leaflets entire or toothed.

* P. QUADRANGULARIS, L. Cultivated.

Branches and branchlets wingedly 4-cornered. Stipules and bracts entire. Petiole with 4-6 glands. Leaves entire.

The root is vermifuge in small doses, poisonous in large. The fruit is pleasant, though rather insipid.

* P. LAURIFOLIA, L. Cultivated.

Branches, etc., almost terete or slightly angular, never winged. Stipules setaceous, long. Bracts obovate, glandular-serrate at the tips. Petiole 2-glanded at the apex. Leaves entire.

* * Involucral leaflets pinnatisect, the end-segments capillary or setaceous, glandular thickened at the apex (*Dysoxia*, DC.).

P. FETIDA, Can. Waste spots and hedges all over Arakan and Pegu.

All parts hairy. Leaves 3-lobed, the petiole gland-less.

Sub-genus EU-PASSIFLORA.

Flowers not involucred, the bracts remote, large, small or absent. Corona membranous, sharply folded, frilled at the edge.

- * *Flowers bracted, the bracts small. Petals present (Decaloba, Endl.).*
 † *Leaves lobed, velvety beneath.*

B. CALONEURA, Kz.

Upper Tenasserim.

Exactly as *P. Horsfieldii*, but leaves deeply 3-lobed and smaller, the lobes blunt.

The texture, nervature, and indument of the leaves are entirely those of *P. Horsfieldii*. Flowers and fruits unknown.

†† *Leaves entire, glabrous.*

- ** *Flowers apetalous, usually without bracts (Cicca, Med.).*

P. SUBEROSA, L.

Chittagong.

Flowers small. Petiole $\frac{1}{4}$ – $\frac{1}{2}$ inch long, 2-glanded at the apex. Leaves acute.

Sub-order PAPAÏACEÆ.

Flowers hermaphrodite or unisexual. Stamens perigynous. Corona small or none.

MODECCIEÆ.

Flowers hermaphrodite, or, if unisexual, the male and female corollas conform. Corona small or none. Petals included in the calyx-tube. Connective often produced beyond the anther-cells.

MODECCA, Linnæus.

Flowers unisexual. Calyx 5-cleft. Corona none or fringed. Disk-glands 5. Tendril-bearing herbs or shrubs.

* *Petals inserted at the throat or to the tube of the calyx. Stigmas sessile (Microblepharis, Wight).*

M. CORDIFOLIA, Bl.

The Andamans. Great Nicobar.

Leaves entire. Seeds pitted, with crenate borders.

** *Petals inserted on the bottom of the calyx. Style 3-cleft or styles 3, distinct (Blepharanthus, Wight).*

M. TRILOBATA, Roxb.

All over Arakan and Burma.

Leaves 3- rarely 5-lobed. Seeds pitted, with a double-crenate border.

M. NICOBARICA, Kz. (K.).

Katchall and Nankowry.

PAPAÏAIEÆ.

Flowers unisexual, the male and female corollas dissimilar, rarely polygamous. Corona none. Calyx minute. Male corolla tubular, the female one 5-petalled. Stamens in two rows, inserted to the corolla-tube. Erect trees, with milky juice.

CARICA, Linnæus.

Filaments free. Leaves simple, lobed or cut.

* C. PAPAÏA, L. Cultivated, and half wild in the South. Kamorta and Katchall. *Papaya vulgaris*, D.C.

Sir J. D. Hooker remarks, "The Papaw is the insipid berry of *Carica*, the juice of whose fruit is a powerful vermifuge and antiseptic, and contains fibrin, a substance otherwise supposed to be peculiar to the animal kingdom. The whole tree has the singular property of rendering tough meat tender, by separating the muscular fibres."

The curious property which the juice of the Papaw possesses of rendering meat tender, depends on the presence of a peculiar principle,¹ termed by Dr. Peckolt, its discoverer, '*Papayotin*,' or, as it is also called, *Papaine*. The properties of this substance are analogous to '*Pepsin*.' To apply the juice to cookery, the meat which it

¹ New Commercial Plants, No. 3, Christy & Co., London.

is desired to render tender should be washed or soaked for a few minutes (5 to 10) in water, to which the juice of the Papaw tree has been added, or the joint wrapped in the fresh leaves of the Papaw, and in this state roasted. The juice mixed with an equal quantity of sugar is also an excellent medicine in cases of enlarged spleen. The dose is one teaspoonful of the juice made into three boluses with sugar, one bolus to be taken morning, noon, and night. The juice is said also to remove freckles.

The most curious property, however, of the active principles of the Papaw is its power of dissolving,¹ or digesting (for that is what it amounts to), living tissues. Two grammes of Papaine (or Papayotin) dissolved in 200 cubic centimètres of water, completely dissolved a living frog of 50 grammes weight in 24 hours, and this peculiar property of Papaine has been successfully employed in the removal and destruction of the false membrane formed in diphtheria. Tape-worms are also killed by this curious medicine, and as the tree is so common in India, its use and value deserve to be more generally known. The medicinal dose internally is 4 or 5 grammes. A liniment for Diphtheria Eczema, and Psoriasis, is made as follows: Papaine 12 grains, Borax in powder 5 grains, Water 2 drams. Pencil the parts with a brush twice a day or oftener.

MRYTALES.

Flowers regular or sub-regular, usually hermaphrodite. *Ovary* syncarpous, usually inferior. *Style* undivided, very rarely styles free. *Placentas* axile or apical, rarely basal. *Leaves* simple, usually quite entire, rarely tri-foliolate in *Combretaceæ*.

Order ONAGRAREÆ.

Corolla polypetalous, epigynous, contorted in bud. *Stamens* inserted with the petals, equal or double them in number, rarely fewer. *Ovary* inferior, many-celled; many (rarely few) ovuled. *Albumen* none.

* *Ovary* 2-6-celled, the cells many-ovuled. *Capsules* dehiscing loculicidally or septicidally, many-seeded. Usually terrestrial herbs.

JUSSLEA, *Linnaeus*.

Stamens twice as many as petals. *Ovary* 4-celled. *Capsule* septicidal.

J. REPENS, L.

Ponds and swamps all over Burma.

J. Swartziana, DC.

J. floribunda, Griff.

Creeping or floating herb. Flowers usually 5-merous, white, long-pedicelled. Seeds large, spongy.

J. SUFFRUTICOSA, L.

Mud banks and rice fields all over Burma.

var. α *J. angustifolia*, Lam.

var. β Kamorta.

J. exaltata, Roxb.

J. longipes, Griff.

J. Burmanni, DC.

var. β *J. villosa*, Miq.

J. fruticosa, DC.

Erect, terrestrial. Flowers mostly 4-merous, very shortly pedicelled or almost sessile. Seeds minute, crustaceous, glossy.

LUDWIGIA, *Linnaeus*.

Stamens as many as petals. *Ovary* 3-6 celled. *Capsule* septicidal.

L. PARVIFLORA, Roxb.

L. perennis and *gracilis*, Miq.

L. lythroides, Bl.

¹ New Commercial Plants and Drugs, No. 5, Christy & Co., London.

Capsules from oblong to elongate-cylindrical, thick. Seeds densely covering the placentas.

- L. PROSTRATA, Roxb. var. *a* Ava, Pegu, and the Andamans.
L. diffusa, Ham. var. *β* Thonkyaghat.
Nematopyxis fruticulosa and *pusilla*, Miq.
 var. *a*. Plant erect, branched, leaves large.
 var. *β*. Plant prostrate, leaves small.

Capsules almost filiform. Seeds in a single row.

** Ovary 1-4-celled, the cells 1- (rarely 2-4-)ovuled. Nut 1-4-celled, 1-4-seeded.

TRAPA, *Linnaeus*.

Flowers 4-merous. Ovary 2-celled. Nuts with 2 or 4 spines or horns. Floating herbs.

*T. BISPINOSA, Roxb.

Tanks in Ava and Chittagong.

Nut with 2 opposite reflexed bearded spines.

The water-nut or Singhara of India is not much cultivated in Burma, but it is capable of yielding a prodigious supply of food, as, for example, in Kashmir, where it forms the staple food of some 30,000 souls for four or five months of the year. The nuts can be eaten raw, but are more palatable boiled, and have been likened to chestnuts in flavour.

Order LYTHRARIEÆ.

Flowers hermaphrodite, very rarely unisexual, regular, or rarely irregular. Calyx free, but often inclosing the ovary, 4-5- (very rarely 3- or 6- or more-)lobed or toothed, the lobes often alternating with as many accessory teeth. Petals as many as calyx-lobes, rarely wanting, inserted at the summit of the calyx-tube, usually clawed, imbricate and usually crumpled in the bud. Stamens as many as petals, or more or fewer, inserted in the calyx-tube. Filaments inflected in the bud. Anthers versatile, the cells opening longitudinally. Ovary superior, or (in a few abnormal genera) inferior, 2-6- (or rarely by abortion of the partitions 1-)celled, with usually numerous ovules attached to the axis, or very rarely parietal. Style simple, with a capitate or rarely 2-lobed stigma. Fruit a capsule, variously dehiscent, inclosed in or surrounded by the persistent calyx. Albumen none. Embryo straight. Cotyledons oblong, or orbicular-cordate. Herbs, shrubs or trees, with opposite, whorled, or sometimes alternate, simple leaves. Stipules none. Flowers in axillary or terminal panicles, cymes or clusters, rarely solitary.

+ Capsule irregularly dehiscent.

× Seeds glabrous. Leaves not black dotted.

† Flowers with petals, or rarely apetalous in some herbs.

○ Herbs. Capsule 1-5-celled, irregularly or transversely dehiscent.

AMMANIA, *Linnaeus*.

Calyx 3-5-toothed. Stamens 2-8. Disk-glands none. Leaves opposite or rarely whorled.

Sub-genus ROTALA, L.

Flowers solitary (rarely and only occasionally by 2 or 3) in the axils of the leaves, or bracts, often forming spikes or racemes. Capsule 2-4-valved.

* Disk-glands 8 under the ovary.

Sub-genus HYDROLYTHRUM, *H. f.*

Calyx 4-lobed. Petals 4. Stamens 4. Disk-glands 8. Capsule 2-celled. Aquatics, with whorled leaves.

A. (HYDROLYTHRUM) WALLICHI, *H. f.* Tavoy.

Aquatic herb of the habit of *Myriophyllum*, the leaves whorled, linear.

* * *Disk-glands absent (Rotala, L.).*

× *Calyx bell-shaped, thrice as deep as wide. Capsule shorter than, and included in, the calyx-tube.*

A. DENTILLOIDES, Kz.

Arakan in wet pastures.

Leaves very shortly petioled, 1-nerved, linear. Flowers solitary, sessile. Pygmy annual.

A. PEPLOIDES, Spreng.

Wet pastures all over Burma.

A. (Peplis) Indica, Willd.

Ameletia elongata, Bl.

A. acutidens, Miq.

A. nana, Roxb.

Leaves usually sessile, strongly penninerved, obovate to oblong. Flowers sessile, forming lateral and terminal leafy or bracted spikes.

A. SUBROTUNDA, Wall.

Segain and Northwards from Mandalay

Leaves sessile, almost orbicular, penninerved. Flowers shortly and slenderly pedicelled, forming shorter or longer slender racemes.

A. (AMELETIA) ROTUNDIFOLIA, Wight.

Bhamo and Khakyen Hills.

Leaves sessile, orbicular or nearly so, penninerved. Flowers sessile, in terminal peduncled bracted simple or compound spikes.

× × *Calyx hemispherical, about as deep as wide. Capsule protruded from, or at least as long as, the calyx-tube.*

A. PYGMEA, Kz.

Pegu Range, Western Slopes.

Leaves linear, 1-nerved, very shortly petioled. Calyx 4-angular, 4-toothed, about $\frac{1}{4}$ – $\frac{1}{3}$ line long. Petals none. Pygmy herb.

A. SIMPLICIUSCULA, Kz.

Ponds and rice fields in Chittagong.

Leaves oblong to linear-oblong, 1-nerved, very shortly petioled. Calyx short, 4-toothed, about $\frac{1}{3}$ line long. Flowers very shortly pedicelled. Pygmy herb.

A. PENTANDRA, Roxb.

Wet pastures all over Burma.

Rotala Roxburghiana, Wight.

Sellowia uliginosa, Roth.

A. nana, DC. non Roxb.

Leaves oblong to linear, sessile, 1-nerved, or the lateral nerves very faint. Calyx usually 5-toothed, $\frac{1}{2}$ –1 line long. Petals 5.

Sub-genus AMMANNIA, L.

Flowers pedicelled or partly sessile, axillary, clustered or in cymes, the latter sometimes reduced to 1 or a few flowers only. *Capsule* irregularly bursting.

× *Leaves narrowed at the base, petioled or sessile.*

A. BACCIFERA, L.

Fallows and road-sides all over Burma up to 3000 feet.

A. vesicatoria, Roxb.

A. Indica, Lamk.

Cryptotheca apetala, Bl.

Flowers minute, apetalous, on slender pedicels, forming sessile or very shortly peduncled cymes or clusters.

× × *Leaves sessile, with a cordate, sagittate or dilated base. Petals present.*

A. MULTIFLORA, Roxb.

Rice fields in Chittagong.

Cryptotheca dichotoma, Bl.

A. microcarpa, DC.

Capsule under a line long. Stamens 4, or fewer. Petals not crumpled. Calyx 4-toothed, without accessory teeth. Cymes slender.

A. AURICULATA, Willd.

Rice fields in Chittagong.

Capsule about $1\frac{1}{2}$ line long. Stamens 6-8. Petals not crumpled. Calyx 4-toothed, without accessory teeth. Cymes slender.

A. OCTANDRA, L.

Rice fields in Chittagong.

Amanella linearis, Miq.

Diplostemon octandrum, Miq.

Capsule about 2 lines long. Stamens 8. Petals large, crumpled. Calyx 4-toothed, with as many horn-shaped accessory teeth. Cymes and pedicels short, stout.

°° *Trees or shrubs.*

PEMPHIS, *Forster.*

Calyx 12-toothed, ribbed. *Petals* 6. *Stamens* 12. *Ovary* 3-celled. *Capsule* 1-celled, transversely circumsciss.

P. ACIDULA, Forst.

Rocky coasts of Tenasserim and the Andamans.

P. angustifolia, Roxb.

MacClellandia Griffithiana, Wight.

LAWSONIA, *Linnaeus.*

Calyx 4-parted. *Petals* 4. *Stamens* 8. *Ovary* and *capsule* 4-celled, the latter irregularly bursting.

*L. INERMIS, L.

Cultivated all over Burma.

L. alba, Lamk.

L. spinosa, L.

Indian privet.

Mason writes: "This is the camphire of the English Bible, and the cypress shrub of the Greeks and Romans. 'The cypress plant,' says Rosenmuller, 'is held in particularly high esteem by the Greeks, the Arabs, and the Turks; and they think that they make an agreeable present when they offer a person a posy of its flowers.'"

There is a little confusion here. Kupros or *Cyprus* is given in dictionaries as *Eastern privet* (*Cyprus shrub*), but it has nothing in common with Kuparessos, or the *Cypress tree*, which was no shrub, but associated in descriptive pieces with lofty and conspicuous trees, as, for example, in that pretty description (sketched in a style suggestive of the Poly-Olbion of our own Drayton) of Penēos attending the wedding of Peleus and Thetis—

"Confestim Penēos adest, viridantia Tempe,
Tempe, quæ sylvæ cingunt superimpedentes,
Nereidum linquens, claris celebranda choreis,
Non vacuus, namque ille tulit radicibus altas
Fagos, ac recto proceras stipite Laurus,
Non sine nutanti Platano, lentâque rore
Flammati Phaëthontis, et aëriâ Cupressu."

Catullus, Nupt. Pel. et Thet. l. 285.¹

The plant makes a good hedge, and its leaves crushed and applied to the extremities give that colour to the skin and nails which Orientals admire, not only

¹ Penēos comes from Tempê's green retreat;
(Tempê, whose sward sustains the Nereids' feet;
When mirthful they in tuneful strains contend,
To laud that vale o'erhanging woods defend.)
Nor giftless comes; for ranged about are seen
The spreading Beech, the Laurel's deathless green,
The fluttering Plumes, the Poplars straight and tall,
That mourn no more their darling Phaëthon's fall.
And lofty Cupresses, with roots uptorn,
Th' Emathian Hall to deck on that auspicious morn.

in their own persons, but in the manes and tails of their horses, which they habitually thus decorate.

†† *Flowers apetalous. Trees or shrubs.*

CRYPTERONIA, *Blume.*

Calyx 4-5-cleft. *Stamens* 4-5. *Ovary* and *capsule* 2-celled, the latter 2-valved.

C. (HENSLOWIA) PANICULATA, Miq. *E.T.* var. *α* Chittagong. var. *β* Tropical Anan-hpyu (Kurz),¹ or Bō. forests from Arakan to Tenasserim.

Calyx 1-1½ line in diameter. Leaves quite glabrous.

var. *α glabra*, Planch. Rachis of racemes glabrous, at least in fruit.

var. *β pubescens*, Griff. Rachis of racemes densely puberulous, not glabrescent.

×× *Seeds pilose. Calyx-tube tubular, curved. Stamens declinate. Leaves black-dotted beneath.*

WOODFORDIA, *Salisbury.*

Calyx 6-lobed. *Petals* 6, or none. *Stamens* 12, long-exserted. *Ovary* and *capsule* 2-celled, the latter elongate, sessile, loculicidally 2-valved.

W. (LYTHRUM) FRUTICOSA, L. var. *α* Ava. Pegu. Khakyen Hills.

W. *floribunda*, Salisb.

Grislea tomentosa, Roxb.

A very ornamental tree common in Prome, with bright red calyces, which, with the leaves, are collected for dyeing and tanning, and infused (as tea) are considered to be restorative. The gum resembles tragacanth, swelling up in water, and is used in calico printing to cover such parts as are not intended to receive the dye, and also in the manufacture of the native confection 'Luddoo.'

++ *Capsule regularly opening into 3-8 valves, or berry-like and indehiscent. Trees or shrubs.*

× *Capsule dry or leathery, dehiscent.*

LAGERSTÆMIA, *Linnaeus.*

Calyx bell-shaped, 4-6- rarely 7-cleft. *Petals* 4-6. *Stamens* numerous, in 2 or more rows. *Capsule* dry, almost woody, 3-6-celled and valved. *Seeds* laterally winged.

Sub-genus SIBIA, DC.

Calyx terete, without ribs or furrows.

* *Inflorescence and calyx glabrous.*

L. PARVIFLORA.

Ava.

Leaves whitish glaucous beneath. Flowers hardly ½ inch across.

* L. INDICA, L.

Cultivated. (Wild in Yunnan.)

Leaves green. Flowers 1½-2 inches in diameter.

** *Inflorescence and calyx covered with a rusty-coloured tomentum.*

L. CALYCLATA, Kz.

Tropical forests East of Toung-ngoo.

Flowers almost racemose, in panicles. *Calyx* by ½ or ⅓ shorter than the capsule.

Sub-genus ADAMBEA, *Lamk.*

Calyx furrowed, plicately ribbed or angular, the angles acute or almost winged.

* *Ribs or angles twice as many as calyx-lobes, the shorter ones terminating at the sinuses of the lobes, those of the longer ones extending over the lobes. Petals large.*

¹ Kurz writes *Hpye*, which may mean either 'hpyu' or 'bo.'

+ *Inflorescence and calyx covered with a floccose tomentum. Calyx-lobes terminating in a bristle or short mucro.*

L. FLORIBUNDA, Jack. Tropical forests of Tenasserim and the Andamans.

Pyimmā-hpyoo (Kurz).

Adult leaves glabrous, acuminate. Tomentum rusty-coloured. Petals on short claws, not fringed.

L. TOMENTOSA, Presl. All over Pegu and Tenasserim.

Lai-za (Kurz).

Adult leaves puberulous beneath, acuminate. Tomentum whitish or yellowish. Petals on long slender claws, ciliolate.

×× *Inflorescence and calyx pruinous, or minutely whitish or greyish puberulous, all other parts glabrous.*

L. HYPOLEUCA, Kz. The Andamans.

Leaves whitish glaucous beneath. Calyx 10-12-angular, the angles acute.

L. FLOS-REGINÆ, Retz. All over Burma.

L. reginæ, Roxb.

Adumbea glabra, Lamk.

Ketmia Indica, Burm.

Pyimmā or Pyeng-mā.

Leaves green. Calyx plicately-sulcate, the ribs very obtuse and broader than the furrows.

L. MACROCARPA, Wall. From Ava to Tenasserim.

Kōng-pyimmā (Kurz).

Leaves green. Calyx longitudinally furrowed, without ribs.

** *Angles of calyx as many as plain lobes and alternating with them. Petals minute.*

L. VILLOSA, Wall. Tropical forests of Pegu and Martaban.

Young-ka-lay (Kurz). (Perhaps Yōng-ga lē.)

All softer parts greyish pubescent. Angles of calyx almost winged. Flowers small.

Several species of *Lagerstræmia* yield useful timber, especially *L. flos-reginæ*, or Pyeng-mā or Pyim-mā, which is in large demand.

DUABANGA, Hamilton.

Calyx 4-7-parted, thick coriaceous. *Petals* 4-7. *Stamens* numerous, in a single row. *Capsule* leathery, 4-8-celled and valved. *Seeds* appendaged at both ends.

D. (LAGERSTRÆMIA) GRANDIFLORA, Roxb. All over Burma and the Andamans.

D. Sonneratioides, Buch.

×× *Capsule berry-like, indehiscent.*

SONNERATIA, Linnæus.

Calyx bell-shaped, 4-8-lobed. *Petals* 4-8, or none. *Stamens* numerous. *Berry* many-celled.

* *Stigma infundibuliform-capitate, small.*

× *Petals linear-lanceolate, dark purple.*

S. ACIDA, L. E.T. All over Burma and the Andamans.

Lamoo.

Calyx terete, 6-8-lobed. Leaves obovate, broad. Timber worthless.

× × *Petals none.*

S. (MANGIUM) ALBA, Rumph. Sea-shore of the Andamans.

Calyx in bud elliptically oblong, acute, the tube at first obscurely, then strongly 6-8 angular.

The roots of *S. acida* and *S. alba*, and perhaps of other species also, send up from out the nut, wherein they are implanted, long spindle-shaped excrescences. These are of a firm close texture, almost devoid of fibrous structure, and can be cut into thin slices and are admirably adapted for insect boxes and setting boards, as the material receives readily the finest pin. Doubtless they would serve many purposes for which cork is used in Europe.

S. GRIFFITHII, Kz. Pegu and Tenasserim.

Ta-hpyoo (Kurz).

Calyx in bud ovoid, obtuse, the tube terete.

** *Stigma large, nearly 3 lines in diameter, conically umbrella-shaped.*

S. APETALA, Buch. From Chittagong to Tenasserim.

Kam-balā (Kurz).

Calyx 4-lobed. Petals none. Leaves oblong to lanceolate.

Wood red, strong, not hard. Good for building and other purposes.

The timber of *Lagerstrœmia*, *Crypteronia*, and some others is valuable. Henma, a reddish orange dye, is the produce of *Lawsonia*, and a similar dye is obtained from the flowers of *Woodfordia*.

Order GRANATÆ.

Calyx-lobes valvate. *Petals* 5 to 7, epigynous, imbricate in bud. *Stamens* many, many-seriate. *Ovary* with 2 superimposed tiers of cells, upper tier with parietal, lower with central placentation. *Berry* traversed by membranous septa. *Seeds* with fleshy testa, exalbuminous. *Cotyledons* convolute. *Leaves* sub-opposite, simple, exstipulate, not gland-dotted. Shrubs.

PUNICA, *Linnaeus*.

* *P. GRANATUM*, L. Cultivated in Prome and Ava.

Tha-lai.

The Pomegranate is a native of Asia Minor, ranging to the Western Himalayas, but cultivated in all temperate regions. The finest in India are imported from Kabul. The fruit is mildly acidulous, and makes a pleasant sherbet. The bark and rind possess considerable astringency, and are used in tanning, and in fine powder boiled with milk for dysentery. The bark of the roots is anthelmintic, and given for tapeworm. The fruit, in decorative art, is highly symbolical, on which subject see Pugin's *Glossary of Ecclesiastical Ornaments*, *Mythologie des Plantes*, vol. ii. p. 166, and Inman, *Ancient Faiths*, vol. iv. p. 612.

Order MELASTOMACÆ.

Flowers regular, hermaphrodite. *Calyx-tube* inclosing the ovary, and either cohering with its angles, leaving intermediate cavities, or entirely free or more or less adnate to it. *Limb* entire, or 3-6-lobed or toothed, usually imbricate in bud. *Petals* 3-5, rarely 6, imbricate (usually contorted). *Stamens* usually twice as many, sometimes only as many as petals, and inserted with them, the filaments curved down in the bud. *Anthers* 2-celled, opening by 1 or 2 pores at the top, or very rarely dehiscing longitudinally, the connective often variously extended or thickened. *Ovary* inclosed in the calyx-tube and adnate to it, or more or less free, with 2 to 6 or rarely more cells, with the placenta in the axis, or rarely 1-celled by the abortion of the partitions. *Style* simple, with a minute stigma. *Ovules* several, rarely 2 only, to each placenta, anatropous. *Fruit* inclosed in the calyx, or combined with

it, a berry, or a capsule with as many openings as there are cells, usually many-rarely few- or 1-seeded. *Albumen* none. *Embryo* straight or curved, the cotyledons plano-convex or thick and variously folded, radicle short. Herbs or shrubs, very rarely trees, with opposite, simple, 3-11-nerved leaves (very rarely 1-nerved and penninerved). *Stipules* none. *Flowers* often gaily coloured, usually in terminal panicles or clusters, rarely axillary or solitary.

The berries of many species of this Order are edible, but dye the mouth black, whence the name *Melastoma*.

Sub-order MELASTOMEÆ.

Ovary 2- or more-celled, the placentas attached to the middle or base of the axial angle, usually elongate, rarely sessile. *Seeds* usually numerous and minute, rarely few and large. *Leaves* usually 3-7-nerved from the base.

* *Placentas* attached to the middle of the axial angle. *Anthers* opening by 1 or 2 apical pores.

× *Capsule* dry or rarely sappy, dehiscing by apical valves, rarely irregularly rupturing.

OSBECKIÆ.

Ovary with a conical or convex free apex. *Connective* usually produced beyond the base of the anthers. *Capsule* dry or berry-like. *Seeds* minute, cochleate.

OSBECKIA, Linnæus.

Anthers usually all equal or nearly so. *Fruit* a capsule.

* *Petals* 8. *Stamens* 3.

× *Flowers* small. *Calyx-tube* bell-shaped. *Anthers* short or abruptly beaked.

O. CHINENSIS, L.

All over Pegu.

O. linearis, Bl.

O. Zeylanica, DC.

Calyx not ribbed, glabrous or more or less covered with long fringed scales. *Anthers* prolonged into a bristle-like beak.

var. *a genuina*. *Flowers* sessile. *Calyx-tube* not or sparingly ciliate-scaly, about 3 lines long or longer, the lobes broad, about as long as the tube.

var. β *O. linearis*, Bl.; *O. Zeylanica*, DC. *Calyx* somewhat smaller and shorter, almost spherical, more or less covered with long-hairy scales, sometimes (in bud) appearing densely pilose. *Flowers* nearly twice as large, on short pedicels, the calycine lobes shorter and narrower.

×× *Flowers* rather large and conspicuous. *Calyx-tube* elongate urceolate, in fruit produced into a tubular neck overtopping the bristle-crown of the capsule.

O. (MELASTOMA) CRINITA, Roxb.

Chittagong and hills East of Tonng-ngoo at 4000 to 7000 feet.

Bristly hairy. *Calyx* covered with peltate stellate-bristly scales, the ciliate lobes linear-subulate, alternating with as many minute teeth conform with the lobes. Branches 4-cornered.

O. ROSTRATA, Don.

var. *a* Chittagong and Pine forests of Martaban at 3500 to 5000 feet. var. β Pegu. var. γ Rangoon and Taong-doung (Ava?).

Almost glabrous or minutely bristly. *Calyx* sparingly sprinkled with minute ciliate scales, or smooth, the lobes lanceolate, usually ciliate, alternating with minute ciliate teeth. Branchlets 4-cornered.

var. *a pulchella*, Roxb. The 4-cornered stems and branchlets and leaf-nerves minutely bristly. *Calyx-tube* covered with ciliate scales.

var. β *longicollis*, Trian. Leaves, the 4-cornered stem and branches glabrous, the latter usually bristly fringed between the petioles. Calyx and its lobes quite glabrous, or only the latter ciliate.

var. γ *ternifolia*, Trian. Pretty glabrous, branches 8-cornered, calyx less stellate-bristly, without additional teeth between the lanceolate-linear calyx-lobes.

** *Petals 5. Stamens 10.*

O. NEPALENSIS, Hook. Khakyen hills.

More or less densely pubescent. Petiole very short or the leaves almost sessile. Bracts broadly obovate. Calyx loosely covered with rotundate fringed scales.

O. ASPERICAULIS, H. f. Tenasserim (?).

More or less appressed bristly, the branches much tubercled. Petiole $\frac{2}{3}$ -1 inch long. Bracts lanceolate. Calyx appressed setose.

OTANTHERA, Blume.

Anthers equal. Fruit a berry.

O. BRACTEATA, Korth. Tenasserim.

MELASTOMA, Linnaeus.

Anthers always unequal. Fruit a berry.

× *Leaves more or less appressed bristly hairy or pubescent.*

+ *Calyx covered with closely appressed chaffy scale-like bristles.*

M. MALABATHRICUM, L. E.S. In waste spots all over Burma.

Trembleya rhymanthera, Griff.

Myet-pyai.

Scales of calyx about $\frac{1}{2}$ line long or longer, often rather broad, the calycine lobes shorter, often only half as long as the tube. Leaves usually appressed-strigose on both sides, usually acute.

A small procumbent form is common at Kamorta.

I have no clear idea as to the differences between the various species of this alliance. Bentham reduces all the 40 species enumerated by Naudin as "species magis ad *M. Malabathricum* vergentes ideoque difficilins distinguende," while Triana keeps most of them distinct, without assigning diagnostic characters to them (Kurz).

M. NORMALE, Don. E.S. Khakyen Hills and Martaban up to 5000 feet.

M. Nepalense, Lodd.

Scales of calyx up to a line long, chaffy, ciliate or finely cleft, the calycine lobes about as long as the tube, ovate to lanceolate, acuminate, alternating with as many short subulate teeth. Leaves on both sides, or beneath only, softly appressed-pubescent, usually acuminate.

+ + *Calyx covered with squarrose spreading scale-like bristles about 2 lines long.*

M. HOUTTEANUM, Naud. E.S. Pegu Range, Martaban, and the Andamans.

Leaves softly appressed-pubescent on both sides.

M. CORDIFOLIA, Roxb. Chittagong.

M. CURVA, Roxb. Chittagong.

M. POLYANTHUM, Bl., also occurs at the Nicobars.

OXYSPORIEÆ.

Connective acute or spurred behind, not appendaged in front. Seeds angular or oblong to club-shaped.

OXYSPORA, Dr Candolle.

Calyx costate. Stamens 4, equal, or 8 and usually unequal. Ovary and the club-shaped capsule adnate to the calyx. Flowers laxly cymose, in terminal panicles.

O. (MELASTOMA) CERNUA, Roxb. E.S.S. Chittagong.

Glabrous. Branchings of panicle 4-cornered or 4-winged. Bracts persistent. Connective without any appendage.

ALLOMORPHIA, Blume.

Calyx costate. *Stamens* 8 or 10, nearly equal. *Ovary* free or adnate to the bottom of the calyx. *Capsule* ovoid, included in the urecolate costate calyx. *Flowers* clustered or almost whorled, in narrow terminal panicles.

A. HISPIDA, Kz.

Upper Tenasserim.

Habit of *A. Griffithii*, the stems, petioles and the 9 strong ribs beneath densely covered with long brownish bristles. *Calyx*-teeth minute.

A. UMBELLULATA, H. f. E.S.

St. Matthias Island, Mergui Archipelago.

Quite glabrous. Leaves 5-ribbed. *Calyx*-lobes with a thick wing-like appendage on the back.

OCHTHOCHARIS, Blume.

Calyx terete and smooth. *Stamens* 10, equal. *Ovary* and capsule adnate to the calyx, the latter globular, smooth. *Cymes* axillary, or collected into terminal panicles.

O. JAVANICA, Bl.

Tenasserim.

ANERINCLEISTUS, Korthals.

Calyx terete. *Anthers* 8, equal. *Capsule* 4-valved at the top, almost free. *Flowers* in axillary fascicles or umbellets.

A. HELFERI, H. f.

Tenasserim (or the Andamans).

Calyx softly appressed-pubescent.

A. GRIFFITHII, H. f.

Mergui Archipelago.

Calyx very densely and spreadingly hirsute.

SONERILIEÆ.

Ovary broadly curved out and depressed at the 3-5-cornered top. *Connective* rarely produced at the base. *Capsule* opening at the top into 3-5-cornered valves, rarely terete. *Seeds* minute, straight, angular, never cochleate.

SONERILA, Roxburgh.

Flowers 3-merous. *Stamens* 3 or 6. *Capsule* 3-celled. Herbs, or rarely under shrubs, sometimes stemless.

* *Capsules* terete or trigonously-terete.

× *Anthers* elongate.

S. LINEARIS, H. f.

Maulmain at 3000 feet.

Annual, 2 feet high, glabrous, or nearly so. Leaves narrow-linear, serrulate.

× × *Anthers* short.

S. STRICTA, Hook.

Maulmain.

Annual, $\frac{1}{2}$ foot high, puberulous. *Calyx* slightly downy and glandular-hairy.

** *Capsules* sharply 3-gonous or 3-quetrous.

× *Anthers* short.

S. TENERA, R. Br.

Laterite rocks and Pagodas all over Pegu and Tenasserim, North of Tavoy.

Small annual, 1-5 inches high, sparingly and spreadingly gland-hairy. Leaves 4-8 lines long, ovate to oval. *Capsule* usually with a few hairs.

× × *Anthers long-acuminate.*

+ *Cauliscent herbs.*

† *Stem short and very thick, scared.*

S. BRANDISIANA, Kz. Thong-yeen.

Quite glabrous. Leaves lanceolate, decurrent, 4-7 inches long.

† † *Stems elongate, slender and leafed.*

S. PICTA, Korth.

Mergui.

S. MACULATA, Roxb.

Tenasserim, between 3000 and 5000 feet.

S. angustifolia, Roxb.

Herb, 1-1½ foot high, sparingly hairy. Leaves 3-4 inches long, more or less cordate at the base, decussately opposite. Capsules glabrous.

var. *a genuina*. All parts sprinkled with hairs. Leaves bristly serrulate, usually ovate and equilateral, above elegantly white-blotched.

var. *β emaculata*, Roxb. As preceding, but the leaves uniformly green.

var. *γ angustifolia*, Roxb. Leaves usually acute or acuminate at the very unequal base, not blotched, but often purplish coloured beneath.

S. SECUNDA, Wall.

Tavoy.

As preceding, but leaves whorled.

++ *Scapigerous stemless herbs.*

S. VIOLEFOLIA, H. f.

Maulmain.

Leaves 5-7-plinerved. Calyx 4-toothed. Petals oblong, acuminate.

SARCOPYRAMIS, Wallich.

Flowers 4-merous. Stamens 8. Capsule 4-celled, included in the succulent calyx. Succulent glabrous herbs.

S. LANCEOLATA, Wall.

Ava Hills and Nüt-toung in Martaban
at 6000 to 7000 feet.

S. grandiflora, Griff.

× × *Berry sappy or coriaceous, irregularly rupturing.*

MEDINILLIÆ.

Ovary wholly, or only its angles, adnate to the calyx, the convex or conical top free. Stamens conform, or the alternating ones reduced to curiously-shaped staminodes, inserted on the limb or thrust into the cavities formed by the adhesion of the ovary-angles to the calyx. Anthers usually recurved.

× *Stamens very unequal.*

ANPLECTRUM, A. Gray.

Anthers 4 or 8, the connective usually not appendaged in front, shortly spurred behind. Ovary 4-crested at the top. Panicles often axillary.

A. (MELASTOMA) CYANOCARPUM, Bl.

Hills East of Toung-ngoo.

A. (?) BARBATUM, Wall.

Tenasserim (Chappedong).

Kurz adds from the Nicobars:

OPANTHERA NICOBARENSIS, T. et B.

Katchall and Great Nicobar.

** *Placentas inserted to the base of the axial angle or to the walls of the cells. Anthers opening by longitudinal slits.*

ASTRONIÆ.

Ovules numerous. Berry coriaceous or succulent, many-seeded, the seeds minute.

PTERNANDRA.

Calyx smooth or scaly, the limb truncate, obscurely 4-lobed. *Stamens* 8. Trees or shrubs.

P. CAPITELLATA, Jack. Tenasserim (or the Andamans).

Flowers in small stout almost simple cymes.

P. CÆRULESCENS, Jack. Tenasserim. Kamorta.

Ewyckia Jackiana, Walp.

Apteuxis trinervis, Griff.

Ewyckia paniculata, Miq.

Flowers in branched rather slender axillary and terminal panicles.

Sub-order MEMECYLEÆ.

Ovary 1-celled, with a free central placenta, to which 6 or more ovules are attached in a whorl. *Berry* succulent or coriaceous, 1-seeded. *Embryo* large, the cotyledons much folded and leafy.

MEMECYLON, *Linnaeus*.

Anthers 8, equal. Trees or shrubs, with pinninerved or rarely 3-nerved leaves.

* *Calyx* inside without radiate lamella-like nerves, or the nerves very obsolete.

M. UMBELLATUM, Burm. *E.S.* Boronga Island.

M. tinctorium, Koen.

M. ramiflorum, Lamk.

Myen-khae-ta-nyet.

Leaves sessile or nearly so, opaque, drying yellowish. Cymes sessile, umbel-like. *Calyx* conspicuously 4-toothed.

Wood very strong and tough, and close-grained. Leaves and flowers yield a yellow dye (Knrz).

** *Calyx* radiately nerved within, the nerves simple or forked, raised and lamella-like, like the gills of a mushroom.

× *Berry* ovoid or ovoid-oblong. *Cymes* and *pedicels* very short and robust.

M. CÆRULEUM, Jack. *E.S.* var. γ Tenasserim.

M. lutescens, Presl.

M. Manillanum, and *M. laurifolium*, Naud.

M. floribundum, Bl.

M. cordatum, Griff.

Leaves sessile or very shortly petioled, with the base rounded or cordate.

×× *Berry* globose, from the size of a pea to that of a cherry.

† *Cymes* short and sometimes reduced. *Leaves* usually thick coriaceous, without visible lateral nerves or veins, petioled.

△ *Berries* the size of a pea or smaller.

† *Branchlets* more or less terete, sometimes marked with obsolete lines.

○ *Calyx* up to a line in diameter, not tubercled.

M. LEVIGATUM, Bl. *E.T.* Tavoy.

M. pachyderma, Wall.

Leaves attenuate at the base, very acuminate, glossy. Petiole 1-2 lines long. Pedicels hardly a line long, thick. Cymes very short, almost sessile.

M. PLEBEIUM, Kz. *E.T.* Bhamo. Pegu. Thoung-yeen.

Leaves attenuate at the base, sharply acuminate. Pedicels 1-1½ line long. Umbel-like cymes shortly peduncled.

♀ ♀ Calyx about $1\frac{1}{2}$ line across, tubercled.

M. PUNCTATUM, Presl. *E.S.* Tenasserim.

Pedicels short and thick. Calyx undulate-truncate, with a hemispherical tubercled base. Leaves bluish or reflex, shortly acuminate.

†† Branchlets sharply 4-lined or almost 5-winged and appearing more or less 4-cornered.

M. SCUTELLATUM, Naud. *E.S.* var. β Pegu and Tenasserim.
var. α in Siam.

Calyx smooth, about $1\frac{1}{2}$ line across, expanded, obsolete undulate-lobed. Cymes almost sessile or shortly peduncled. Leaves as in preceding species.

var. α *subsessile*. Umbellets on peduncles less than a line long or almost sessile. Pedicels about a line long. Leaves smaller.

var. β *brevi-pedunculatum*. Umbellets on peduncles 1 to 2 lines long, the pedicels usually 2 lines long. Leaves larger.

M. PAUCIFLORUM, Bl. *E.T.* Tropical forests of Chittagong, Tenasserim and the Andamans.

Calyx about $\frac{1}{2}$ line wide, sharply 4-toothed. Leaves only $\frac{1}{2}$ – $1\frac{1}{2}$ inch long. Pedicels about a line long. Cymes much reduced, almost sessile, few-flowered.

△ △ Berries the size of a cherry, sappy.

M. CERASIFORME, Kz. *E.T.* Chittagong.

+ + Cymes more or less ample, peduncled. Berries the size of a pea or smaller.

† Leaves rather thin-coriaceous, the lateral nerves more or less conspicuous and arcuately anastomosing towards the margin.

M. CELASTRINUM, Kz. *E.T.* Tropical forests of Martaban.

Cymes simple, the pedicels slender. Calyx 1 – $1\frac{1}{2}$ line wide. Leaves those of *M. cerasiforme*.

var. α *genuinum*. Leaves glaucous-green, coriaceous. Cymes stiff peduncled.

var. β *Brandisianum*. Leaves of a thinner texture, more (often caudately) acuminate. Cymes short or very short, simple or the lateral branchings almost reduced. Peduncles 2–4 lines long, pedicels more slender.

M. GRIFFITHIANUM, Naud. *E.S.* Tropical forests East of Toung-ngoo and Tenasserim.
M. Horsfieldii and *Lampougam*, Miq.

Umbellets in thyrsoid cymes, the pedicels 1–2 lines long. Calyx $\frac{2}{3}$ line wide, the limb sinuate 4-angular.

†† Leaves more or less thick-coriaceous, the lateral nerves not or barely visible.

○ Leaves sessile, with a cordate base.

M. PULCHRUM, Kz. *E.T.* Andamans.

Leaves large. Cymes lax, peduncled, rather slender. Pedicels 2–3 lines long, slender.

○○ Leaves petioled, more or less tapering, very rarely rounded, at the base.

△ Branchlets sharply 4-cornered. Leaves tapering at base.

M. ELEGANS, Kz. *E.S.* Andamans.

Cymes rather short-peduncled, but slender. Leaves 3–4 inches long.

△ △ Branchlets terete or with only faint lines.

M. OVATUM, Smith, *E.S.* Chittagong to Tenasserim.

M. grande, Wall.

M. lucidum, Presl.

M. prasinum, Naud.

Leaves attenuate at the base, blunt or retuse. Petiole 1-2 lines long. Pedicels $\frac{1}{2}$ -1 line long, slender. Cymes simple or compound, peduncled.

M. EDULE, Roxb. *E.T.*
M. ramiflorum, Griff.

Tenasserim, the Andamans and Cocos.

Leaves rounded at the base, smooth and shining. Petiole 2-4 lines long. Pedicels 2-3 lines long. Cymes simple or compound, peduncled.

Kurz adds from the Nicobars :

M. SUBTRINERVIUM, Miq.
 var. *grandifolia*, Kurz.

Tropical forests of Kamorta.

Leaves 8-10 inches long.

"A small tree which I identify with Miquel's *M. subtrinervium*, on the supposition that the berries in Miquel's plant would, when full grown, reach a similar size. As a species it is a very distinct one, being one of the few that have the berry not globular" (Kurz).

The genus *Memeylon* is in need of a thorough revision. The species are extremely difficult of correct identification without access to the very authentic specimens for the most part deposited in European herbaria, and hence inaccessible to the Indian botanist. Triana's account of the genus is barely more than a compilation. I have, therefore, kept the Burmese forms all separate pending a comparison and identification of the same with those already described (Kurz).

Mason adds :

M. AMPLEXICAULE.

(*file* Parish).

Order MYRTACEÆ.

Flowers regular, hermaphrodite, or rarely by abortion polygamous. *Calyx-tube* more or less adnate to the ovary, the limb 4-5- (very rarely 3- or more than 5-)parted or toothed, or reduced to a narrow border, or entirely wanting, imbricate, or open in bud. *Petals* usually as many as calyx-lobes, much imbricate in bud, the outer ones sometimes larger in bud than the inner, or rarely all cohering and falling off in an entire operculum. *Stamens* indefinite, usually numerous, or rarely few and definite, inserted in 1 or several series on a thinner or thicker disk lining the calyx-tube above the ovary or close round the ovary-summit. *Filaments* free or rarely united at the base, or separated into as many bundles as calyx-lobes. *Anthers* versatile, or basifixed, longitudinally dehiscent, or rarely opening in terminal pores. *Ovary* inferior, or rarely almost superior, but inclosed in the calyx-tube, 2- or more- (very rarely 1-)celled, with 2 or more uni- or multi-seriate ovules, attached to the parietal or axile placentas. *Style* simple, with a small entire or rarely lobed stigma. *Fruit* inferior, very rarely all or almost wholly superior, and supported by the calyx-tube, crowned with the persistent calyx-limb or its scar, either loculicidally capsular, with as many valves as ovary-cells, or indehiscent and berry or drupe-like. *Perfect seeds* often few, rarely numerous. *Albumen* none or almost none. *Embryo* and *Cotyledons* various. *Trees* or shrubs, very rarely under shrubs. *Leaves* simple, opposite or rarely alternate, usually gland-dotted. *Flowers* solitary or variously arranged, into axillary or terminal inflorescences. *Bracts* 1 or more. *Bractlets* 2, often minute, and very fugaceous.

LEPTOSPERMIÆ.

Ovary 2-5- rarely more-celled. *Fruit* a capsule, either opening at the summit in as many valves as there are cells, or very rarely indehiscent.

* *Stamens* united into 5 separate bundles.

MELALEUCA, *Linnaeus*.

Staminal bundles alternating with the petals. *Flowers* in heads or spikes. *Leaves* alternating.

M. LEUCADENDRON, L. *E.T.*
M. Cajuputi, Roxb.

Mergui (rare).

The leaves yield by distillation the light green, limpid and volatile *Cajuput* oil, which is so beneficial both applied externally and exhibited internally in Rheumatism and Gout. Combined with camphor liniment it is often singularly efficacious when rubbed over the affected part. It is a diffusible stimulant and excites the action of the heart (Waring).

TRISTANIA, *R. Brown.*

Staminal bundles opposite the petals. *Flowers* in cymes or corymbs. *Leaves* broad, alternate, rarely opposite.

* *Calyx-lobes blunt or almost so.*

T. MERGUENSIS, Griff. *E.S.*

Mergui.

Leaves sessile or nearly so, rigidly coriaceous, glossy on both sides. Flowers sessile or nearly so. Calyx about 3 lines across.

T. BURMANICA, Griff. *E.T.*

Pegu Range and Tenasserim up to 4000 feet.

Toung-yoh-pyu-zing (Kurz).

Leaves petioled, thin coriaceous, opaque beneath. Flowers pedicelled. Calyx only $1\frac{1}{4}$ line across. Capsule exserted.

** *Calyx-lobes subulate-acuminate.*

T. GRIFFITHII, Kz. *E.T.*

Mergui.

T. conferta, Griff. vix R. Br.

Leaves crowded, narrowed at both ends. Flowers large. Capsule hardly exserted.

MYRTIÆÆ.

Ovary 2- or more-celled. *Fruit* an induriscient berry or drupe, very rarely opening by an apical opercle. *Leaves* opposite, dotted (*Eu-Myrticæ*).

× *Stigma* peltate or capitate. *Testa* of seeds hard. *Cotyledons* small.

+ *Ovules* 2-6 in each cell.

DECASPERMUM, *Forster.*

* *Ovary* 5- or rarely 4-celled. *Embryo* long and narrow, curved, circular or spiral.

D. (NELITRIS) PANICULATUM, Ldl. *E.T.*

var. *a* Martaban and Tenasserim
 at 3000 and 4000 feet.

Eugenia polygama, Roxb.

N. pallescens, Miq.

+ + *Ovules* numerous, in 2 or more series.

RHODAMNIA, *Jack.*

Ovary 1-celled, with 2 parietal placentas. *Leaves* 3-nerved.

R. TRINERVIA, DC.

var. *a* Tenasserim.

var. *a* *R. cinerea*, Griff. non Jack.

Kamorta.

R. concolor, Miq.

Leaves green on both sides, beneath thinly puberulous or almost glabrescent.

var. β *R. spectabilis*, *subtriflora*, and *Muelleri*, Bl.

R. nageli, Miq.

R. cinerea, Jack.

Leaves beneath covered with a minute silvery pubescence.

PSIDIUM, *Linnaeus.*

Ovary 2-7- (usually 4-5)-celled, the placentas often 2-lamellate. *Leaves* pennis-nerved.

* P. GUYAVA, L.

Cultivated in Burma and likewise wild on
Kamorta and Katchall.

Ma-la-ka-pu (Kurz).

var. *a* P. *pyriferum*, L. Peduncles 1-flowered. Fruits pear-shaped.var. *β* P. *pomiferum*, L. Peduncles usually 2-flowered, with a third flower in
the axil of the forking. Fruits globular or ovoid.× × *Stigma simple, minute. Testa of seed membranous.*EUGENIA, *Linnaeus*.

Ovary 2-3-celled, with several ovules in each cell. Embryo thick and fleshy,
either indivisible or with 2 thick fleshy cotyledons, the radicle short. Flowers
4- rarely 5-merous, solitary or in cymes or panicles. Leaves penninerved.

Sub-genus SYZYGIUM, Gaertn.

Calyx smooth inside, without intra-staminal thickened ring. *Calyx-limb* often
obsolete and turning truncate after defloration. *Petals* free or often cohering in a
deciduous calyptra. *Flowers* usually small. *Berries* often small, globular to ovoid
and cylindrical, more or less sappy, 1- rarely 2-seeded.

* *Calyx elongate and cylindrical, or shorter and obversely conical* (*Acmena*, Wight).× *Flowers in simple or almost simple axillary racemes, sometimes much reduced.*
Calyx much elongate. Berries ovoid.

E. CLAVIFLORA, Roxb. E.T.

Tropical forests of Tenasserim, the Andamans,
Kamorta, and Great Nicobar.

Tha-byē (generic).

Calyx tubular-narrowed, $\frac{1}{2}$ -1 inch long, the lobes broad and rounded. Berries
about an inch long, ovoid-oblong, crowned by the calyx-lobes.

E. LEPTANTHA, Wight. E.T.

Tropical forests of the Pegu Range, Tenasserim,
and the Andamans.

Calyx club-shaped, $\frac{1}{3}$ - $\frac{1}{2}$ inch long, the limb truncate. Berry clavate-oblong,
only $\frac{1}{3}$ - $\frac{1}{2}$ inch long, crowned by the cup-shaped truncate calyx-limb.

× × *Flowers in more or less corymb-like axillary and terminal panicles. Calyx*
more or less obconical.+ *Calyx at base contracted pedicel-like.*

E. GRATA, Wall. E.T.

Tenasserim. Rangoon.

Calyx smooth. Leaves somewhat glaucous and rather opaque beneath. Berries
black.

E. ZEYLANICA, Wight non Roxb. E.T.

Tropical forests of Tenasserim and
the Andamans.*Jambosa bracteata*, Miq.

Tha-byē-pouk (Kurz).

Calyx (dried) granular-rough. Leaves rather glossy beneath. Berries white.

++ *Calyx sessile, not narrowed pedicel-like at base.*

E. CONTRACTA, Wall. E.S.

Tropical forests of Tenasserim.

Leaves more or less linear, net-veined between the remote indistinct irregular
lateral nerves.

The Martaban specimens dry blackish and have the net-venation less prominent.
They may possibly form a large and long-leaved variety of *E. cuneata*, Wall.

Another species from Tenasserim, nearly allied to the above, has larger leaves of a
thinner texture and very lax net-venation. It is no doubt new, but the inflorescences
are too young for description. It has white, while the above has red-brown
bark (Kurz).

E. BRACTEOLATA, Wight. E.T.

Tenasserim.

Leaves more or less oblong, somewhat glaucous beneath, not net-veined
between the close-set parallel lateral nerves.

* * *Calyx hemispherical to funnel shaped, sessile or contracted pedicel-like at the base.*

× *Leaves usually opaque, green, the lateral nerves more or less distant, somewhat irregular, net-veined between. Inflorescence usually lateral from the older branches.*

+ *Calyx sessile, not tapering pedicel-like at the base.*

† *Leaves green on both sides.*

E. OPERCULATA, Roxb. *E.T.* Swamp forests of Pegu and Martaban.

Petiole $\frac{1}{2}$ – $\frac{2}{3}$ inch long. Leaves broader, not decurrent. Flowers more than 3 together. Panicle longer peduncled, the last ramifications very short.

E. OBOVATA, Wall. Ava. Bhamo.

Thi-tha-byē (Kurz).

As preceding, but leaves more obovate. Panicle very short peduncled or almost sessile, more lax. Flowers often by threes.

E. PANIALA, Roxb. *E.T.* Chittagong.

Leaves acuminate decurrent on a short petiole, more acuminate.

†† *Leaves glaucous or glaucescent beneath.*

E. CINEREA, Wall. *E.T.* Tropical forests of the Southern Pegu Range and Tenasserim.

Branchlets terete or nearly so. Panicles more or less peduncled. Calyx soon truncate, the lobes obsolete.

Possibly not different from the following species, which I know only from Roxburgh's description and figure (Kurz).

+ + *Calyx narrowed into a longer or shorter pedicel like base. Panicle short, sessile or nearly so, usually branched already from the base.*

† *Calyx-lobes well developed, up to $\frac{1}{2}$ line long.*

E. PRECOX, Roxb. *E.T.* Chittagong.

Similar to *E. cinerea*, the branchlets greyish. Calyx-lobes $\frac{1}{2}$ line long.

E. CERASOIDES, Roxb. *E.T.* Chittagong and Tenasserim. var. β

Tha-byē-chin (Kurz). Khakyen Hills.

Branchlets brownish. Racemes sometimes corymb-like, slender, short.

var. β *angustifolia*. Leaves on shorter and thicker petioles, linear to oblanceolate-linear, with fewer more remote and arcuate nerves. Panicles shorter and stouter, the ultimate branchings much reduced. The pedicel-like base of calyx shorter. Berries the size of a pepper-corn, globose, almost sessile, crowned by the truncate calyx-limb. Probably a distinct species (Kurz).

†† *Calyx soon truncate, the lobes obsolete.*

E. TETRAGONA, Wight. *E.T.* Khakyen Hills, 3000 to 4000 feet.

Branchlets brown, 4-cornered, often winged, especially while young.

E. BALSAMEA, Wight. Burma (*vide* Mason).

Branchlets white, terete. Panicles cyme-like, short.

× × *Leaves usually glossy, often drying blackish or brownish, the lateral nerves all thin and vein-like, more or less crowdedly parallel-running.*

+ *Calyx narrowed into a longer or shorter pedicel-like base.*

† *Inflorescence lateral from the older branchlets.*

E. FRUTICOSA, Roxb. Chittagong. Pegu Range and Tenasserim.

Tha-byē-ni (Kurz).

Calyx a line long, almost sessile. Ramifications of panicle sharply 4-cornered. Berries ovoid, the size of a pea. Branchlets brownish.

* *E. JAMBOLANA*, Lamk. *E.T.* Ava. Tenasserim and the Andamans.
Tha-byē-hpyu.

Calyx 2 lines long, tapering into a thick pedicel-like base. Ramifications of the panicle obsolete 4-cornered. Berries ovoid-oblong, $\frac{1}{2}$ inch long. Branchlets white.

†† *Inflorescence terminal (and often also axillary on the same branch).*

‡ *Branchlets brown.*

◦ *Leaves bluntish acuminate to blunt.*

E. CYMOSEA, Lamk. *E.S.* Tenasserim.
E. toddalioides, Wight.
Jambosa tenuicuspis, Miq.

Leaves thin coriaceous, the lateral nerves thin but distinct. Petiole 3 lines long, slender.

E. MYRTIFOLIA, Roxb. *E.S.* Maulmain.

Leaves firmly coriaceous, the lateral nerves obsolete. Petiole thick, not above a line along.

◦◦ *Leaves long and sharply acuminate.*

E. (MYRTUS) ACUMINATISSIMA, Bl. *E.T.* Tenasserim (or the Andamans).

Leaves almost chartaceous, pale-coloured beneath. Petiole about 2 lines long.

‡‡ *Branchlets white.*

E. VENUSTA, Roxb. *E.T.* Tippera Hills and Touk-ya-ghat, East
Syzygium Gardneri, Thw. of Toung-ngoo.

Tha-byē-khā (Kurz).

Leaves bluntish-acuminate, almost chartaceous, elegantly transversely veined.

++ *Calyx not or scarcely contracted at the base, sessile. Leaves blackish or reddish in drying.*

† *Branchlets white.*

E. RUBENS, Roxb. *E.T.* Chittagong and Tenasserim.
Jambosa Wightiana, Bl.

Leaves chartaceous. Calyx-lobes about a line long. Petals 2 lines long or longer. Filaments 4-5 lines long.

If my identification prove correct, then it is only the length of the stamens and a thinner texture of the leaves that separate this species from *E. thumra*. The petals and sepals, too, are nearly twice the size.

E. THUMRA, Roxb. *E.T.* Tropical forests of the Pegu Range
Tor-tha-byē. and Tenasserim.

Leaves coriaceous, the lateral nerves strong and prominent. Calyx-lobes and petals shorter. Filaments 2-3 lines long. Berries obovoid.

† *Branchlets red-brown.*

E. OBLATA, Roxb. *E.T.* Tropical forests of Martaban and
Tha-byē-ni. Tenasserim.

Like preceding, but lateral nerves thin and vein-like. Berries almost globular, the size of a large cherry.

E. (SYZYGIUM) OCCUSA, Miq. (K.). Katchall.

Sub-genus JAMBOSA, DC.

Calyx inside usually with a circular or 4-angular intra-staminal ring, or the stamens inserted on the thickened ring itself. *Flowers* often large. *Calyx-lobes* conspicuous and persistent. *Berries* usually large, more or less turbinate or ovoid, the endocarp thick and fleshy. *Seeds* large.

* *Calyx-lobes in fruit spreading.*

× *Calyx less than $\frac{1}{2}$ inch long.*

+ *Flowers sessile in terminal and often also in axillary panicles.*

† *Leaves glossy, firmly coriaceous, the lateral nerves thin and parallel.*

E. GRANDIS, Wight.

Pegu and Tenasserim.

E. cymosa, Roxb. non Lam.

Toung-tha-byē (Kurz).

Leaves 5-6 inches long, blunt or nearly so. Panicle corymb-like, peduncled. Berry obovoid-pear-shaped, about an inch long.

var. γ *E. lepidocarpa*, Wall.

Upper Tenasserim.

Syzygium Palembangicum, Miq.

Leaves only 2-3 inches long, decurrent at the base, bluntish acuminate.

E. PACHYPHYLLA, Kz. *E.T.*

Upper Tenasserim at 3000 feet.

Leaves cuneate at the base. Panicles sessile, reduced and cluster-like, the ramifications very short and thick, joint-like.

†† *Leaves opaque, coriaceous, the lateral nerves curved and distant.*

E. TRISTIS, Kz. *E.T.*

Loungkim, Tenasserim.

Leaves long-petioled. Panicle terminal, corymb-like.

++ *Flowers pedicelled. Leaves more or less chartaceous, the lateral nerves curved.*

E. LANCEFOLIA, Roxb. *E.T.*

Chittagong.

Panicles axillary and terminal. Calyx-base thick, pedicel-like, the true pedicel very short or almost wanting. Leaves thin coriaceous.

E. ALBIFLORA, Duthie. *E.T.*

Ava (probably).

Panicle almost corymb-like, little branched from the base. Calyx-base clavate-narrowed, the true pedicel 3-6 lines long. Leaves coriaceous.

E. KURZII, Duthie. *E.T.*

Hills East of Toung-ngoo and Sikkim and Khasya Hills.

E. cerasiflora, Kz.

Racemes simple, slender, lateral or axillary. Calyx-base filiform and pedicel-like, the true pedicels long and filiform. Leaves membranous.

×× *Calyx an inch long or longer.*

E. FORMOSA, Wall. *E.T.*

Tropical forests of Chittagong and

E. ternifolia, Roxb.

Upper Tenasserim.

Leaves large, almost sessile, rounded at the base. Corymbs lateral and terminal.

** *Calyx-lobes in fruit incurved or inflexed.*

× *Flowers sessile or nearly so.*

E. (JAMBOSA) MACROCARPA, Miq. *E.T.*

Pegu Range and Tenasserim.

Leaves rounded at the base, the petiole very short. Corymbs terminal.

E. AMPLEXICAULIS, Roxb. *E.T.*

Chittagong.

Leaves sessile with a cordate base, blunt. Branchlets white, terete. Corymbs small, lateral.

Specimens from the tropical forests of Upper Tenasserim come nearest to this species. They differ apparently by the sharply 4-angular branchlets and bluntish

acuminate or bluntish leaves. The inflorescence is terminal, but otherwise quite agrees with Roxburgh's figure. The shape of the leaves is very variable, some of them almost agreeing with those of *E. aqua* (Kurz).

* *E. MALACCENSIS*, L. *E.T.* Planted in Tenasserim.
Jambosa domestica, Rumph.

Tha-hpyu-tha-byē.

Leaves acuminate at both ends. Panicle cluster-like, reduced and lateral.

× × *Flowers truly or spuriously pedicelled.*

+ *Leaves opposite.*

† *Leaves rounded at the base. Fruits obversely turbinate, waxy, white or rose-coloured.*

* *E. (JAMBOSA) AQUEA*, DC. *E.T.* Cultivated from Chittagong to Tenasserim.

Branchlets usually 4-cornered and often winged white or pale rose-coloured. Leaves acuminate, the intramarginal nerve as strong as the lateral.

E. JAVANICA, Lamk. *E.T.* The Andamans. Katchall.

Branchlets terete, brown. Leaves bluntish, the intramarginal nerve faint.

†† *Leaves narrow, acute at the base, petioled.*

* *E. JAMBOS*, L. *E.T.* Cultivated all over Burma.
Jambosa vulgaris, DC.

Berries almost globular or ovoid, dull-yellow.

+ + *Leaves whorled by threes, narrow, obtuse at the base.*

E. POLYPETALA, Wall. *E.T.* Chittagong.
E. angustifolia, Roxb.

Leaves linear or linear-lanceolate, almost sessile. Petals 4-16.

Mason gives the following vernacular names for several species of *Eugenia*: Tha-byē-htan-shit, Tha-byē-hsat-khyac, Tha-byē-ta-o-kyē, Tha-byē-ni, Kywai-laik-tha-byē, Tha-byē-set-galē.

The wood of many species of *Eugenia* is dark-brown or reddish, heavy, and close-grained, but of inferior quality, brittle, and liable to warp and decay. Possibly some species might yield a good timber for furniture if properly seasoned. But as ornamental and road-side trees the *Eugenias* have but few superiors, from the dense foliage they possess; but whether they would flourish in such spots, remains to be seen.—W.T.

Sub-order LECYTHIDEÆ.

Leaves alternate, not dotted. *Calyx* nearly valvate, rarely imbricate.

BARRINGTONIA, Forster.

Stamens all perfect. *Ovary* 2- or 4-celled, with numerous ovules in each cell. *Fruit* fibrous or fleshy, often angular, 1- or very rarely 2-4-seeded.

B. (MAMMEA) ASIATICA, L. *E.T.* The Andamans, Tenasserim, and the Nicobars.
B. speciosa, Forst.
Agnota Indica, Miers.

Kych-gyi.

B. CONOIDEA, Griff. *E.S.* Coast forests of Tenasserim.
Butonica alata, Miers.

Leaves serrulate. Racemes rather erect, puberulous.

Miers brings part of this species to his *B. alba*, and in this case, as elsewhere, accuses the editor of Griffith's Posthumous Papers of having confused the plates, but in this he is greatly in error (Kurz).

Sub-genus STRAVADIUM, JUSS.

Calyx already in bud 3-4-cleft, the lobes imbricate.

* *Ovary* 4-celled. *Rachis* of raceme very thick.

+ *Calyx-tube* winged. *Fruits* narrowly winged on the corners. *Flowers* sessile.

B. (DOXOMMA) ANGUSTA, Miers. *E.T.* Tenasserim. Tavoy (Parish).

Calyx-lobes rounded, 2 lines long. *Leaves* obtuse or acute at the base, not decurrent.

B. PTEROCARPA, Kz. *E.T.*

Tropical forests of the Pegu Range and Tenasserim.

Doxomma magnificum, Miers.

Kyeh (generic).

Calyx-lobes triangular-ovate, more or less acute, more than 3 lines long. *Leaves* long-decurrent.

Very nearly allied to the preceding, from which it differs in the few characters above given. The unripe fruits a good deal resemble those of *Doxomma Cochinchinense*, Miers, but this species has very long slender petioles.¹

Sub-genus BUTONICA, Rumph.

Calyx closed in bud, entire, valvately rupturing into 2 to 4 lobes. *Ovary* 4-celled. *Flowers* pedicelled.

* *Fruit* angular, without appendages, 1-seeded.

B. RACEMOSA, DC. *E.T.*

The Andamans, Tenasserim, and Nicobars.

Butonica rubra, inclyta, and Zeylonica, Miers.

Flowers about an inch in diameter, in long slender pendulous racemes. *Leaves* erenulate, very shortly petioled.

** *Fruit* conically pyramidal, with short wing-like basal appendages.

+ + *Calyx-tube* terete or angular, not winged.

× *Flowers* sessile.

B. MACROSTACHYA, Kz. *E.T.*

Southern Tenasserim.

Doxomma sarcostachys and *acuminatum*, Miers.

Leaves elongate, entire, long-petioled. *Calyx* angular.

× × *Flowers* pedicelled.

B. (CAREYA) PENDULA, Griff.

Tenasserim.

Leaves elongate, long-petioled. *Calyx* terete.

** *Ovary* 2-celled. *Rachis* of raceme slender. *Fruits* sharply 4-angular.

B. (EUGENIA) RECTANGULA, L.

All over Burma.

Stravadium demissum and *pubescens*, Miers.

St. Rheedii, Bl.

St. coccineum, DC.

Glabrous or pubescent. *Flowers* rather small, red. *Leaves* erenulate, shortly petioled.

CAREYA, Roxburgh.

Outer or inner series, or both, without anthers. *Fruit* globose to ovoid, many-seeded, the seeds imbedded in pulp. *Ovary* 4-celled.

Sub-genus CAREYA, Roxb.

Outermost and innermost series of stamens reduced to filaments. *Embryo* consolidate.

¹ " *B. agnote* "alde affinis sed differt foliis longe decurrentibus et calycis lobis" (Kurz).

* *Flowers sessile. Trees.*

C. ARBOREA, Roxb.

All over Burma.

Ban-bwē.

Petals blunt or rounded, concave. Ovules in 2 rows in each cell.

Wood described as reddish-brown, tough and durable. Weight 55 lbs.

C. SPHERICA, Roxb.

Chittagong Hills.

Petals acute, the borders revolute. Ovules in 6 rows in each cell.

Sub-genus PLANCHONIA, Bl.

Only the innermost row of stamens reduced to filaments. Cotyledons 2, distinct.

C. (PIRIGARA) VALIDA, Blume.

The Andamans.

Planchonia littoralis, Bl.

Fruits ellipsoid, angular-ribbed.

LEUCYMMEA SALICIFOLIA, Presl.

Maulmain (*vide* Helfer).

A genus which is entirely enigmatic to me. The gamopetalous corolla and the insertion of the very numerous stamens on the bottom of the calyx form a puzzling combination of characters. If the corolla be incorrectly described, we may guess *Myrtaceæ* as its probable affinity (Kurz).

More than 50 species of this Order, all woody plants, are found in Burma. Astringent principles prevail in the bark, and it is therefore often used for tanning purposes. Fragrant aromatic or pungent volatile oil abounds also in the *Myrtaceæ*. The buds of *Caryophyllus aromaticus* yield our cloves. All-spice or pimento-pepper is derived from *Pimenta*. Several furnish good dessert fruits, like guava, jambo, rose-apple. Heavy, usually brown-coloured timber is obtained from the various species of *Eugenia* and *Careya* (Kurz).

Order COMBRETACEÆ.

Flowers hermaphrodite, rarely polygamously dioecious, or unisexual. *Calyx-tube* terete, or angular, more or less narrowed above the ovary, the limb usually bell-shaped, 4-5- (rarely more-)toothed, lobed, or parted, valvate, or very rarely imbricate, persistent or deciduous. *Petals* none, or as many as calyx-lobes, usually small, imbricate, or valvate. *Stamens* as many or twice as many as calyx-lobes, rarely numerous, in a single or triple series, inserted on the calyx, or epigynous. *Filaments* straight, or inflexed in bud, sometimes alternating with glands or staminodes. *Anthers* versatile, and opening longitudinally, or adnate and opening by 2 valves. *Epigynous disk* none, or lobed. *Ovary* inferior, 1-celled, with 2 or more, or very rarely a single pendulous ovule. *Style* filiform, or scarcely any, with an entire terminal stigma. *Fruit* various, dry or drupaceous, indehiscent, or very rarely dehiscent, winged or not. *Seed* solitary, pendulous. *Albumen* none. *Cotyledons* convolute, or folded, very rarely flat, radicle short, superior. *Trees* or shrubs, often climbing, with alternate or opposite, rarely whorled, simple or rarely 3-foliolate leaves. *Stipules* none. *Flowers* usually small, in axillary or terminal inflorescences. *Bracts* usually small. *Bractlets* sometimes larger, often wanting.

Sub-order COMBRETEÆ.

Calyx-lobes valvate. *Stamens* without alternating glands at the base, the filaments often inflexed in bud. *Anthers* versatile, opening in longitudinal slits. *Ovary* with 2 to 12 suspended ovules. *Flowers* in racemes, spikes, or heads.

* *Calyx-limb deciduous.*

× *Calyx-tube short, constricted, but not produced beyond the ovary.*

TERMINALIA, *Linnaeus.*

Petals none. *Stamens* inflexed in bud, exserted. *Flowers* spiked or paniced.

Sub-genus MYROBALANTIS, Gaertn.

Fruit a fleshy drupe, compressed or obsoletely angular, the putamen bony.

* *Spikes simple, solitary in the leaf-axils.*

° *Spikes quite glabrous.*

* T. CATAPPA, L. Andamans, the Nicobars, and cultivated all over Burma.
T. *Moluccana*, Lamk.

Glabrous or pubescent. Petioles very short, the base of the broad leaves more or less rounded. Drupes $1\frac{1}{2}$ –2 inches long, compressed.

The kernels of this tree are known on breakfast-tables in Calcutta as ‘country almonds,’ and are pleasant to eat.

T. PROCERA, Roxb. Tropical forests of the Andamans.

As preceding, but glabrous, the base of the leaves more or less acuminate. Drupes about an inch long, obsoletely 5-angular, ovoid-oblong, red inside.

T. KURZIANA, Theobald. Kamorta.

Terminalia (sp. nov. Kurz, J.A.S.B. 1876, p. 130).

Leaves narrower and more cuneate than in *T. catappa*. Flowers and fruit not known.

°° *Spikes puberulous or tomentose.*

T. BELERICA, Roxb. All over Burma up to 2000 feet.

T. fatidissima, Griff.

Thyt-sein.

Leaf-buds rusty villous. Leaves obovate, on 2–3 inch long petioles, usually silky pubescent. Drupes obovoid, silky puberulous.

** *Spikes more or less panicled at the end of the branchlets, puberulous or tomentose.*

T. CHEBULA, Retz. Chittagong.

T. reticulata, Roth.

Young shoots and under side of the oblong leaves rusty villous, the petiole short. Ovary villous. Drupes oval, glabrous.

T. TOMENTELLA, Kz. Pegu and Tenasserim.

Hpān-gā.

As preceding, but ovary quite glabrous, the flowers and fruits much smaller, the leaves more coppery villous beneath.

T. CITRINA, Roxb. Tenasserim and the Andamans.

var. *Malayana*. Nankowry.

Very young shoots rusty villous. Leaves smooth and glabrous, acuminate, the petiole short. Drupes oblong-lanceolate, obsoletely 5-cornered, glabrous.

Sub-genus PENTAPTERA, Roxb.

Fruit a dry nut, with a chartaceous or fibrous-coriaceous pericarp, compressed, or 3–5-cornered, winged.

* *Nuts usually 3-cornered, the angles expanded into 2 equal, or 3–1 unequal wings (Chuncoa, Pav.).*

× *Nuts large, equally 2-winged, $1\frac{1}{2}$ –2 inches long. Spikes simple, axillary.*

T. (PENTAPTERA) BIALATA, Roxb. Andamans.

Lēn.

All parts glabrous. Spikes puberulous or tomentose. Leaves obovate, the petiole 2–3 inches long. Nut 3-cornered, with 2 large equal spreading wings, about 3–3½ inches across.

T. (PENTAPTERA) PYRIFOLIA, Presl. Pegu and Tenasserim.

Lên.

As preceding, leaves smaller and shorter petioled. Nuts equally 2-winged, only $\frac{1}{2}$ – $\frac{3}{4}$ inch across.

×× Nuts small, unequally 2-3-winged. Spikes forming terminal panicles.

T. MYRIOCARPA, Heurck and Muell. E.T. Khakyen Hills.

Fruits much smaller than in preceding, equally 2-winged, almost glabrous, pale coloured.

** Nuts 4- or 5-cornered, all the angles expanded into equal wings.

T. ALATA, Roth. All over Pegu and Martaban.

Pentaptera tomentosa, Roxb.

T. elliptica, Willd.

Htonk-kyän.

All parts more or less greyish tomentose. Leaves strongly net-veined beneath, the petiole short, furnished with 2 stalked turbinate glands.

T. CRENULATA, Roth. Arakan, Pegu Range, and Tenasserim up to 2000 feet.

Pentaptera glabra, Roxb.

T. Arjuna, Bedd.

Htonk-kyän.

All parts glabrous. Leaves not prominently net-veined beneath, the petiole short, with 2 stalked turbinate glands. Spikes panieled, like the calyxes, puberulous or almost tomentose.

var. *macrocarpa*, Wall.

As preceding, but the panieled spikes and outside of calyx quite glabrous.

Several *Terminalias* afford splendid timber. *T. crenulata*, the *Htonk-yan* (or *Arjun* in India), is an admirable brown wood, weighing 70 lbs., and of the largest scantling. Kurz (following Brandis) says 58 lbs., which I am confident is an error. *T. tomentella*, or *Hpän-gäh*, is an equally fine wood, very similar, and weighing 64 lbs. It is procurable of the largest scantling; and the yellowish sap wood is in large trees scarcely inferior to the dark brown heartwood. *T. pyrifolia* or *Lên* yields a poor timber, but is a highly ornamental and umbrageous tree, deserving of planting along roads and as an ornamental tree round houses.

Myrobalans are the dried unripe fruit of different species of *Terminalia*, and are classed as Chebulic (*T. chebula*), Citrine (*T. citrina*), Belleric (*T. bellerica*), and Emblic (*Emblia officinalis*). Good myrobalans yield 40 per cent. of tannic acid, but if allowed to ripen before being gathered are very deficient in tannin. Owing to the expense of grinding the myrobalans in England, Mr. Christy¹ remarks: "If a properly prepared extract of these different varieties could be obtained in India, there would be a very large demand for it by the tanners of England." To prepare the extract² the raw material, either myrobalans, barks or other products, must be ground or pulverized and macerated in sufficient cold water just to cover it for 24 hours. The first solution should now be pumped off and used with a fresh charge, and this may be repeated four times. The liquid fully charged with tannin may now be concentrated. This is recommended to be done in copper or earthen vessels, iron being wholly inadmissible, but the concentration could equally well be carried on in India (save in the rains) in open shallow brick pans which, if asphalted, would form most efficient evaporating pans by the sun's heat alone. If artificial heat is used, it must be carefully regulated and the specific gravity recommended for such

¹ New Commercial Plants and Drugs, Christy and Co., London.

² For fuller particulars consult Christy, *l.c.*

extract, for exportation, is 1.261; but, if the condensation is effected by the sun's heat, no limit of condensation need be fixed. If gun metal stamps were employed to reduce the materials to powder, they might be wetted, and the inconvenience thereby avoided, usually experienced from the irritating dust created.

To ascertain the presence of tannin in any wood, bark, leaf or fruit, prepare an infusion, and add thereto a warm solution of gelatine or isinglass; if tannin is present, a white precipitate will be formed. Mr. Christy also observes: "Should colonists or any enterprising firm be still uncertain as to the value of any tanning material, and how far it would be wise to convert it into extract, or otherwise, they can obtain more accurate information and the best advice on the subject by forwarding samples to me, and I will report not only as to the amount of tannic acid contained, but how far the material is suitable for the English market, and give advice as to the proper condition in which it should be forwarded."

COMBRETUM, *Linnaeus*.

Petals very rarely wanting. *Stamens* straight in bud. *Flowers* usually racemose or paniced. Usually scandent shrubs.

Sub-genus POIVREA, Comm.

Flowers 5-merous. *Stamens* 10, all equal or alternately shorter. *Fruits* usually 5-, rarely 4- or 6- or 8-cornered or winged.

* *Calyx funnel-cup-shaped.*

× *Petals none.*

C. APETALUM, Wall. *T.*

Ava and Prome.

Nabu-nweh (Kurz).

Leaves only 1½–3 inches long. Panicles greyish velvety, the floral leaves not discoloured. The native name indicates a 'creeper.'—W.T.

× × *Petals present.*

C. (POIVREA) ROXBURGHII, DC. *E.S.S.*

All over Burma up to 3000 feet.

C. decandrum, Roxb.

Tha-ma-kā-nweh.

Leaves large, opposite. Panicles rusty or tawny tomentose, the floral leaves white-discoloured. Fruits with 5 chartaceous wings.

C. TRIFOLIATUM, Vent. *E.S.S.*

Swampy forests all over Burma.

Terminalia lanceifolia, Griff.

Embryogonia lucida, Bl.

Leaves often whorled by 2–4, smooth, coriaceous. Panicles greyish tomentose, without floral leaves. Fruits with 5 sharp thick almost wing-like corners.

C. TETRAGONOCARPUM, Kz. *E.S.S.*

Swampy forests of Pegu.

Similar to the preceding, but leaves strongly nerved and net-veined. Fruits sharply 4-cornered.

** *Calyx-tube tubular, the limb abruptly salver- or cup-shaped.*

C. OVALE, R. Br. *S.*

Pegu Range and Hills East of Toung-ngoo.

Kyet-tet-nweh (Kurz). Non '*verum*,' fide Clarke, sed *C. pilosum* var.

Racemes, petioles, and branchlets greyish or rusty puberulous or velvety.

C. PILOSUM, Roxb. *W.C.*

Khakyen Hills, Pegu and Tenasserim.

Panicles, petioles, and branchlets all rusty pilose. Fruits 5-winged, puberulous.

Sub-genus COMBRETUM, DC.

Flowers 4-merous. *Stamens* 8, equal or alternately shorter. *Fruits* usually 4-, rarely 5-winged or cornered.

* *Calyx shorter or longer tubular-bell-shaped (the limb never abruptly cupular). Fruits winged, the wings chartaceous and broader than the diameter of the nut.*

× *Flowers shortly pedicelled.*

- C. EXTENSUM, Roxb. *H.C.* All over Burma. Car Nicobar.
C. rotundifolium, Roxb.
C. Horsfieldii, Miq.
C. platyphyllum, Heurck and Muell.
C. formosum, Griff.

Mō-ma-kā-nweh.

All parts glabrous, the leaves opposite. Inflorescence and flowers velvety.

×× *Flowers all sessile.*

- C. SQUAMOSUM, Roxb. *S.S.* Pegu and Tenasserim. Katchall.
C. lepidotum, Presl.

All younger parts, the inflorescence, and leaves beneath coppery or rusty lepidote. Leaves large, opposite.

A 'sport' from Prome, with abnormal much-bracted inflorescences, has all the scales developed into yellowish hairs, so as to appear hirsute all over (Kurz).

- C. CHINENSE, Roxb. *E.W.C.* Chittagong and Hills East of Young-ngoo
C. Griffithii, Heurck and Muell. up to 3000 feet.

Leaves usually whorled in threes (at least in the older branchlets), glabrous, when young minutely lepidote. Inflorescence and young shoots puberulous.

- C. DASYSTACHYUM, Kz. *E.W.C.* Tropical forests of the Pegu Range
and Martaban.

As preceding, but branchlets, petioles, and inflorescence all rusty tomentose. Leaves more or less pubescent beneath, never lepidote.

** *Calyx funnel-cup-shaped. Fruits winged or angular.*

× *Fruits 4- or 5-winged, the wings chartaceous. Leaves and fruits small.*

† *Nuts smooth and glabrous.*

- C. (PENTAPTERA) PYRIFOLIUM, Wall. non Presl. Ava.

Young shoots rusty pubescent, the leaves and the 4- or 5-winged fruits glabrous. Branchlets terete.

- C. QUADRANGULARE, Kz. *S.S.* Tenasserim.

All parts, also the 4-winged fruits, silvery lepidote. Branchlets 4-cornered.

†† *Nuts fibrillose-hirsute.*

- C. WALLICHII, DC. *S.S.* Tropical forests of Chittagong. Khakyen Hills.

Leaves beneath resinose-dotted. Inflorescence brown-lepidote. Young shoots pubescent.

×× *Fruits 4-cornered, the angles thick and rounded.*

- C. COSTATUM, Roxb. Tenasserim.

Inflorescence and young branchlets rusty puberulous, the former also lepidote. Leaves large, strongly nerved, and parallel-veined.

×× *Calyx-tube elongate and produced beyond the ovary.*

ANOGEISSUS, *Wallich.*

Calyx-tube 2-winged at the base. *Stamens* 10, exserted. *Leaves* alternate. *Flowers* in heads, small.

* *Beak as long as or longer than the nut.*

- A. (CONOCARPUS) ACUMINATA, Roxb. var. *a* from Chittagong to Tenasserim
Yōng. up to 3000 feet. var. *β* swampy
forests of Ava and Pegu.

This tree is cognizable by the bark, which consists of herbaceous green tubercles covered with a smooth grey epidermis which is easily scraped off. By this mark the tree can be recognized from all others in Burma, but in the plains (the var. *β*) the bark becomes white marmorate and conchoid (as in *Emblica officinalis*). I should certainly have specifically separated this swampy variety had I not met with trees that bore both kinds of bark. The wood is inferior (Kurze).

QUISQUALIS, *Linnaeus*.

Calyx-tube very long and slender, the limb small. *Stamens* 10, exserted. *Leaves* opposite. *Flowers* showy, in racemes.

- * Q. INDICA, L. vars. *a* and *β* all over Burma, var. *γ* Khakyen Hills.
Q. longiflora, Presl.
Q. villosa, Roxb.

Da-wel-hmaing. Chinese honey-suckle. Rangoon creeper.

A scandent shrub with beautiful white, orange, or red flowers, which towards evening exhale a powerful perfume. It can be raised either from seed or cuttings, and is a luxurious and beautiful creeper for a house front.

** *Calyx-limb persistent.*

CALYOPTERIS, *Lamarck*.

Calyx-tube 5-ribbed, not produced beyond the ovary, the limb enlarging. *Stamens* 10, included. *Leaves* opposite. *Flowers* racemose. Climbers.

- C. (GETONIA) NUTANS, Roxb. All over Burma up to 2000 feet.
C. floribunda, W.A. non Roxb.

Kywōt-nē-uwel.

Leaves pubescent, rarely almost glabrous. Longer stamens $\frac{3}{4}$ - $\frac{1}{2}$ as long as the acuto calyx-lobes.

Wight and Arnott state that *C. nutans* with short stamens does not occur in Hindustan, but all the specimens which I have seen from there belong to *C. nutans*, none to *C. floribunda*, Lamk.

LCMNITZERA, *Willdenow*.

Calyx-tube elongate, narrowed beyond the ovary. *Stamens* 5 or 10, exserted. *Leaves* alternate. *Flowers* racemose. Trees or erect shrubs.

- L. RACEMOSA, Willd. Tropical forests all over Burma, the Andamans,
Petaloma alternifolia, Roxb. and Great Nicobar.

Hmaing or Yen-yai.

Flowers white. *Stamens* 10, about as long as the petals.

- L. (PYRRANTHUS) LITOREUS, Jack. Mangrove swamps, Mergui, and a
L. coccinea, W.A. straggler at Kamorta.
L. pentandra, Griff.

Flowers crimson. *Stamens* 5-10, twice as long as the petals.

Sub-order GYROCARPEÆ.

Calyx-lobes valvate or imbricate. *Stamens* alternating with as many glands or staminodes. *Filaments* straight in bud. *Anthems* adnate, opening by a slit along the inner edge or by 2 valves. *Ovary* with a solitary pendulous ovule. *Leaves* alternate. *Flowers* cymose.

ILLIGERA, *Blume.*

Calyx-lobes valvate, deciduous. *Fruit* extended into 2 or 4 lateral wings. Climbers with 3-foliolate leaves.

- | | |
|---|---|
| I. APPENDICULATA, Bl. <i>W.C.</i>
<i>Coryzadenia trifoliata</i> , Griff. | Tropical forests of Pegu, Tenasserim, and the Andamans. |
|---|---|

GYROCARPUS, *Jacqueminot.*

Calyx-lobes imbricate, 2 of them persistent and enlarging, wing-like. *Nut* 2-winged at the top. Erect trees, with entire or lobed leaves.

- | | |
|--|---|
| G. JAQUINI, Roxb.
Pyn-leh-thyt-kouk (Kurz). | Coast forests of Tenasserim, the Andamans and Nicobars. |
|--|---|

Order RHIZOPHOREÆ.

Calyx-tube usually adnate to the ovary, sometimes produced beyond it, rarely quite free, the limb 4-14-lobed, valvate. *Petals* as many as calyx-lobes and alternating with them, the margins usually induplicate, and embracing the stamens. *Stamens* as many or twice as many as petals, or more, inserted with them at the base of the free part or lobes of the calyx. *Anthers* erect or versatile, 2-celled, opening longitudinally. *Ovary* more or less inferior, or rarely quite superior, 2- or more-celled, with 2 or few pendulous ovules in each cell, or rarely 1-celled by obliteration of the partition. *Style* simple, with an entire or lobed stigma. *Fruit* inferior, or inclosed in the calyx. *Seeds* solitary or few, with or without albumen. The Rhizophors form an important agency in binding the muddy shores of tropical countries especially along estuaries. The bark of many is astringent, and good for tanning purposes. It is also often used for dyeing black. The timber of *Bruguiera* and others is hard and durable.

Sub-order RHIZOPHOREÆ.

Ovary inferior. *Albumen* none. *Seeds* germinating on the tree, the thick radicle rapidly enlarging and protruding from the summit of the fruit. Salt-loving shrubs or trees.

* *Ovary-cells* with 2-6 ovules.

RHIZOPHORA, *Linnaeus.*

Calyx 4-cleft. *Petals* entire. *Anthers* 8-12, nearly sessile. *Ovary* 2-celled, the cells 2-ovuled.

- | | |
|--|--|
| R. MUCRONATA, Lamk. <i>E.T.</i>
<i>R. mangle</i> , Roxb.
<i>R. stylosa</i> and <i>macrorrhiza</i> , Griff. | Mangrove swamps in Arakan, Tenasserim, and the Nicobars. |
|--|--|

Hpyu (generic).

Flowers pedicelled, the petals villous along the borders. Stamens 8.

- | | |
|---|--|
| M. CONJUGATA, L. <i>E.T.</i>
<i>R. candelaria</i> , Griff. | Mangrove swamps in Arakan, Tenasserim, and the Andamans. |
|---|--|

Flowers sessile, the petals quite glabrous. Stamens 8-12.

The timber of this genus deserves notice, being heavy and close-grained, and the bark of value for tanning.

CERIOPS, *Arnott.*

Calyx 5-6-cleft. *Petals* notched, appendaged. *Stamens* 10-12. *Ovary* 3-celled, the cells 2-ovuled.

- | | |
|---|---|
| C. (RHIZOPHORA) DECANDRA, Griff.
<i>C. Roxburghiana</i> , Arn. | Littoral forests all over Burma and the Andamans. |
|---|---|

Kap-yaing.

Cymes compact, on very short peduncles. Petals bristly fringed towards their tips.

C. CANDOLLEANA, Arn. Mangrove swamps in the Andamans and Nicobars.

Cymes rather lax. Petals terminated by 2 or 3 club-shaped appendages.

KANDELIA, *Wight et Arnott*.

Calyx 5-6-cleft. *Petals* cut. *Stamens* many, the filaments capillary. *Ovary* 1-celled, with 6 ovules.

K. RHEEDEI, W.A. Littoral forests of Pegu and Tenasserim.

** *Ovary-cells with a solitary ovule.*

BRUGUIERA, *Lamarck*.

Calyx 8-14-cleft. *Petals* 2-cleft, appendaged. *Stamens* 16-28, the filaments filiform. *Ovary* 2-4-celled.

Sub-genus *KANILIA*, Bl.

Calyx-tube almost club-shaped, the limb 8-cleft. *Petals* 8, bearing bristles at the tips. *Stamens* 16, the filaments filiform and longer than the cordate or ovate anthers. *Fruit* cylindrical.

B. (RHIZOPHORA) PARVIFLORA, Roxb. Littoral forests of Tenasserim and the Andamans.

Нрпу-сунг.

Calyx-tube narrowed at the base, ribbed, the lobes very short and stiff.

B. (RHIZOPHORA) CARYOPHYLLOIDES, Griff. Mouth of the Salween.

Calyx-tube obtuse at the base, smooth, the lobes nearly as long as the tube.

Sub-genus *MARGIUM*, Bl.

Calyx-tube almost bell-shaped, the limb 10-14-cleft. *Petals* 10-14. *Stamens* 20-28, the anthers linear, longer than the filaments. *Ovary* 3-4-celled. *Fruit* turbinate.

B. GYMNORHIZA, Lamk. Littoral forests of Arakan, Tenasserim, the Andamans and Nicobars.

B. Wightii and *Rheedii*, Bl

B. parietosa and *B. 10-angulata*, Griff.

B. eriopetala, Wight.

Sub-order *LEGNOTIDEÆ*.

Ovary inferior, almost superior or free. *Embryo* imbedded in a fleshy albumen. *Seeds* germinating in the ordinary way.

* *Ovary inferior. Calyx bell-shaped beyond the ovary.*

CARALLIA, *Roxburgh*.

Calyx-lobes short, erect. *Stamens* 10-16. *Ovary-cells* 2-ovuled. *Flowers* cymose.

C. LUCIDA, Roxb. Pegu and Tenasserim up to 4000 feet.

C. integrissima, DC.

The Nicobars.

C. Zeylanica, Arn.

Ma-ni-ok-kā.

Leaves usually entire, petals not embracing the filaments.

C. LANCEIFOLIA, Roxb.

Tenasserim.

C. confinis, Bl.

Leaves serrulate. Petals embracing the filaments.

** *Ovary superior or nearly so, with a broad base adnate to the calyx.*

GYNOTROCHES, *Blume*.

Calyx without bractlets. *Stamens* 8-10, filaments elongate. *Ovary-cells* 4-ovuled.

G. AXILLARIS, Bl.

Upper Tenasserim.

ROSALES.

Flowers usually hermaphrodite, regular or irregular. *Carpels* one, or more, usually quite free in bud, sometimes variously united afterwards with the calyx-tube, or inclosed in the swollen top of the peduncle. *Styles* usually distinct.

Order HAMAMELIDEÆ.

Flowers regular or irregular, hermaphrodite or unisexual. *Perianth* in male flowers sometimes wanting. *Calyx-tube* more or less adnate to the ovary, the limb truncate, or 4-5-lobed, valvate or imbricate. *Petals* as many, more, or fewer than calyx-lobes, or none. *Stamens* 4 or more, definite or indefinite, perigynous, 1-seriate. *Filaments* free. *Anthers* 2-celled, the cells opening laterally in various ways. *Ovary* inferior or half-inferior, rarely superior, consisting usually of 2 or rarely more carpels, usually free at the apex, and beaked, with 2 suspended ovules in each carpel, or rarely more, on axile placentas. *Style* usually persistent. *Fruit* a capsule, the carpels usually diverging at the apex, and each one opening in 2 short valves. *Albumen* thin fleshy. Trees or shrubs with usually alternate, simple or tri-lobed leaves. *Flowers* small, usually collected in heads, rarely racemose or spicate.

BUCKLANDIA, *R. Browne.*

Flowers polygamous, in heads, the calyces confluent. *Calyx-tube* almost campanulate, adhering to the ovary, the limb repand-5-lobed. *Petals* in hermaphrodite flowers linear-spatulate, often converted into stamens, in females reduced to 4 and rudimentary. *Stamens* 10 to 14, the filaments unequal, subulate. *Anthers* unequally 2-valved, the connective apiculate. *Ovary* semi-inferior, bifid at top, 2-celled with 6 biseriate ovules in each cell. *Styles* 2, recurved thick. *Capsule* nearly free, woody, 2-valved and 2-celled, the valves bifid, the cells 6-seeded or less, the fertile seeds winged upwards.

C. (LIQUIDAMBER) TRICUSPIS, Miq.

Hills East of Toung-ngoo, from 4000
to 7200 feet.

B. populnea, R. Br.

A superb evergreen tree up to eighty feet in height. Leaves broadly ovate, glossy and coriaceous. Flower-heads small, greenish, compact on thick peduncles, covered with a rusty or coppery pubescence. Capsules as large as a pea, almost globular, seated on the cup-shaped calyces united into a solid head. Wood brown, heavy and close-grained, but soon attacked by insects. It is marked with the microscopic disks characteristic of all coniferous woods, and of many Hammelidæ and Maguoliaceæ.

ALTINGIA, *Noronh.*

Flowers unisexual, in heads supported by a single bract. In males, *Calyx* and *corolla* none. *Stamens* packed into a globular head. *Filaments* short. *Anthers* 4-cornered. In females, *Calyces* confluent, without limb. *Petals* none. *Anthers* rudimentary. *Ovary* semi-inferior, 2-celled, with many ovules in each cell. *Placenta* axile. *Carpels* produced into subulate recurved eaduous styles. *Capsules* united into a globular head, each capsule opening superiorly by 2 valves. A single seed only fertile, winged and angular, the rest sterile. *Leaves* alternate, simple, glandular, serrate and deciduous.

A. EXCELSA, Noronh.

Tenasserim and Khakyen Hills.

Sedgwickia cerasifolia, Griff.

Nan-ta-yōk.

Mason writes: "The tree is indigenous on the Tenasserim Coast, and in some sections is quite abundant. A considerable stream in the province of Mergui derives its name from this tree, in consequence of its growing so thick on its banks. It seems to have escaped the notice of Dr. Helfer, for if I recollect right, it is not once alluded to in any of his reports, nor has it ever been brought to notice by any one,

if we except a Catholic priest, a resident of Rangoon, who has introduced it in a little Burmese medical treatise, that was lithographed a few years ago by Col. Burney, who took a lithographic press with him into Burma. This gentleman, however, seems to have mistaken the tree, for he describes it as the one that produced the Balsam of Peru (*Myrospermum Peruiferum*), and which belongs to a different natural family."

Liquidamber altingia is a large forest tree in Java, and one of those which yield liquid storax, a balsam containing benzoic acid, and possessing considerable influence over the mucous surfaces, and acting as a stimulating expectorant.

Order SAXIFRAGEÆ.

Flowers usually hermaphrodite and regular. *Calyx* 5- rarely 4-12-merous, free or adnate to the calyx, the lobes valvate or imbricate. *Petals* usually 4 or 5, rarely none, perigynous, rarely epi- or hypo-gynous, imbricate or valvate. *Stamens* as many or twice as many as petals, rarely indefinite. *Filaments* free. *Anthers* usually didymous. *Intrastaminal disk* often present, and sometimes passing into staminodes or glands. *Ovary* more or less adnate to the calyx, or if free usually attached to a broad base, either 2- to 5-celled, or with 2 to 5 parietal placentas, very rarely contracted at the base, or apocarpous, with several or very rarely a solitary ovule in each cell, or to each placenta. *Styles* as many as ovary-cells, free or rarely united. *Fruit* a capsule, or rarely berry-like and indehiscent. *Seeds* usually small, with or rarely without albumen. *Embryo* straight, small, or rarely rather large. Herbs, rarely shrubs or trees, with alternate or opposite, simple or compound leaves. *Stipules* present or not.

ESCALLONIEÆ.

Trees or shrubs. Leaves alternate. Stipules none. Stamens as many as petals.

POLYOSMA, Blume.

Ovary inferior, 1-celled. *Style* simple. *Fruit* a 1-seeded berry.

P. WALLICHI, Benn.

Tropical forests of the Andamans.

Very near to *P. ilicifolia*, Bl., but the flowers are smaller and the fruits different.

Order DROSERACEÆ.

Petals 5, hypogynous, imbricate. *Stamens* 5, rarely more. *Anthers* extrorse. *Ovary* usually 1-celled, and with parietal placentation. *Capsule* with semi-placentiferous valves. *Embryo* albuminous.

DROSERA, Linnaus.

Stamens 4-8. *Styles* 2-5, simple, 2-parted, or many-cleft. *Ovary* 1-celled. Glandular-pilose herbs, scapiferous or not.

× *Leaves* radical or nearly so, rosulate. *Scapes* leafless.

D. BURMANI, Vhl.

Chittagong. Rare in Prome.

Leaves obovate-spathulate. Flowers white or pale rose.

× × *Leaves* scattered. *Scapes* leafy.

D. INDICA, L.

Pegu and Tenasserim.

Leaves linear. Flowers purple.

D. PELGATA, Sm.

Nāt-toung East of Young-ngoo at 7000 feet.

D. lunata, Ham.

Upper Tenasserim from 1500 to 3000.

D. Lobbiana, Turcz.

The most familiar example of this Order is the Venus fly-trap (*Dionæa muscipula*), with its sensitive and insecticidal leaves, which close over the unwary fly which alights thereon.

Order CRASSULACEÆ.

Petals usually free, perigynous or sub-hypogynous. *Stamens* as many as the petals. *Carpels* as many as the stamens, distinct, with a gland or scale at the base of each carpel, 2- to many-ovuled, follicular when ripe. Usually succulent herbs.

SEMPERVIVUM, *Linnaeus*.

*S. TECTORUM, L. (M.).

Ywet-kych-pen-pouk. House-leek.

The juice of the house-leek is said to remove corns, and also makes a refreshing drink, and mixed with oil forms an outward application for burns. The juice of other species of *Crassulaceæ* is also refreshing, and is credited with corn-removing and vulnerary properties, as the Stonecrops (*Sedum*), *Crassula reflexum*, and *C. rubens*, and Navel-wort (*Umbilicus pendulinus*), once in repute as an application for hard nipples.

BRYOPHYLLUM, *Salisbury*.

Calyx large, inflated, shortly 4-cleft.

B. (COTYLEDON) PINNATA, Lamk.

Rubbishy spots all over Burma.

Kalanchoe pinnata, Ferr.

B. calycinum, Salis.

Cotyledon rhizophylla, Roxb.

Ywet-khyeh-pen-pouk.

Roxburgh's name for this plant has reference to its curious habit of producing young plants on the edges of the leaves, and is, so to speak, *viviparous*, the little plantlets detaching themselves and dropping with ready-formed roots into the soil below. Said to have been introduced into India from the Moluccas by Lady Clive (Mason). It now, however, grows like a weed in some places in Bengal and Burma. It is thus described¹: "A succulent tropical plant, whose leaf produces buds furnished with root, stem, and leaves, at the extremities of its lateral nerves; these buds, which spontaneously fall off and root in the earth, may be likened to embryos that do not need to be fertilized before developing; and the leaf of *Bryophyllum* may be regarded as an open carpel, on which the seeds have been developed by nutritive action alone. This fecundity of *Bryophyllum* completes the analogy between the true bud and the fertilized embryo."

A similar instance of vegetable *parthenogenesis* may be seen in the Watercress (*Nasturtium officinale*), and Lady's smock (*Cardamine pratensis*).

KALANCHOE, *Adanson*.

Calyx 4-parted.

× *Panicles glandular-puberulous*.

K. (COTYLEDON) LACINIATA, L.

Ava.

Leaves pinnatifid, the lobes flattened, lobed or cut.

× × *Panicles quite glabrous*.

K. ACUTIFLORA, Ham.

Ava.

K. varians, Wall.

K. subamplectans, Wall. non Harv.

Leaves simple or pinnately 3-foliolate, crenate.

K. TERETIFOLIA, Harv.

Pegu. Ava.

Leaves pedately 3-pinnatisect, the segments almost terete, sulcate.

¹ Descriptive and Analytical Botany, by Le Maout and Decaisne, p. 7.

Order ROSACEÆ.

Flowers usually regular, or hermaphrodite. *Calyx* free, and inclosing the ovaries, or adnate to the ovary, the limb equal or in *Chrysobalanee* unequal, 4-rarely 5- or more lobed, with the addition (in a few genera) of as many external accessory lobes. *Disk* filling the calyx-tube. *Petals* as many as true calyx-lobes, equal, or rarely unequal, imbricate. *Stamens* indefinite, rarely few, free, inserted with the petals at the base of the calyx-lobes. *Ovary* of 12 or more carpels, usually distinct at the time of flowering, but sometimes combined into a single, 2-5-celled inferior ovary, with 1 or 2 rarely more ovules in each carpel. *Styles* elongate or sessile, stigmas distinct. *Fruit* various, superior or more or less inferior, sometimes inclosed in the persistent calyx-tube, fleshy or dry, indehiscent or capsular, or the carpels collected on a fleshy or dry torus. *Albumen* usually none. Trees, shrubs, or under shrubs with simple or compound leaves. *Stipules* usually present. *Flowers* in axillary or terminal cymes or solitary, rarely in simple racemes.

To this Order belong Apples¹ (*Pyrus malus*), Pears (*P. communis*), the Rowan or Mountain Ash (*P. aucuparia*), the Hawthorn (*Crataegus oxyacantha*), Medlars (*Mespilus germanica*), Loquat (*Eriobotrya Japonica*), Raspberry (*Rubus Idae*), Black-berry (*R. fruticosus*), Strawberry (*Fragaria vesca*), Almond (*Amygdalus communis*), Peach (*Persica vulgaris*), Nectarine (*Persica laevis*), Apricot (*Armeniaca vulgaris*), Sloe (*Prunus spinosa*), Cherries (*Cerasus*), and the Queen of flowers, the Rose.

The above enumeration by no means exhausts the list of fruits and other products we owe to this fine Order. The wood of several Pears and Cherries is close-grained, and in considerable request for wood-engraving and cabinet-work. Various herbs, once used in medicine, but now neglected, may also be mentioned. Dog-rose (a confection of which still holds a place in the Pharmacopœia), Agrimony (*Agrimonia*), Great Burnet (*Sanguisorba officinalis*), Salad Burnet (*Poterium sanguisorba*), Lady's mantle (*Alchemilla vulgaris*), Avens (*Gonum urbanum*), regarded as distasteful to, and an antidote against evil spirits, Drop-wort (*Spiraea filipendula*), Mead-wort, corrupted in later times to Meadow-sweet (*S. ulmaria*), used for flavouring beer and wines, and last, and not least in interest, Kouso (*Brayera anthelmintica*), whose flowers are the best known remedy for tapeworm, and which indirectly, through the mischievous indiscretion and meddling of a missionary, led to the Abyssinian war, one of those hateful and inglorious episodes into which our curiously mixed devotion to God and Mammon is constantly betraying us.

A. *Carpels solitary or united into a solid 2- or more-celled ovary. Fruit indehiscent.*
 † *Ovary superior. Fruit a drupe. Calyx or its lobes usually deciduous.*

CHRYSOBALANIEÆ.

Flowers usually irregular. Style basilar. Oculis 2, ascending. Radicle inferior.

PARANARIUM, Jussieu.

Petals 5 or 4. Stamens perigynous. Filaments filiform. Anthers small. Ovary and drupe 2-celled.

P. (PTEROCARYA) SUMATRANA, W. Jack. Upper Tenasserim (?).

PARASTEMON.

P. TROPHYLLUS, DC. Kamorta.

A beautiful tree 30-40 feet high, with a dense round crown. Drupes lovely rosy.

FRUNIEÆ.

Flowers regular. Style almost terminal. Oculis 2, suspended. Radicle superior.

¹ The name, both in English and Latin, indicates that it was known to the Arian tribes before their separation, as both *apple* and *pomum* have reference to the juicy character of the fruit. *Ab phal*, *water-fruit*, *apple*, and *pomum*, from the root of *potum*, *p table*, having a cognate sense.

PRUNUS, *Linnaeus*.

Calyx 5-lobed. *Petals* 5, usually conspicuous. *Drupe* with a bony putamen.

+ *Leaf-shedding trees or shrubs*. *Flowers* appearing before or along with the young foliage. *Vernation of leaves* conduplicate or convolute.

Sub-genus AMYGDALUS, L. (ARMENIACA, Juss.)

Flowers solitary or clustered. *Drupes* densely velvety or tomentose.

* P. (AMYGDALUS) PERSICA, L. Cultivated about Bhamo up to 3500 feet.

Leaves narrow, 2-glandular at the base. Stone wrinkled.

Sub-genus PRUNUS.

Flowers solitary, fasciated or racemose. *Drupes* glabrous.

* *Drupes* usually pruinous. *Vernation of leaves* convolute.

P. TRIFLORA, Roxb.

Khakyen Hills.

Glabrous. *Flowers* rather small, usually by threes. *Petals* $\frac{1}{2}$ inch long. *Calyx-tube* 1-1 $\frac{1}{2}$ lines long, lobes usually somewhat longer.

There is a leaf-specimen of another *Prunus* from the Khakyen Hills which differs from *P. pseudo-cerasus*, Ldl., only very slightly in the smaller size and in the serrature of its leaves (Kurz).

P. PUDDUM, Roxb.

Khakyen Hills.

P. sylvatica, Roxb.

Almost glabrous. *Flowers* rather large, by 2 or 3 from bracted buds. *Petals* nearly $\frac{1}{2}$ inch long. *Calyx-tube* 3 $\frac{1}{2}$ lines long, the lobes nearly as long.

** *Drupes* smooth, not pruinous. *Vernation of leaves* conduplicate (*Cerasus*, Juss.).

+ + *Evergreen trees*. *Flowers* racemose (*Pygeopsis*).

P. (CERASTUS) MARTABANICA, Wall.

Tropical forests of Tenasserim and the Andamans.

Drupes an inch long. Lateral nerves very faint or almost obsolete.

PYGEUM, *Gaertner*.

Calyx 5-15-toothed. *Petals* 5-10, minute or none. *Drupes* often transversely didymous, coriaceous.

* *Ovary* tawny villous.

P. ARBOREUM, Endl.

Tenasserim.

P. parviflorum, T. and B.

Leaves beneath more or less tawny villous.

** *Ovary* glabrous or sparingly hirsute.

P. ACUMINATUM, Colebr. non Wight.

Chittagong.

Glabrous. Nerves and veins conspicuous and deeply immersed, so as to render the surface of the leaves almost wrinkled.

P. PERSIMILE, Kz.

Tenasserim.

Young branchlets, petioles, and nerves beneath pubescent. Nerves and veins thin, little visible. Allied to *P. latifolium*; general appearance exactly that of *P. Lampongum*, Miq.

The genus *Pygeum* is so closely allied to the section *Pygeopsis* of *Prunus* with evergreen foliage as to make it difficult to keep it distinct. Indeed, *Pygeum* and *Pygeopsis*, combined, stand pretty much in the same relation to *Prunus* as *Eriobotrya* does to *Pirus* (Kurz).

†† *Ovary inferior. Fruit an apple or a 1-5-pyrenous drupe.*

ROMIEE.

* *Ovary-cells 1-5, with 2 ovules in each cell. Leaves simple to lobed and pinnate. Flowers regular.*

PYRUS, *Linnaeus.*

Calyx-limb deciduous or persistent. *Ovary* and *apple* 2-5-celled, the endocarp often cartilaginous. Leaf-shedding trees or shrubs.

* *Flowers usually by pairs from the axils of the leaves, or spuriously racemose from the non-development of young foliage. Ovary-cells many ovuled.*

P. INDICA, Roxb.

Ava and Khakyen Hills.

Young parts, pedicels, and calyx densely white-woolly. Petals an inch long. Fruits pear-shaped, 1-1½ inch long, crowned by the calyx-limb.

** *Flowers corymbose or paniced at the end of the branchlets or in the axils of the upper leaves. Ovary-cells 2-ovuled.*

P. PASHIA, Don.

Khakyen Hills.

P. variolosa, Wall.

Flowers corymbose, on slender pedicels 1-2 inches long. Fruits globose, the size of a bullet.

P. GRANDULOSA, Bertol.

Hills East of Toung-ngoo at 7000 feet.

P. Karcensium, Kz.

Flowers paniced, very shortly and stoutly pedicelled. Fruits as in preceding.

ERIOBOTRYA, *Lindley.*

Calyx-limb persistent. *Ovary* and *berry* 1-5-celled, the endocarp and septa thin.

× *Leaves entire.*

E. (PHOTINIA) INTEGRIFOLIA, Ldl. Nāt-toung, East of Toung-ngoo at 7000 feet.

P. Notoniana, W.A.

P. congenifolia, Ldl.

Calyx and *panicle* puberulous. *Berries* the size of a pea. Evergreen tree.

E. MACROCARPA, Kz.

Tropical forests of Kambalu Toung in the Pegu Range at 2000 feet.

Quite glabrous. *Fruit* an apple of the size of a bullet.

The fruits look more like apples, but the tree is evergreen. The very same tree occurs also in the outer hills of the Sikkim Himalaya (Kurz).

×× *Leaves coarsely crenate, at least towards the apex. Inflorescence rusty or tawny woolly-tomentose.*

E. DUBIA, Ldl.

Chittagong, Blamo, and hills East of Toung-ngoo at 6000 feet.

Mespilus Bengalensis, Roxb.

Leaves glabrous. *Calyx* about a line long.

* E. (MESPIBUS) JAPONICA, Thib.

Cultivated.

The 'Loquat.'

Leaves woolly-tomentose beneath. *Calyx* 3-4 lines long.

B. *Carpels usually numerous, rarely few, connate or more usually distinct and inserted on a torus or inclosed in the calyx-tube. Fruit-carpels indchiscent, or rarely dehiscient (in Spirea, etc.).*

† *Carpels distinct, within the persistent calyx-tube, which forms a compound spuriously inferior fruit.*

ROSACEÆ.

Calyx without bractlets. Petals usually 5. Carpels many, 1-ovuled. Achenes dry, inclosed in the fleshy calyx-tube.

Rosa, Linnæus.

Shrubs, often prickly, with unpaired pinnate leaves and showy flowers.

Styles all free.

* *Calyx-throat pervious and not closed by the disk.*

* *R. INDICA.*

Flowers large, usually corymbose. Calyx glabrous or sparingly glandular. Leaflets glabrous, glaucous beneath. Carpels about 40 to 50.

* *R. DAMASCENA.*

As preceding, but leaves solitary. Carpels about 15.

R. MICROPHYLLA.

Leaflets small. Flowers solitary. Calyx-tube and the globular fruits densely echinate.

** *Calyx-throat completely closed by the disk.*

R. INVOLUCRATA, Roxb.

Country North of Mandalay.

Calyx, younger bractlets, and the globular fruits densely tomentose. Flowers white.

Several species of roses (especially *R. Indica* and *R. damascena*) are found planted around khyoungs chiefly, in almost every one of the larger villages of Pegu (Kurz).

There is perhaps no flower more universally esteemed for its fragrance than the Rose, and this feeling seems to have been coeval with the cultivation of the flower. Some indication of this is, I think, afforded by the use of such an epithet as 'rosy-fingered,' applied by Homer to the Dawn, for the Rose is by no means the only flower which might claim, from its mere colour, to be introduced in a descriptive epithet, but no sooner is the mind turned to the contemplation of a red flower than the Rose, from the unchallenged perfection of its scent, fills the mirror of our thoughts, and is unconsciously adopted as a type for the colour it most commonly displays. And with regard to this point, it must be remembered that it is the old-fashioned roses, such as our 'cabbage-rose,' which at once display the perfection of scent united with a typical rosy colour, the former quality being woefully deficient in many roses now in vogue, displaying yellow tints rather than rosy ones. The Attar of Roses, or the essential oil of the flowers, is one of the most delicious perfumes known, and the dearest, and one extremely difficult to procure free from adulteration, which is not surprising when we remember that it has been said that it requires 100,000 flowers to furnish 180 grains or 1 rupee's weight of oil. The old poetic fancy of the birth of the Rose from the life-blood of Adonis is too pretty to be passed over:—

“*Αἰ ἀὶ τὰν Κυθερείαν, ἀπώλετο καλὸς Ἄδωνις.
 Δάκρυον ἃ Παφία τοσσὸν χεῖρ, ὀσσὸν Ἄδωνις
 Αἶμα χεῖρ' τὰε πάντα ποτὶ χθονα γίγρεται ἀνόη.
 Αἶμμα ῥόδον τικτεῖ, τὰ εἰ δάκρυα τὰν ἀνεμώνων.*”

Bion Idyl. I. l. 62.¹

†† *Carpels distinct, on a conspicuous torus, when ripe forming a superior compound dry or sappy fruit.*

¹ Woe! Woe! for love's own Queen, since stretched in death
 Adonis lies, the beautiful, whose blood
 Poured forth, like water on the thirsty earth
 Is matched by tears from Aphrodite's eyes.
 Where fell those tears, Anemones upspring
 And where each ruddy drop, Lo! blooms a Rose.

RUBIÆÆ.

Stamens and carpels numerous. Oculis 2, suspended. Calyx without tractlets. Shrubs or under shrubs, often prickly, with compound, rarely simple, leaves.

RUBUS, Linnaeus.

Characters of the Tribe.

* *Carpels few, only 3-6. Leaves simple.*

R. PYRIFOLIA, Sm. Hills of Ava.
R. hexagona, Roxb.
R. Indica, Lesch.

Petioles very short. Flowers in large terminal panicles.

** *Carpels numerous, forming a sort of sappy berry.*

× *Leaves entire or lobed.*

+ *All softer parts and the under side of the lobed leaves covered with a dense tomentum usually intermixed with longer hairs. Calyx-lobes entire.*

R. MOLUCCANA, L. var. *a* and *β* Hills of Martaban over 2500 feet. var. *γ* probably Ava, also Kamorta and Nankowry.

Bracts and stipules pinnatisect, the segments long, thin, and often filiform.

var. *a genuina*. Leaves beneath clothed with a short tomentum intermixed with a few longer hairs only, the basal lobes usually diverging. Calyx velvety and at the same time densely tawny and appressedly hirsute, the lobes acuminate.

var. *β alccæfolia*, Poir. Leaves softly pubescent beneath, the basal lobes usually much converging. Calyx densely tawny or yellowish appressed hirsute, the lobes acuminate.

var. *γ abnormalis*. Stems covered with spreading tawny hairs. Leaves of var. *a*. Calyx shortly and densely greyish or whitish tomentose, without any admixture of longer hairs, the lobes acute or almost blunt.

++ *All parts, except the inflorescence, without tomentum, glabrous or pubescent.*

R. FEROX, Wall. Ava (?).
R. Moluccana, Roxb.

Calyx-lobes pectinate-toothed.

× × *Leaves digitately 3-5-foliolate.*

R. PENTAGONA, Wall. Nät-toung, East of Toung-ngoo, over 6000 feet.

Branchlets almost terete. Leaflets green, shortly puberulous. Stipules and bracts linear entire, shortly glandular-pubescent. Flowers white.

I formerly combined *R. alpestris* and this species, but Mr. O. Kuntze, of Leipzig, who revised the species of *Rubus* in HBK., has pointed out to me the differences between the two (Kurz).

R. ALPESTRIS.

Branchlets terete. Leaflets glabrous or pubescent. Stipules and bracts usually cut into 1-2 linear segments, glabrous, or only very sparingly and shortly glandular-hairy. Flowers red.

Kurz's remark to the last species leaves us in doubt if the present species occurs in Burma.

× × × *Leaves pinnately 3-foliolate or unpaired-pinnate.*

° *Fruits tomentose.*

R. LASIOCARPA, Sm. Hills East of Blamo.
R. albescens and *racemosa*, Roxb.

R. Mysorensis, Heyne.

R. Horsfieldii, Miq.

Leaves unpaired pinnate, the leaflets beneath white or yellowish tomentose. Flowers white.

°° *Fruits glabrous.*

R. FLAVA, Ham.

R. Gourreophul, Roxb.

Ava. Khakyen Hills. Hills East of Toung-ngoo (*vide* Mason).

Leaves pinnately 3-foliolate, the leaflets white or yellowish tomentose beneath. Petals white.

R. ROSIFOLIA, Sm.

var. *a* Martaban Hills at 3000 feet.

var. *β* Hills East of Blamo.

Leaves unpaired-pinnate, uniformly green. Petals white.

var. *a* *R. aspera*, Don. Stem, branches, and petioles more prickly and covered with long stiff blackish gland-hairs. Calyx and peduncle tomentose-pubescent, with long spreading gland-bristles. Leaves more or less appressed hairy. Flowers usually in poor corymbs.

var. *β* *glabriuscula*. Stems, branches, and petioles glabrous or with few short gland-hairs only. Peduncles and pedicels usually shortly glandular-pubescent, rarely almost glabrous. Calyx glabrous or sprinkled with few short gland-hairs, velvety-tomentose inside. Leaves more glabrous. Flowers much larger, usually solitary on leaf-opposed long pedicels.

POTENTILLIÆ.

Stamens and carpels 4 or more, the latter with a solitary ovule; style usually ventral, marcescent or caducous. Calyx usually with bractlets. Unarmed herbs or under shrubs, with compound or simple leaves.

FRAGARIA, *Linnaeus*.

Calyx with 5 bractlets. *Stamens* numerous. Ripe carpels crustaceous, seated on a fleshy sappy torus; styles ventral. Herbs with 3-foliolate leaves.

F. INDICA, Andr.

Chittagong. Blamo.

F. Malayana, Roxb.

Duchesnea fragarioides, Sm.

Dr. Mason remarks: "I have raised very fine strawberries in my garden at Tavoy, but the plants require considerable care."

POTENTILLA, *Linnaeus*.

Calyx with 4 or 5 bractlets. *Torus* in fruit dry, rest as in preceding. Herbs or under shrubs with variously compound leaves.

P. (DUCHESNEA) SUNDAICA, Miq.

Khakyen Hills.

P. Kleiniana, W. A.

Order LEGUMINOSÆ.

Flowers hermaphrodite, irregular or regular. *Calyx* various, quinque-merous, regular or irregular, imbricate or valvate, rarely the sepals all free. *Corolla* of 5 or rarely fewer petals, or wanting altogether, perigynous, or rarely hypogynous, irregular and more or less papilionaceous, or regular, the lobes or petals imbricate or valvate. *Stamens* 10, rarely fewer, or indefinite, united in 1 or 2 sheaths, or free. *Ovary* of a single excentric carpel, with 1 or more ovules on the ventral suture. *Style* simple. *Fruit* a pod, opening along one or both sutures, or indehiscent, from chartaceous to fleshy and woody. *Arillus* more or less developed, or wanting. *Cotyledons* large, the radicle short. *Albumen* none or scanty, very rarely copious. Trees, shrubs or herbs, sometimes climbing, with alternate, or very rarely opposite,

compound or simple leaves. *Stipules* and *stipulets* usually present. *Flowers* various, solitary, or variously arranged in axillary or terminal inflorescences.

This vast Order is second only to the *Gramineæ* in importance to man, as all the edible pulses, which in the East play so important a part in the dietary of the masses, belong to one of its tribes (*Papilionaceæ*). This Order also yields valuable Woods, Dyes, Fibres, Drugs and some virulent poisons. Among edible species may be specified: Peas, *Pisum sativum*; Beans, *Faba vulgaris*; Sword beans, *Canavalia ensiformis*; French beans, Broad beans, Gram, *Cicer arietinum*; *Phaseolus vulgaris*; Mung or Urad, *P. mungo*; Mōht, *P. aconitifolius*; Sōnā mung, *P. aureus*; Kālā mung, *P. max*; Hari mung, *P. Roxburghii*; Scarlet runner, *P. multiflorus*; and many other varieties, some of which, as *P. adenanthus*, are cultivated for their tubercous rhizome, like *Pachyrhizus bulbosus* and the American species *Apios tuberosa*, *Psoralea esculenta* and *P. hypogæa*; Lentils, *Ervum lens*; Arhar, *Cajanus indicus*; Kulthi, *Dolichos uniflorus*; Lobia, *D. Sinensis*; Ban-sēm, *D. lablab*; Kasur, *Lathyrus sativus*; Ground nuts, *Arachis hypogæa*, and many other species. Among fodder plants may be specified: Vetches, *Vicia sativa*; Mehilot, yielding an odoriferous hay, *Melilotus officinalis*; Lucern, *Medicago sativa* and *lupulina*; Clover, *Trifolium pratense* and *repens*, and Lupines, *Lupinus albus*, *varius* and *luteus*. Among substances useful in manufactures may be mentioned Indigo, *Indigofera tinctoria*; Gum Arabic, the produce of several species of *Acacia*; Katchu or Kath, extracted from *A. catechu*; Copal, the resin of *Hymenæa verrucosa*; Logwood, *Hæmatoxylon Campechianum*; Sappanwood, *Cæsalpinia sappan*; Brazil wood, *C. echinata*; and Sun hemp, *Crotalaria juncea*. Valuable timbers are yielded by various species of *Acacia*, *Albizzia*, *Cassia*, *Pterocarpus*, *Dalbergia*, *Xylia*, *Milletia*, *Tamarindus*, and others of less importance. Among Medicinal products may be enumerated Balsam of Copaiba, yielded by some Tropical American trees, *Copaifera officinalis*, *coriacea* and *cordifolia*; Cassia, the pulp surrounding the seeds of *C. fistula*. Tamarinds. Dragon's blood and Gum-kino, produced by species of *Pterocarpus*, *Butea* and *Drepanocarpus*. Tragacanth, a gum yielded by several species of *Astragalus*; Liquorice, extracted from the roots of several species of *Glycyrrhiza*, and the Calabar bean, *Physostigma venenosum*, a most violent poison, but which possesses the curious property of causing contraction of the pupil, and Goa powder, prepared from *Andira araroba*, which owes its efficacy in skin diseases to the presence of Chrysophanic acid.

Oils, gums, dyes, woods, fibres, fruits, seeds, fodder, and ornamental flowers are yielded by other Leguminosæ too numerous to enumerate. Among ornamental trees, however, may be named as indigenous to Burma the singularly handsome *Anherstia* from the Salween Valley.

For some strange and now unknown cause Beans were once regarded as impure, and rejected as food by the followers of Pythagoras. Some of the supposed reasons for this abstention from Beans are such as cannot be more particularly alluded to here, but may be gathered from the interesting article on this subject in the 'Mythologie des Plantes,' by De Gubernatis, vol. ii. p. 132. Whatever may have been the original reason for the estimation in which beans were once held, we know that they were regarded as sacred to the dead. "Les légumes, nous l'avons déjà remarqué à plusieurs reprises, ont presque tous une signification phallique et funéraire. Festus nous apprend que le Flamen ne pouvait ni toucher, ni nommer les fèves, 'Fabam nec tangere, nec nominare diali Flaminii licet, quod ea putatur ad mortuos pertinere; nam et lemuralibus jacitur larvis, et parentalibus adhibetur sacrificiis, et in flore ejus, luctus litteræ apparere videntur.' Les Lémures, c'est-à-dire les ombres vagabondes de ceux qui avaient mal vécu, d'après la superstition romaine, s'approchaient pendant la nuit des maisons et y jetaient des fèves" (De Gubernatis, l.c. p. 136). To guard against this invasion, black beans, as we learn from Ovid, were used to propitiate the spirits of the nether world.

"Nox ubi jam media est somnoque silentia præbet
Et canis et variæ conticuistis aves;
Ille memor veteris ritus timidusque decorum
Surgit; habent gemini vincula nulla pedes:

Signaque dat, digitis medio cum pollice junctis,¹
 Occurrat tacito ne levis umbra sibi ;
 Quumque manus pure fontanâ perluit undâ,
 Vertitur, et nigras accipit ore fabas,
 Aversusque jacit, sed dum jacit 'Hæc ego mitto,
 His, inquit, redimo meque meosque fabis.'
 Hoc novies dicit, nec respicit ; umbra putatur
 Colligere et nullo terga vidente sequi."

Fasti V. 429.

Some copies read 'ante' in place of 'ore,' but the beans in this case may have been intentionally deposited in the mouth with regard to the silenee-loving shades to which they were offered. In support of this view may be adduced the amusing account given by Ovid of the offerings made to Tacita.

"Eece anus in mediis residens annosa puellis
 Sacra facit Tacitæ ; vix tamen ipsa tacet.
 Et digitis tria thura tribus sub limine ponit,
 Qua brevis oculentum mus sibi fecit iter.
 Tum cantata ligat cum fuscio licia rhombo ;
 Et septem nigras versat in ore fabas ;
 Quodque pice astrinxit, quod acu trajecit aenâ,
 Obsutum mænæ torret in igne caput.
 Vina quoque instillat ; vini quodecumque relictum est,
 Aut ipsa, aut comites, plus tamen ipsa, bibit.
 'Hostiles linguas inimicaque vinximus ora,'
 Dicit discedens, ebriæque exit anus."

Fasti II. 571.

An amusing mode of fortune-telling by beans is thus described by De Gubernatis: "En Sicile (Noto) et en Toscane (Campagne de Florence), les jeunes filles qui désirent un mari apprennent leur soit par les fèves ; voici comment : elles mettent dans un petit sac trois fèves, l'une entière, une autre sans l'œil, une troisième sans écorce, et elles les seconent ; puis elles en tirent une, si elles ont la chance de tomber sur la fève entière, un mari riche et bien portant leur est garanti ; si elles tombent sur la fève sans œil, leur mari sera infirme et gêné ; si elles ont le malheur d'attraper la fève sans écorce, le seul mari qui se présentera pour les épouser sera un pauvre diable sans le sou."—*Mythologie des Plantes*, vol. ii. p. 136.

Sub-order *EU-LEGUMINOSÆ*.

Flowers more or less irregular, rarely almost regular, and in this case the standard-petal slightly larger and innermost in bud. *Petals* imbricate in bud. *Stamens* definite, variously connate or rarely free.

PAPILIONACEÆ.

Uppermost petal (standard) outside in bud.

* *Stamens* free from the base or slightly connate at the very base only.

¹ The thoughtful student will not fail to remember that the Pope of Rome still blesses the faithful with three fingers, on the centre one of which is a ring, evidently a variation of the procedure alluded to by Ovid.

For some very pointed remarks (which cannot here be reproduced) on Christians still persisting in the use of symbols of a Pagan and indecent character, see Inman's 'Ancient Faiths embodied in Ancient Names,' vol. ii. p. 651, but the cause of what seems so surprising to the writer is not far to seek. It is simply ignorance. Not one person in a hundred has any conception of the original significance of religious symbols, and it is about the last subject regarding which people may look for any enlightenment from their religious teachers, many of whom, however, it must in fairness be allowed, are as ignorant on such matters as the bulk of the laity. It is an utterly tabooed subject, save with a few restless philosophers who have acquired the inconvenient habit of logical thought!

Sub-tribe SOPHORIEÆ.

Leaves pinnately 1-many-foliolate. Pods indehiscent or dehiscent.

* *Leaves pinnate. Bracts and bractlets small, deciduous.*

SOPHORA, *Linnaus.*

Pods moniliform, terete or winged, usually indehiscent. Arillus none. Leaves without stipulets.

S. TOMENTOSA, L.

Pegu and the Andamans.

S. OCCIDENTALIS, L.

Then-bo-ma-ji (Kurz).

ARILLARIA, *Kurz.*

Pods fleshy-coriaceous, short, dehiscent. Arillus crimson, enveloping the whole seeds. Leaves with stipulets.

A. ROBUSTA, Roxb.

Lower Pegu and Martaban.

Kway-tanyin or Thyt-wā-gyi (?).

** *Stamens variously united into a tube, or into a slit sheath or into two separate sheaths with the vexillar stamen free or adnate.*

+ *Pods jointed, dehiscent or not, very rarely obsolete or not jointed, in which case the valves are usually marked with transverse veins or lines. In a few genera the pods consist of a single joint.*

Sub-tribe HEDYSARIEÆ.

Leaves often pinnately 3-1-foliolate, rarely pinnate.

* *Stamens united into a single slit sheath, the vexillary 10th one free.*

+ *Ovules solitary. Pods 1-jointed.*

LESPEDEZA, *Michaux.*

Pods indehiscent. Flowers clustered or in racemes, usually axillary.

* *Flowers in axillary almost sessile clusters.*

L. SERICEA, Miq.

Khakyen Hills.

Hedysarum junceum, Roxb.

Appressed silvery silk-hairy. Leaflets linear-cuneate.

** *Flowers in axillary and terminal racemes often collected into terminal panicles.*

× *All parts densely and softly pubescent. Bracts deciduous.*

L. PINETORUM, Kz.

Martaban, 4000 to 6000 feet.

Softly tomentose. Racemes sessile. Calyx-teeth almost filiform and flexuose.

× × *Branchlets and under side of leaves appressedly greyish puberulous.*

L. DECORA, Kz.

Martaban, 4000 to 6000 feet.

Racemes glandular-pubescent. Bracts persistent.

L. PARVIFLORA, Kz.

Nāt-toung East of Young-ngoo (*vide* Mason).

Racemes tawny pubescent, not glandular. Bracts deciduous.

Allied to *L. elliptica*, Bth., from which it differs by its much smaller flowers, its subulate calyx-teeth, the different vestiture of its inflorescence, and its deciduous bracts (Kurz).

+ + *Ovules 2 or more. Pods 2- or more-, rarely (by abortion) 1-jointed.*

° *Pods not jointed, compressed or inflated.*

† *Pod inflated like that of Crotalaria.*

PYCNOSPORA, *R. Brown.*

Herbs with pinnately 3-foliolate leaves. *Flowers* in racemes.

P. HEDYSAROIDES, R. Br. Tenasserim.
P. nervosa, W.A.

†† *Pod compressed.*

PSEUDARTHRIA.

Pods flat with straight sutures. Flowers in terminal racemes. Herbs.

P. VISCIDA, L. Upper Tenasserim.

°° *Pods distinctly jointed.*

† *Pod-joints in a line, not folded up.*

DESMODIUM, Desvaux.

Pod-joints flat or slightly convex, dehiscent or indehiscent. Racemes terminal or axillary and terminal. Leaves 3- rarely 1-foliolate.

A. *Pod-joints dehiscent along the ventral suture.*

Sub-genus PLEUROLOBIUM, DC.

Pod-joints dehiscent along the more or less indented suture, distinctly separated or continuous, and the separation indicated by a transverse line only. Inflorescence in a young state conspicuously imbricate-bracted.

* *All bracts deciduous. Pods continuous, the joints marked only by transverse lines. Erect shrubs or herbs.*

D. GYROIDES, DC. Arakan, Pegu, and Tenasserim.

D. pseudo-gyroides, Miq.

Shrub, the leaflets one-coloured. Flowers purple. Pod-joints $2\frac{1}{2}$ lines long by 3 broad, densely and shortly hirsute.

D. GYRANS, Lamk. From Chittagong to Tenasserim.

Annual or biennial, the leaves as often 1- as 3-foliolate, with the two lateral leaflets much reduced, leaflets white variegated. Flowers pale yellow, turning pale brick-coloured. Pod-joints about $2\frac{1}{2}$ lin. long and broad, shortly and sparingly hirsute.

** *Lowermost bracts of young inflorescences more or less persistent. Pods distinctly jointed.*

D. HETEROCARPUM, L.

D. polycarpum, DC.

Hedysarum purpureum, Roxb.

D. patens, Wight.

Leaves 3-foliolate, the leaflets elliptical to oblong. Fruiting pedicels erect. Racemes elongate.

var. *a genuinum*. Branches and leaves beneath only thinly appressed-pubescent. Pods glabrous with fringed edges, or sparingly and minutely stiff-hairy.

var. *β trichocaulon*, Bak. Branches densely and spreadingly pilose, the leaves beneath appressed pilose. The rest as in var. *a*.

var. *γ capitatum*, DC. Branches and leaves beneath more or less silvery pubescent, the leaflets smaller. Pods puberulous.

var. *a* common in all leaf-shedding forests, especially the mixed ones, entering also the savannahs and cultivated lands, all over Burma and the adjacent islands.

var. *β* Ava hills. var. *γ* Arakan.

D. RETROFLEXUM, L. Tenasserim.

Leaves 1-3-foliolate, the leaflets more or less orbicular. Fruiting pedicels refracted. Racemes shorter than the leaves.

Sub-genus SAGOTIA, Walp.

Pod-joints dehiscent along the lower more or less indented suture. Young inflorescence not conspicuously bracted.

* *Flowers in many-flowered terminal and axillary racemes which often form terminal panicles. Erect annual herbs.*

D. OBLONGUM, Wall. Ava and Pegu.

Stems and under side of leaves sparingly and appressedly greyish pubescent. Panicle glandular-puberulous. Pods glabrescent.

D. AURICANS, Grah. Coast of Arakan and Tenasserim.

D. auricomum, Grah., Wall. Cat. 5704.

Stems and peduncles spreadingly tawny pilose. Pods tawny pilose.

** *Flowers few, axillary or in leaf-opposed racemes. Prostrate or diffuse herbs.*

D. MICROPHYLLUM, Thbg. Yoonzaleen at 2500 feet.

D. parvifolium, DC.

Flowers in leaf-opposed and spuriously terminal simple or branched racemes. Leaflets very small.

D. REPTANS, Burm. Pegu and Tenasserim.

D. heterophyllum, DC.

D. triflorum, W.A.

Flowers usually yellowish, by 1-4 on a longer or shorter axillary peduncle, which is longer than the leaves.

D. TRIFLORUM, L. From Chittagong to Tenasserim;
Hedysarum stipulaceum, Burm. (introduced into the Andamans).

Flowers usually purple or rose-coloured, by 1-6 in the leaf-axils.

B. Pod-joints not dehiscing in any way.

* *Flowers in terminal and axillary racemes, often collected into panicles. Bracts small, deciduous or rarely persistent.*

Sub-genus *Eu-Desmodium*, DC.

Shrubs, under shrubs or herbs, the leaves 1-3-foliolate. *Petiole* not winged. *Pods* various, many-jointed, the joints variously shaped, but never quite square.

* *Pods and ovary quite glabrous, the joints more or less deeply indented on the lower suture, the basal one very shortly stalked.*

× *Leaves simple, broader than long, oblate to reniform.*

D. OBLATUM, Bak. Along streams in Ava, Pegu Hills and Martaban.

D. reniforme, Wall. Cat. "vix DeCan. certissime non Burm."

Flowers 3 lines long, sky-blue, on capillary glandular pedicels $\frac{1}{3}$ - $\frac{1}{2}$ inch long. Pod-joints deeply indented at the lower suture.

D. RENIFORME, L.

Flowers small, white, on pedicels $1\frac{1}{2}$ -2 lines long. Pod-joints slightly indented at the lower suture.

All Burmese specimens seen by me belong to the preceding species. I myself gathered the true Burmese plant only in the Terai-lands of Sikkim (Kurz).

× × *Leaves oblong to oblong-lanceolate.*

D. SUBSTIPULACEUM, Bl. Nāt-toung East of Young-ngoo (*vide* Mason).

D. stipulaceum, Miq.

Hedysarum mucronatum, Bl.

Leaves simple, or the lower ones 3-foliolate. Racemes slender, in diffuse terminal panicles. Pod-joints elliptical, 2 lines long by $1\frac{1}{2}$ broad.

This species greatly resembles the American *D. stipulaceum*, DC. It differs in its stouter stature and its broad ovate (not linear-subulate) calyx-lobes. The pod-

joints are glabrous and net-veined, not hooked-pilose like those of Hasskarl's *D. Aparius*, which Miquel combines with *D. stipulaceum*, while Baker would make it synonymous with *D. spirale*.

** *Pods and ovary variously clothed with glandular or glandless, straight or hooked hairs.*

× *Pod-joints 4-5 times longer than broad, or if shorter stalk-like narrowed at the base.*

+ *Pod-joints pedicel-like narrowed or abruptly constricted at the base, securiform or crescent-shaped, puberulous.*

° *Pod-joints crescent-shaped, abruptly constricted at both ends.*

D. CONEIXNUM, DC.

Martaban from 4000 to 6000 feet.

D. pendulum, Wall.

Leaves oblong, acute or blunt, strongly parallel-nerved. Pod-joints broadly lunate, tumid, and only 2 lines long, coriaceous, the basal one refracted on a stalk 2 lines long thickened club-like at the apex.

D. (URARIA) OBCORDATUM, Miq.

Maulmain. Sumatra.

Leaves divaricately obovate. Pod-joints membranous, broadly lunate, acute and divaricate at both ends, very flat. Spreading or trailing herb.

°° *Pod-joints securiform, the basal one long-stalked.*

D. SCALPE, DC.

Hill forests of Martaban at 4000 to 5000 feet.

D. strangulatum, W. A.

Calyx about a line, the corolla 5 lines long; stalk of basal pod-joint about 1-½ line long.

Baker identifies the *D. trichaulon* of Hasskarl's Pl. Jav. rar. 367 with the above, but this he could only do by simply guessing, for the description does not in the least agree, and the dehiscent pods at once indicate its true affinity (Kurz).

D. PODOCARPUM, DC.

Ava Hills.

Calyx and corolla half the size. Stalk of basal pod-joint slender, ½ inch long.

If *D. laxum*, DC., is correctly referred to the above species (as to which I entertain grave doubts), this name has precedence (Kurz).

++ *Pod-joints truncate at both ends, oblong to linear-oblong and sessile.*

° *Leaves pinnately 3-foliolate.*

D. RECTRVATUM, Grah.

Chittagong, Arakan, Pegu, and Kondul.

Hedysarum diffusum, Roxb. non Willd.

D. laxiflorum, DC.

Pod-joints only 1½-2 lines long by ½-¾ line broad, densely hooked puberulous, not narrowed at the ends.

°° *Leaves simple, the petiole short.*

D. TERES, Wall.

Ava. Taong-doung.

The petiole very short. Pod-joints 10-12, about 3 lines long and hardly a line broad, shortly glandular-pubescent.

×× *Pod-joints narrow, as long or only twice as long as broad.*

+ *Shrubs or more usually erect or spreading perennials. Pod-joints usually as long as broad, more or less rotundate with truncate ends.*

° *Leaves simple. Pod-joints indented at the lower suture, about a line long.*

D. GANGETICUM, L.

From Pegu, Tenasserim, and the Nicobars.

Hedysarum collinum, Roxb.

D. latifolium, Wight.

Perennial, erect, slightly appressed-pubescent. Racemes elongate and very slender. Pod-joints sparingly and shortly hispid. Leaves acute.

D. FLEXUOSUM, Wall. Prome Hills.

As preceding, but diffuse, the leaflets broader and usually blunt.

This, as already suggested by Bentham, is hardly more than a diffuse variety of *D. Gangeticum*, with broader leaves and spreadingly hirsute branches (Kurz).

D. LATIFOLIUM, Roxb. Ava. Prome. Pegu. Martaban.
D. lasiocarpum, DC.

Shrub, densely pubescent. Racemes tomentose, rather short and robust. Pod-joints densely and shortly grey hirsute. Leaves blunt.

°° *Leaves 3-foliolate. Pod-joints about a line long and broad.*

D. SEQUAX, Wall. Hills East of Young-ngoo at 4000 to 5000 feet.
D. sinuatum, Bl.
D. dasylobum, Miq.

Erect shrubby perennial. Leaflets somewhat repand, glaucescent beneath, acute or acuminate. Branchlets almost terete. Pod-joints densely covered with hooked stiff hairs.

D. DIFFUSUM, Willd. Prome Hills.
Hedyсарum auriculatum and *quinquangulatum*, Roxb.
D. quinquangulare, Wight.

Diffuse perennial, the branches sharply 5-6-angular. Leaflets entire, blunt. Pod-joints sparingly covered with white hooked stiff hairs.

+ + *Shrubs or woody under shrubs. Pod-joints usually about twice as long as broad, more or less indented on one or both sutures.*

° *Bracts of the young inflorescence scarious and large, forming imbricate cones, very deciduous, but the basal ones usually remaining persistent.*

† *Basal pod-joint sessile.*

D. FLORIBUNDUM, Don. Upper Tenasserim between 4000 and 5000 feet.
D. multiflorum, DC.
D. dubium, Ldl.

Racemes sessile or peduncled, rather short. Pod-joints $1\frac{1}{2}$ -2 lines long and nearly as broad, indented on the lower suture, appressed hirsute. Branchlets sharply angular, often villous on the corners.

†† *Basal pod-joint shortly but distinctly stalked.*

D. TILLEFOLIUM, Don. Tenasserim.

Racemes slender, long-peduncled, forming spreading terminal panicles. Pod-joints $\frac{1}{2}$ inch long and 3 lines broad, puberulous, slightly indented. Branchlets terete.

D. KARENSIUM, Kz. Khakyen Hills and Martaban at 4000 to 5000 feet.

Racemes very slender and usually shorter than the leaves, sessile or branched from the base. Pod-joints 4 lines long by $2\frac{1}{2}$ broad, more or less indented at the lower suture, sparingly and shortly hirsute. Branches angular.

°° *Bracts of the young inflorescence narrow, herbaceous, not conspicuous, and imbricating (Catenaria, Bth.).*

D. LABERNIFOLIUM, DC. Ava Hills.

Flowers $\frac{1}{2}$ inch long, often in axillary slender racemes. Pod-joints oblong, nearly 4 lines long, densely and shortly hooked-hairy, the basal one stalked.

Sub-genus *PREROLOMA*, Desv.

Shrubs. *Leaves* 1-foliolate, the petiole winged. *Bracts* minute. *Pods* very flat, many-jointed, the joints not or hardly indented and almost square.

D. TRIQUETRUM, L. var. α common all over Burma over 5000 feet. var. β at lesser elevations (Kurz).
Mök-hsō-hlan-mā.

Branchlets sharply triquetrous. Pods glabrous or pubescent along the sutures or all over.

var. *a genuinum*. Pods more or less greyish hirsute or villous, larger and usually somewhat curved. Flowers larger.

var. *β pseudo-triquetrum*, DC. Pods glabrous or pubescent only on the edges, shorter and straight. Flowers smaller.

** *Flowers clustered or in sessile or peduncled umbels in the axils of the leaves or in the axils of bract-like floral leaves.*

Sub-genus DENDROLOBIUM, W. A.

Flowers in dense sessile or peduncled axillary umbels or clusters. *Bracts* minute or deciduous. *Leaves* pinnately 3-foliolate. *Pods* 5-1-jointed, appressed pubescent.

* *Pods normally 2-1-jointed. Under shrubs (Dicerna).*

D. BIARTICULATUM, F. Muell. Ava. Menghoun and Paghā-myo.

Flowers by 2-4 or fewer, clustered in the leaf-axils, and passing into terminal leafy racemes.

** *Pods 2-5- (only occasionally 1-)jointed. Shrubs or trees (Dendrolobium proper).*

D. CEPHALOTES, Wall. Arakan. Pegu. Ava.

Hedysarum umbellatum, Roxb.

D. congestum, Wall.

Flowers in sessile clusters. Pod-joints only 2 lines long.

D. UMBELLATUM, L. The Nicobars, Andamans and Tenasserim, re-appearing on the limestone hills of Segain (Ava).

Flowers in peduncled umbels. Pod-joints about 4 lines long.

Sub-genus PHYLLODIUM, Desv.

Flowers clustered or umbellate, in the axils of bract-like large floral leaves, which are complicately 2-foliolate, persistent, and placed distichously. *Leaves* pinnately 3- or rarely 1-foliolate. *Pods* 2-4-jointed.

* *Pods pubescent or villous-pubescent.*

D. GRANDE, Kz. Ta-goung (Ava).

Leaflets 3-5 inches long, acuminate. Pods villously pubescent.

D. VESTITUM, Bth. Tenasserim.

Leaflets 1-2 inches long, rounded or almost retuse.

** *Pods glabrous except on the margin.*

D. PULCHELLUM, Bth. All over Burma and the Andamans.

Leaves pinnately 3- or occasionally 1-foliolate, the petiole only 2-3 lines long. Pods glabrous, net-veined.

Kurz also adds from the Nicobars:

D. POLYCARPUM, DC. Kamorta and Great Nicobar.

D. HETEROPHYLLUM, DC. Kamorta.

The bark of several species of *Desmodium* yields a good fibre for ropes, and also a material for the manufacture of paper.

ALYSICARPUS, Necker.

Pod-joints more or less turgid. *Calyx* deeply divided and almost glumaceous. *Leaves* often 1-foliolate.

* *Calyx shorter than the first pod-joint.*

A. MONILIFER, DC. Ava. Maulmain.

Pod-joints inflated-globular, without wrinkles or veins.

A. VAGINALIS, L.

From Chittagong to Tenasserim; var. β affects the drier forests (Kurz).

Pod-joints slightly compressed, thickened at the truncate ends, obsolete-ly wrinkled-net-veined.

var. α genuina. Leaves all, or only the cauline ones, narrow.var. β nummularifolius, Miq. Leaves all more or less oval or almost orbicular, usually small, and sometimes very small or minute.

** Calyx much longer than the first pod-joint, the teeth much imbricate in fruit.

A. BUPLEURIFOLIUS, L.

Pegu and Ava.

Hedysarum gramineum, Retz.

Calyx-lobes lanceolate, acuminate. Pods as long or twice as long as the calyx, the joints (fully ripe) almost smooth, obliquely 4-angular.

A. RUGOSUS, DC.

Pegu.

Hedysarum bupleurifolium, Roxb.*A. Wallichii*, W. A.

Glabrous. Calyx-lobes broader and acute. Pod inclosed in the scarious calyx, the joints broader than long, strongly and transversely wrinkled.

A. STYRACIFOLIUS, DC.

Ava.

Hedysarum glutaceum, Koen.

As preceding, but stems silk-hairy, the calyx-lobes and bracts fringed with long silky hairs. Pod-joints twice the size.

MECOPTIS, Bennett.

Pod 2-jointed, between uncinat-subulate bracts, the pedicels abruptly deflexed from the tips. Leaves simple.

M. NIDULANS, Benn.

Pegu and Tenasserim.

†† Pod-joints folded one upon the other.

LOUREA, Necker.

Calyx enlarged in fruit. Flowers in racemes. Leaves 1-3-foliolate.

* Glabrous herbs. Calyx glabrous.

L. PANALICULATA, Wall.

Ava, Taong-doung.

Terminal leaflet barely twice as broad as long, obversely reniform.

** More or less puberulous or pilose herbs. Calyx pubescent or villous.

L. RENIFORMIS, Lour.

Limestone Hills of Segain and Paghā-myo.

Leaflets obversely reniform to oblate. Racemes simple, terminal.

* Flowers in elongate, slender lax racemes, the upper ones collected into terminal panicles.

× Bracts subulate, persisting at the flowering. Pedicels in fruit straight, but reflexed.

URARIA, Desvoux.

Calyx not changed in fruit. Flowers in racemes. Leaves 3-1-foliolate, or pinnate.

U. CORIIFOLIA, Wall.

Ava and Prome.

Calyx-lobes $1\frac{1}{2}$ line long, long-tawny-pilose. Stipules lanceolate, $\frac{1}{2}$ inch long. Pods densely hooked-hispid.

×× Bracts very deciduous long before opening of the flowers. Pods minutely puberulous. Pedicels in fruit arcuate.

U. CAMPANULATA, Wall.

Ava. Taong-doung.

Pods glossy. Calyx about 2 lines long, in fruit rather ample, and almost inclosing

the pod. This species connects *Uraria* and *Lourea*, two genera rather too artificially separated (Kurz).

U. ПАМОСА, Wall. Chittagong, Ava, Pegu.

Desmodium Horsfieldii, Miq.

Pods opaque. Calyx $1\frac{1}{2}$ –2 lines long, very much shorter than the pod.

Doodia simplicifolia, Roxb., seems to be only the simple-leaved form of this species, which Wallich distributed under the name of *U. leptostachya*.

** *Flowers in dense thick simple or almost simple racemes.*

× *Bracts all very deciduous and falling long before opening of the flowers.*

○ *Upper leaves pinnately 5–9-foliolate.*

† *Leaflets narrow.*

U. PICTA, Desv. Grass land of Arakan and Ava.

Leaflets white-variegated, blunt or bluntish, the net-venation beneath strong and close. Pod-joints leaden-coloured, polished. Seeds pale-coloured.

U. ACUMINATA, Kz. Pegu and Martaban.

Leaflets glaucous-green, one-coloured, long and very sharply acuminate, the net-venation very thin and lax. Pod-joints glossy. Seeds brown.

†† *Leaflets broad.*

U. CRINITA, L. Chittagong to Tenasserim.

Leaflets with prominent and close net-venation. Pod-joints opaque.

var. β *macrostachya*, Wall. More robust, the leaves larger. Racemes $1-1\frac{1}{2}$ feet long.

○○ *Leaves 1- and 3-foliolate (often on the same plant).*

U. LAGOPUS, DC. Chittagong.

U. lagopoides, Royle.

Rather stout plant, usually tawny pilose. Pods opaque, net-veined.

×× *Bracts all persistent at flowering time and conspicuous.*

U. ALOPECUROIDES, Roxb. Bank of the Irrawaddy between Prome and Ava.

Robust, the racemes elongate and brown-pilose. Pods glossy black.

U. LAGOPOIDES, L. Chittagong.

Slender, the racemes short and greyish-pilose. Pods pale-coloured, opaque.

** *Stamens 10, all united into a single tube, or into 2 separate sheaths of 5 each.*

+ *Stamens all united into a single complete tube. Anthers dimorphous.*

ARACHIS, *Linnaeus*.

Calyx-tube filiform, the 4 upper lobes united, the lowermost thin and free. *Petals* and *stamens* inserted at the mouth of the calyx-tube. *Pod* ripening under the soil. *Leaves* abruptly pinnate.

A. HYPOGAEA, L.

Myñ-leh.

Indigenous to South America, but cultivated all over the East for its edible kernels and the oil extracted from them, which is excellent. The wrinkled pod, which is buried in the earth, contains 2 or 3 'nuts,' or seeds, which, when roasted, are favourite and wholesome articles for dessert, resembling somewhat an almond in flavour.

ZORNIA, *Gmelin*.

Calyx-tube short. *Pod* 2–6-jointed, mucicate. Herbs, the leaves digitately 2–4-foliolate.

Z. DIPHYLLUM, L.

Arakan and Pegu.

++ *Stamens united into 2 separate sheaths of 5 each.*

† *Pod twisted within the calyx.*

SMITHIA, *Aiton.*

Calyx 2-parted. Herbs with abruptly pinnate leaves, the rachis ending in a bristle.

* *Fruiting calyx simply striate, not reticulate, the lobes more or less acute. Joints of pod more or less angular.*

S. SENSITIVA, Ait. Chittagong to Tenasserim. Kamorta.
S. Javanica, Bth.

Calyx-lobes quite glabrous and nude. Flowers in slenderly peduncled naked heads or short racemes.

S. CONFERTA, Sm. Tavoy.
S. hispidissima, Zoll.

Calyx-lobes more or less hairy-fringed on the keel beneath. Flowers in dense sessile heads, involucred by the uppermost leaves.

S. CILIATA, Royle. Martaban between 3500 and 5000 feet.

Calyx-lobes minutely toothed, the teeth all excurrent into long stiff bristles. Flowers in dense slenderly peduncled naked heads.

** *Fruiting calyx urceolate-bell-shaped, striate and net-veined, the lobes more or less truncate. Pod-joints (and also the seeds) much compressed.*

S. DICHOTOMA, Dalz. Akyab.

Leaflets in 4 to 2 pairs. Upper part of stipule about 3 lines long. Pod-joints 10-12, about a line long, papillose.

S. GRANDIS, Bth. Pegu.

Leaflets in 10-15 pairs. Upper part of stipule nearly an inch long. Pod-joints 20-25, 2 lines long or longer, veined.

†† *Pod straight.*

GEISSASPIS, *Wight and Arnott.*

Calyx deeply 2-lipped, the upper lip entire. Herbs, with abruptly pinnate leaves. Pods 1-2-jointed, indehiscent.

G. CRISTATA, W. A. Arakan. Ava. Pegu and Tenasserim.

ÆSCHYNOMENE, *Linnaeus.*

Calyx 2-lipped. Herbs, rarely under shrubs, with unpaired-pinnate leaves. Pods many-jointed.

Æ. INDICA, L. Swamps from Chittagong to Tenasserim.

Æ. *Cachemiriana*, Camb.

Æ. *sensitiva*, P. de B.

Hedysarum Neli-tali, Roxb.

Smithia aspera, Roxb.

‘Kāt-shola’ of Bengal.

Calyx and corolla glabrous, the latter 1 lines long. Pod-joints only 2 lines long.

Æ. ASPERA, L. Swamps in Arakan and Pegu.

Hedysarum lagenarium, Roxb.

Æ. *trachyloba*, Miq.

Pouk and Nya, *vide* Mason; but ‘Pouk’ in Pegu is *Butea frondosa*.

Calyx and outside of keel of corolla sparingly hairy, the corolla about an inch long. Pod-joints about $\frac{1}{2}$ inch long.

This is the plant called in India *Shola*, of which 'Shola hats' are made. Mason says its bark yields a coarse hemp.

ORMOCARPUM, *Palisot de Beauvois*.

Calyx 5-toothed. *Pod-joints* longitudinally striate or ribbed. Shrubs with unpaired-pinnate leaves.

O. SENNOIDES, Willd.

Siam and probably Tenasserim.

O. ochroleucum, Zoll.

++ *Pods not jointed, very rarely 1-seeded.*

Sub-tribe VICIELE.

Petiole terminating in a bristle or tendril. Leaves abruptly pinnate.

* *Stamens 10, united into a single slit sheath with the tenth vexillary one free.*

× *Leaflets toothed. Wings free from the staminal tube.*

CICER, *Linnaeus*.

Style not bearded at the apex. *Pod* inflated. *Funicle* filiform. Erect herbs.

* C. ARIETINUM, L.

Ka-lā-peh. 'Gram.'

Extensively cultivated, especially in Upper Burma.

× × *Leaflets entire. Wings more or less adhering to the staminal tube.*

VICIA, *Linnaeus*.

Staminal tube oblique at the mouth. *Style* pubescent, or bearded at the apex. *Orules* usually numerous. Erect or twining herbs.

V. SATIVA, L.

Ava. Bhamo.

Flowers solitary, almost sessile, nearly $\frac{1}{2}$ inch long. *Pods* glabrous, 6-18-seeded.

LENS, *Grenier and Godron*.

Staminal tube oblique at the mouth. *Style* filiform. *Orules* usually 2. Erect herbs.

* L. ESCULENTA, Moench.

Cultivated in Chittagong.

Errum lens, L.

Lentils.

The flour of this pulse (the Masur ka dāl of India) is considered rather heating if liberally consumed. It is believed to be the basis of the popular *Revalenta Arabica*. *Errum lens* is by a slight change written *erevalenta*, which is then easily converted into *Revalenta*. It is strange that the sale of a really commendable article seems to be increased and stimulated by some paltry trick in advertising or by some audaciously unreal placard to catch the vulgar eye! I well remember years ago being struck with the ingenuity of the manufacturers of some bug-powder or other, who, being by the nature of the article precluded from declaring it to be patronized by the Queen and other members of the Royal Family, fell back on the next best recommendation to an idiotic public, that it was highly in vogue with Her Majesty's Army in Abyssinia! And so it is, in Trade as in Religion, "Populus vult decipi. Decipiatur."

LATHYRUS, *Linnaeus*.

Staminal tube truncate at the mouth. *Style* flat, or dilated at the apex. *Pods* more or less compressed. Erect herbs.

* L. SATIVUS, L.

Cultivated in Chittagong.

Kesāri-dal, or Kasur in India. Tira in Bengal.

The seed is grey-coloured, with minute black specks, and surrounded by a thin black line. This 'dal' is considered indigestible, and Dr. Thomson attributed to its

use paralysis of the lower extremities in persons of all ages and sexes which came under his observation in a particular village in India.

PISUM, *Linnaeus*.

As preceding, but style triquetrous and dilated upwards. *Pods* turgid.

* P. SATIVUM, L. var. *α* Cultivated in Ava, Prome, Pegu, etc.

Garden Pea. var. *β* Cultivated in Chittagong.

var. *α sativum*. Flowers larger, white. Seeds globular or nearly so, pale-coloured or green.

var. *β arvense*, L. Flowers white or pale-violet, the wings and keel purple. Seeds somewhat depressed angular, greyish, brown- or purple-mottled.

** *Stamens* only 9, all united into a single slit sheath.

ABRUS, *Linnaeus*.

Style not bearded. *Pods* compressed, chambered within. Climbing under shrubs.

A. PRECATORIUS, L. In forests and hedges from Ava and Chittagong to Tenasserim, Car Nicobar, and Nankowry.

Pods $\frac{1}{2}$ – $\frac{3}{4}$ as broad as long, somewhat crumpled. Seeds terete.

A. LÆVIGATUS, E. Mey. Pegu and Tenasserim.

A. pulchellus, Wall.

A. melanosperma, Hassk.

Pods flat and straight, 4 to 5 times as long as broad. Seeds compressed.

Of *A. precatorius*, Waring says the roots and leaves are demulcent, and an extract forms an excellent substitute for ordinary liquorice. The seeds are purgative and emetic. Dr. Mason also writes: "The jewellers use the seed of an *Abrus*, red with a black eye or black with a white eye, for small weights. It is a popular belief that they almost uniformly weigh exactly one grain troy, but I have weighed many and found them to vary from one to two grains. The Burmese use them within a fraction for two-grain weights, one hundred and twenty by one mode of reckoning, and one hundred and twenty-eight by another, make one tickal, which weighs, according to Capt. Low, 253.75 grains troy."

Sub-tribe PHASEOLIÆÆ.

Petiole without tendril. *Leaves* pinnately 3-foliolate, very rarely unpaired pinnate.

* *Leaflets* not resinous-dotted beneath.

× *Stamens* united into a slit sheath with the tenth vexillary one free.

+ *Nodes* of the inflorescence not tumid. *Stipules* and bracts conspicuous, persistent.

CLITORIA, *Linnaeus*.

Petals very unequal in length, the standard narrowed at the base, nude at the apex. *Calyx-tube* cylindrical, longer than the lobes. Herbs or under shrubs.

× *Corolla* quite glabrous.

C. TERNATEA, L. Chittagong, Tenasserim, the Nicobars.
Leaflets in 2 or rarely in a single pair. Bractlets roundish.

× × *Standard* more or less pilose outside. *Leaves* pinnately 3-foliolate.

C. GRAHAMII, Steud. Tenasserim, Bithoko Range, at 3000 feet elevation.
var. *β* Ava, Taong-doung, and Prome Hills.

Calyx puberulous, the teeth as long as the tube. Bractlets broader and larger, nearly $\frac{1}{2}$ as long as the calyx. Flowers by 3-6, clustered in the leaf-axils.

var. *α Grahamii*, Steud. Elongate, twining, appressed pubescent. Bractlets broader and larger, nearly half as long as the calyx. Leaflets acuminate or sharply

acuminate. Calyx-lobes narrower, subulate-acuminate. Pedicels very short, the raceme almost reduced. Standard more pilose outside.

var. *β macrophylla*, Wall. More robust in all parts, the shoots and petioles spreadingly tawny pubescent, glabrescent. Leaves larger, acute or nearly so. Raceme short, often branched. The rest as in preceding.

SUTTERIA, *Wight and Arnott.*

Style filiform. *Calyx-teeth* distinct, the 2 upper ones connate. *Anthers* conform. *Bracts* persistent, striate.

S. VESTITA, W. A. Ava to Martaban between 3000 and 5000 feet.
More or less hairy. Racemes sessile, naked. Pods hairy.

S. SUFFULTA, Bth. Ava to Martaban up to 4000 feet.

All parts (also the pods) quite glabrous. Racemes filiform, furnished with 1 or 2 distant whorls of broad floral leaves.

DUMASIA, *De Candolle.*

Style dilated at the middle. *Calyx-tube* cylindrical, obliquely truncate at the mouth.

D. LEOCARPA, Bth. Martaban Hills, between 4000 and 5000 feet.
D. villosa, var. *leiocarpa*, Baker.

All parts, also the ovary, glabrous.

+ + *Nodes of the inflorescence tumid.*

† *Stigma* terminal, capitate. *Style* beardless.

° *Anthers* all conform.

§ *Twining or creeping herbs. Petals usually long.*

GALACTIA, *R. Brown.*

Calyx 4-toothed (the 2 upper teeth united into one). *Pod* 2-valved.

G. TENUIFLORA, W. A. Hills opposite Loongyi Island in the Irrawaddy.
All parts scantily and minutely appressed-pubescent. Leaves glabrous above.

G. VILLOSA, W. A. Limestone Hills of Segain.

All parts, also the upper side of the leaves, softly but shortly pubescent.

GRONA, *Bentham (vix Loureiro).*

Calyx 5-toothed, the 2 upper teeth free. *Pod* linear, 2-valved. *Seeds* strophio-
late.

G. GRAHAMII, Bth. Prome Hills.

Leaves 3-nerved at the base, glabrous above. Flowers $\frac{1}{2}$ inch long, in lax racemes.

G. FILICATLIS, Kz. Pegu.

Leaves palmately 5-nerved, sparingly hirsute on both sides. Flowers 2 lines long, yellow, solitary on filiform axillary peduncles.

§ § *Trees or woody climbers or shrubs.*

BUTEA, *Roxburgh.*

Petals equally long. The 2 upper calyx-teeth free. *Pod* indehiscent, 1-seeded at the apex, the sterile basal part much dilated and flat.

Sub-genus BUTEA, Roxb.

Corolla very large, orange-scarlet, appressed silk-hairy outside, the keel and standard more or less acute.

× *Pods stalked.*

B. FRONDOSA, Roxb.

All over Burma.

Pouk. (Palās or Prās in India.)

Tree. Pedicels $\frac{1}{2}$ –1 inch long.

Dr. Mason remarks: "There is a species of *Butea* very abundant on the alluvial lands, which is a most magnificent tree. The Pwo Karens plant it in their sacred groves, where the deep rich orange blossoms, seen under a tropic sun in the dry season, enveloping their almost leafless trunks and branches, give the copse the appearance of a burning jungle. The Burman books describe the Himalaya forest as shining with the flowers of the *Butea*, like a flame of fire."

The tree yields a clear red gum with the astringent properties of Gum Kino. The leaves are used in India as plates, and the flowers yield a fugitive yellow or orange dye. Lac is also principally produced on this tree, and its brilliant saturnine or orange-red flowers seem to set the jungle ablaze and herald the commencement of the hot season. I measured one dwarfed tree near the Irrawaddy of 18 feet in girth, but have never seen another approaching this size (W. T.).

B. SUPERBA, Roxb. *W.C.* All over Burma.

Pouk-nwch.

Woody climber. Pedicels 1–1 $\frac{1}{2}$ inch long.

× × *Pods sessile.*

Sub-genus *SPATHOLOBUS*, Hassk. (Woody climbers.)

Corolla small, white or purple, glabrous keel and standard more or less blunt.

B. PARVIFLORA, Roxb. *W.C.* All over Burma.

Spatholobus Roxburghii, Bth.

Leaves large, beneath appressed silvery pubescent. Pods stalked. Flowers white.

B. ACUMINATA, Wall. *W.C.* Tropical forests all over Burma.

Leaves small, glabrous to the naked eye. Pods sessile. Flowers white.

ERYTHRINA, *Linnaus.*

Petals very unequal, the standard exceeding the keel.

* *Wings of corolla much longer than the spathaceous calyx.*

× *Pod bearing the few seeds at or towards the narrowed end only, the lower sterile part greatly dilated, as in Butea.*

Sub-genus *HYPAPHORUS*, Hassk.

Pods dehiscing at both sutures, the pilose sterile part contracted into a stalk 1–2 inches long. *Seeds* 1–3, free. *Flowers* almost sessile.

E. LITHOSPERMA, Miq. Pegu Range and Martaban.

E. Sumatrana, Miq.

Standard glabrous. Keel-petals wholly connate, obovate and shortly acuminate in the sinus.

E. HOLOSERICEA, Kz. Tharawaddy district (Adamson).

Standard minutely velvety. Keel consisting of 2 obliquely oblong rather acute petals united at the middle only.

A curious species, the flowers of which much resemble those of *E. ovalifolia*, while the leaves (if they really belong to the flowers) are those of *E. lithosperma*.

× × *Pod many-seeded, seed-bearing from the base.*

Sub-genus *DECHASSANGIA*, Walp.

Pods flat, torulose, opening only along the sinuate outer suture, the dorsal suture prominent and straight. *Seeds* free, but usually separated by spurious spongy septa.

E. OVALIFOLIA, Roxb. Lower Pegu, and often cultivated.

Glabrous, glaucous. Standard broad, notched. Pods minutely greyish-velvety.

Sub-genus STENOTROPIS, Hassk.

Pods torulose and almost moniliform, the valves opening at both sutures and exposing the continuous pithy-chartaceous indchiscent endocarp inclosing the seeds.

E. INDICA, Lamk.

The Nicobars.

E. *bisctosa*, Griff.

Ka-thyt.

Glabrous. Leaves membranous or chartaceous. *Pods* glabrous.

Frequent in the beach-forests all along the coasts of Burma and the adjacent islands; reeurs in the dry Prome District, but there very rare; often planted in villages.

** *Wings of corolla minute, as long as, or shorter than the spathaceous calyx.*

Sub-genus MICROPTERYX, Walp.

Pods foliicle-like, opening along the ventral suture, continuous. *Seeds* free.

E. SUBEROSA, Roxb.

Pegu Range.

Leaves rigidly chartaceous or almost coriaceous, more or less shortly tomentose or puberulous beneath. *Calyx* spathaceously 2-lobed.

E. STRICTA, Roxb.

Pegu Range and Martaban.

Leaves ehartaceous, glabrous, acuminate. *Calyx* spathaceous.

The wood of *Erythrina* is very light, and of little use save for some of the purposes of cork. It is also selected for the manufacture of gunpowder, and an *Erythrina* tree, Dr. Mason says, is "famous in Buddhist mythology, as the tree round which the Devas dance till they are intoxicated in Indra's heaven." It is very questionable, however, if the Buddhist tradition favours the idea of dancing being associated with intoxication, as the Doctor's words would seem to imply! Or perhaps the intoxication meant is that produced not by strong drink, but by thrilling doctrine such is now-a-days distributed by your tub-thumpers and Revivalists.

° ° *Authers dimorphous.*

MUCUNA, Adanson.

Petals very unequal, the keel exceeding the standard. Woody climbers or twining under shrubs.

* *Pods winged along the sutures, or lamellate, or both.*

Sub-genus CITTA, Lour.

Pods transversely and obliquely lamellate on the valves, but not winged at the sutures. *Seeds* orbicular.

M. MONOSPERMA, DC.

All over Burma.

M. *anguina*, Wall.

Racemes corymb-like, short-peduncled. *Pods* 1-seeded.

Sub-genus CARPOPOGON, Roxb.

Sutures of pod dilated into broad wings, the valves smooth. *Seeds* orbicular.

M. GIGANTEA, DC.

Coasts of Tenasserim, the Andamans, and Nankowry.

Flowers yellowish or white. *Pod* 3-4 inches long, appressed tawny setose.

** *Pods without sutural wings, the valves either quite plain, or longitudinally ribbed on the faces only.*

Sub-genus STIZOLOBIUM, Pers.

Characters as above. *Pods* often longitudinally ribbed on the sutures.

× *Pods stalked, glabrescent, torose. Seeds orbicular.*

M. MACROCARPA, Wall.

Hills of Ava and East of Toung-ngoo.

Arboreous climber. Flowers variegated dark-purple. *Pod* 1-3 feet long, plain.

×× *Pods sessile, plain or longitudinally ribbed. Seeds transversely oblong.*
 + *Pods densely setose, not glabrescent. Flowers purple.*

M. PRURITA, H. f. Ava and Pegu.
M. pruriens, L. (in part).
M. utilis, Wall.

Khwe-leh.

Peduncle naked. Flowers arising from a knob. Pods with two longitudinal ribs along the upper suture. Leaves pubescent beneath.

The hairs which invest the pods cause intense itching, whence the name 'cowitch,' or perhaps more correctly 'cowage,' which some consider a corruption of 'kirack,' one of the native names of the plant. The hairs mixed with honey, by dipping the ripe pods therein, and scraping them, are sometimes given to children for round worms, whose expulsion they contribute to by sticking in these animals and causing uneasiness. The remedy is not, however, much used by European practitioners.

M. prurita is the East Indian plant, and *M. pruriens* that from the West Indies.

M. (CARPOPOGON) BRACTEATA, Roxb. Ava, Chittagong, and Pegu up to 4000 feet.

Peduncle bracted. Flowers from a secondary peduncle about 2 lines long. Pod without ribs. Leaves almost glabrous.

Another probably new species has been collected by Dr. Brandis somewhere in Pegu, which is very near to *M. atropurpurea*, DC., and, indeed, has the same flowers. It differs in the long cuspidate leaflets, slender and short racemes, the lower persistent bracts, which are concave-ovate, long-acuminate, and about an inch long; and the lanceolate, acuminate calyx-lobes (Kurz).

++ *Pods velvety, glabrescent. Flowers white.*

M. NIVEA, Roxb. Ava.

Pods longitudinally ribbed, $\frac{1}{2}$ foot long.

†† *Style bearded.*

Stigma oblique.

§ *Free part of filaments straight, alternately shorter. Twining herbs.*

PACHYRHIZUS, Rich.

Keel not spirally twisted. Style flat upwards, the stigma almost globose on the inner face. Pod transversely lined between the seeds.

* *P. BULBOSUS*, L. Cultivated all over Burma for its tuberous rhizomes.

P. angulatus, Rich.

VIGNA, Savi.

Keel not spirally twisted, blunt or arcuate-beaked. Style filiform.

* *Stipules not peltately attached. Keel prolonged into a distinct beak.*

× *Ovary and pods (at least while young) more or less pubescent to tomentose. Flowers purple or blue.*

×× *Seeds velvety.*

V. DOLICHOIDES, Roxb. Chittagong and Arakan.

Habit of the following. Pods 2-3 inches long by $\frac{1}{2}$ broad, densely silky villous.

⊙ *Seeds glabrous.*

V. PILOSA, Roxb. Pegu.

Tor-peh.

Flowers about $\frac{1}{2}$ inch long, forming short-peduncled many-flowered racemes. Pods densely brown hirsute, $2\frac{1}{2}$ -3 lines broad by 4-5 inches long.

V. VEXILLATA, L. Pegu Range, along streams.

V. hirta, Hook.

Phaseolus Pulniensis, Wight.

Flowers about an inch long or longer, by 2-4 terminating the long peduncles. Pod glabrescent.

× × *Ovary and pods glabrous. Flowers yellow.*

° *Leaflets obovate, blunt or almost retuse.*

V. LUTEA, A. Gray. Beaches of Tenasserim, the Andamans and Nicobars.

Quite glabrous. Corolla about $\frac{1}{2}$ inch long. Pods 1-1 $\frac{1}{2}$ inch long.

° ° *Leaflets from ovate to ovate-lanceolate, acuminate to acute.*

V. REPENS, Baker. Promé.

Flowers by 1-2 on very short paired peduncles.

V. LUTEOLA, Bth. Ava. Bhamo.

Dolichos Gangeticus, Roxb.

Racemes many-flowered, long-peduncled. Stipules small, almost peltately falcate-ovate.

Baker refers my Burmese specimens to this species, but they differ greatly in the stipules, and are referred by me to the following species (Kurz).

** *Stipules peltately attached, the lower end produced.*

× *Keel not prolonged into a beak. Flowers yellow.*

V. CALCARATA, Roxb. Arakan and Pegu.

Pods 1-2 inches long by 1 $\frac{1}{2}$ -2 lines broad, minutely puberulous, soon glabrous. Seeds glossy. Stipules oblong, the produced basal part falcate-ovate.

V. BRACHYCARPA, Kz. Arakan.

Pods rather blunt at both ends, up to an inch long by 2 $\frac{1}{2}$ lines broad, sparingly but long-hirsute. Seeds opaque. Stipules peltately linear-oblong, 3-4 lines long.

× × *Keel prolonged into a distinct beak. Flowers blue or white, or variegated in these colours.*

* V. (DOLICHOS) SINENSIS, L. Cultivated all over Burma and the islands.

Dolichos Tranquebaricus, Jacq.

D. catjang, L.

Pods 2-3, or 4-12 inches long by 2-4 lines broad, glabrous. Stipules shortly peltate, lanceolate.

§ § *Free part of filaments once or rarely twice spirally twisted.*

PHASEOLUS, *Linnaeus*.

Keel spiral. *Style* filiform. The 2 upper calyx-teeth, or all, shorter than the tube. *Hilum* oblong or shortly orbicular. Twining or rarely almost erect herbs.

Sub-genus EU-PHASEOLUS.

Stipules small, basifixed and not or hardly produced downwards.

* *Pods dimidiate, oblong or linear, 2-many-seeded. Flowers purple to lilac and white.*

* P. LUNATUS, L. Ava (cultivated?).

Country French beans.

Flowers small, greenish white, on filiform puberulous pedicels. Calyx shallow, 2 lines wide and barely a line deep. Pods falcate, 2-3 inches long by $\frac{1}{2}$ broad, glabrous. An excellent vegetable, originally, it is said, introduced from Mauritius, easy to cultivate, and yields well.

P. TENUICAILIS, Grch. Prome. Bhamo.

Flowers purplish, middling-sized, on slender glabrous pedicels. Calyx about 2 lines deep and nearly as wide, ribbed. Pods $1\frac{1}{2}$ –2 inches long, by 3–4 lines broad.

** *Pods neither dimidiate nor falcate, linear to narrow-linear, 4-many-seeded. Flowers purple to white.*

× *Bractlets oval, persistent, as long as, or longer than the calyx.*

* *P. VULGARIS*, L. Chittagong, cultivated.

P. nanus, L.

Racemes few-flowered. Pedicels longer than the calyx. Pods linear, 4–6-seeded.

×× *Bractlets deciduous, shorter than the calyx. Flowers shortly pedicelled.*

* *P. ADENANTHUS*, E. Mey. Ava. Prome. Tenasserim.

P. rostratus, Wall.

P. alatus, Roxb. (non. L.).

Corolla nearly an inch long. Calyx plain. Pods many-seeded, $\frac{1}{3}$ inch broad.

Cultivated for its tuberous roots.

P. SEMIERECTUS, L. Chittagong, in grass-land.

P. psaraleoides, W. A.

Corolla about $\frac{1}{2}$ inch long. Calyx almost 5-ribbed. Pods many-seeded, 2 lines broad or narrower.

Sub-genus STROPHOSTYLES, Ellis.

Stipules peltately attached and produced downwards. *Flowers* yellow or greenish yellow. *Bracts* very deciduous.

* *Ovary and pods glabrous.*

P. (GLYCINE) TRILOBUS, L. Burma (*vide* Mason).

Prostrate or half-twining. *Stipules* large and leafy, about $\frac{1}{3}$ inch long. *Leaflets* more or less deeply-lobed.

** *Ovary pubescent to hirsute.*

P. TRINERVIUS, Heyne. Martaban and Tenasserim.

Twining, the stems spreadingly hirsute. Pedicels 1–1 $\frac{1}{2}$ lines long. Pods thinly and shortly hirsute.

* *P. RADIATUS*, L. var. β generally cultivated all over Burma.

Erect or nearly so, hirsute to almost glabrous. *Flowers* almost sessile. *Pods* sparsely but long-hirsute.

var. α *radiatus*, *P. Mungo*, L. More or less spreading and twining. *Pods* shorter and more blunt.

var. β *P. Mungo*, L.; *P. Max*, Roxb. Dwarf and erect. *Pods* longer, narrower, and acuminate. *Seeds* green or black. Of this there is also an almost glabrous form.

It is a curious thing that some pulses should be unwholesome, and even poisonous, as *Eryum ervilia*, and some species of *Phaseolus* and *Lathyrus*. This unwholesomeness of some species is so well known, that they are avoided by well-to-do natives, but are consumed by the very poor with, it is believed, the result of inducing paralysis of the lower limbs.

— *Stigma terminal. Free part of filaments straight.*

DOLICHOS, *Linnaeus*.

Kel not spirally twisted. *Style* filiform, minutely penicillate around the minute stigma. Twining or rarely sub-erect herbs.

D. BIFLORUS, L. Ava.

Glycine unijlora, Dalz.

Peh (generic).

Flowers by 1-3 clustered in the leaf-axils. Calyx-teeth about as long as the tube. Corolla yellow.

D. LANCEOLATUS, Grah. Prome Hills.

Flowers by 1 or 2 on a short axillary peduncle. Calyx-teeth shorter than the tube. Corolla reddish? Twining or sub-erect herbs.

D. LABLAB, L. Cultivated all over Burma.

D. Bengalensis, Jacq.

D. lignosus, Roxb.

As preceding, but style thickened upwards, bearded down the inner edge.

× × *Stamens all united into a complete tube.*

+ *Nodes of inflorescence tumid.*

CANAVALIA, Adanson.

Upper-lip of calyx projecting. Style beardless or rarely bearded. Pod indehiscent or late-dehiscing, the upper suture thickened or narrowly 2-winged.

Sub-genus EC-CANAVALIA.

Pods more or less dimidiate, with 2 parallel wings along the upper suture, glabrous or glabrescent.

* *Seeds an inch long or slightly longer.*

* C. (DOLICHOS) ENSIFORMIS, L. Cultivated all over Burma.

C. gladiata, DC.

Peh-noung-ni. Sword Bean.

Pods $\frac{1}{2}$ -2 feet long, linear-oblong. Seeds red or white.

var. *a erythrosperma*, Voigt. Seeds red. Flowers red or white.

var. *β leucosperma*, Voigt. Seeds and flowers white. Pods about 2 feet long.

** *Seeds only $\frac{1}{2}$ inch long.*

C. VIROSA, Roxb. Arakan. Kamorta. Katchall and Nankowry.

C. ensiformis, L., var. *viriosa*, Bak. H. f.

Leaflets shortly acuminate or apiculate. Standard an inch long. Seeds light grey.

C. TURGIDA, Grah. Frequent in the leaf-shedding forests,

C. ensiformis, L., var. *turgida*, Bak. all over Burma, and the Andamans.

Leaflets apiculate. Standard $\frac{2}{3}$ inch long or shorter. Seeds dark brown.

C. OBTUSIFOLIA, DC. Coast of Arakan and the Andamans.

Dolichos rotundifolius, Vhl.

Leaflets oboval, retuse or rounded. Standard an inch long. Seeds grey.

Sub-genus DYSOLEBIUM, Bth.

Pods terete, straight or slightly curved, obtusely 2-keeled along both sutures, but not winged, densely hirsute to velvety.

C. GRANDIS, Wall. All over Burma.

Phaseolus velutinus, Bak.

Shortly pubescent. Corolla an inch long. Style bearded. Pods velvety.

C. LUCENS, Wall. Forests from Chittagong to Tenasserim.

Glabrescent. Corolla hardly $\frac{1}{2}$ inch long. Pod as in preceding, but more densely velvety, style villous round the stigma.

PSOPHOCARPUS, Necker.

Pod 4 cornered, longitudinally 4-winged. *Stigma* almost globose, densely penicellate-villous.

* *P. TETRAGONOLOBUS*, L. Prome and Martaban cultivated (*vide* Mason).

Bractlets shorter than the calyx. Pods up to a foot long, 12-16-seeded.

* *P. PALUSTRIS*, Desv. Cultivated all over Burma.

Diesingia scandens, Endl.

P. longipedunculatus, Hassk.

Dolichos tetragonolobus, Roxb. non L.

Peh-myit or Peh-hmung-wā. Goa beans.

Bractlets as long or longer than the calyx. Pods 2-3 in. long, often 5-6-seeded.

The pods of this species are eaten as beans, and it also yields edible tubers. The pods have fringed or membranous edges, and the plant is said to be a native of Mauritius.

DIOCLEA, Humboldt, Bonpland et Kunth.

Upper teeth of calyx not projecting. Pods oblong, turgid, indehiscent, the upper suture thickened or 2-winged. *Anthems* dimorphous.

D. REFLEXA, Hook.

Tenasserim.

Dolichos hexandrus, Roxb.

PTERARIA, DeCandolle.

Upper teeth of calyx not projecting. Pod linear, flattish, readily dehiscent, many-seeded.

Sub-genus EU-PTERARIA. (Woody leaf-shedding climbers).

Pods constricted between the seeds. Roots large, tuberous. Flowers pale blue.

P. TUBEROSA, Roxb.

Chittagong.

Calyx densely silky. Bractlets minute. Pods tawny hirsute while young.

P. CANDOLLEI, Grah.

All over Burma.

Calyx minutely appressed pubescent. Bractlets as long as the buds. Pods minutely appressed pubescent, soon glabrous.

Stands in a similar relationship to the preceding species as *Millettia extensa* does to *M. macrophylla*, and is barely more than a glabrous variety of it (Kurz).

Sub-genus NEUSTANTHUS, Bth. (Under shrubs or shrubs, erect or twining).

Pods not constricted between the seeds.

* Erect shrubs or under shrubs, the branchlets terete or nearly so.

× Bracts deciduous.

P. WALLICHI, DC.

All parts nearly glabrous. Calyx minutely velvety. Pods 1½-2 inches long. Flowers white.

P. COMPOSITA, Bth. Ava, Taong-doung and the drier hill-forests, especially the pine-forests of Martaban, 3500 to 5000 feet elevation.

Tomentum of young parts, inflorescence, and calyx tawny. Pods 2-3 inches long.

× × Bracts persistent.

P. STRICTA, Kz.

Pegu Hills between 1000 and 3000 feet.

Leaves sparingly appressed hirsute. Fruiting pedicels 2 lines long. Pods 1-1½ inch long, glabrous.

** *Twining or prostrate herbs or under shrubs. Flowers purplish blue.*

× *Pods narrowly linear, 1½–3 inches long by 2 lines broad, many-seeded.*

° *Bracts deciduous. Branchlets terete or nearly so. Leaflets often lobed.*

Extensive twiners (Schizophyllum, Baker).

P. PHASEOLOIDES, Roxb.

Pegu.

Calyx about 2½ lines long, the lobes acuminate. Corolla about 5 lines long.

P. SUBSPICATA, Bth.

Arakan, Pegu, and Tenasserim.

Calyx about 4 lines long, the lobes subulate-acuminate. Corolla ¾ inch long.

°° *Bracts persistent. Branchlets somewhat angular.*

Prostrate or twining perennial herbs.

P. ANABAPTISTA, Kz.

Both varieties frequent in the upper mixed forests of the Pegu Range; also Khakycen Hills.

Pods long, but thinly hirsute.

var. *a genuina*. Branches, petioles, etc., spreading tawny hirsute. Pods similarly hirsute while unripe. Flowers purple.

var. *β glabrescens*. Branches, petioles, and also the pods thinly appressed hirsute, the last shorter and almost glabrescent. Flowers pale lilac, violet at the tips.

var. *β* may be distinct, and stands in a similar relation to the normal form as *P. Candollei* does to *P. tuberosa*. The species is also common in Sikkim (Kurz).

×× *Pods oblong to linear-oblong, ½–1 inch long by 2½–3½ lines broad, flat or torose. Branchlets sharply angular, retrorsely pubescent on the angles.*

P. HIRSA, Kz.

Pegu Range up to 3000 feet.

Pods flat, sparingly but long and spreadingly hirsute, 2–4-seeded. Calyx small.

P. BRACHYCARPA, Kz.

Pegu Range.

Pods torose, shortly and sparingly appressed hirsute, 5–6-seeded. Calyx nearly a line long.

++ *Nodes of inflorescence not tumid. Stipules and bracts minute, deciduous.*

TERAMNUS, Sprengel.

Calyx-teeth free. Alternate anthers abortive.

* *Pods more or less torose, tawny hirsute.*

T. MOLLIS, Bth.

Pegu Range.

Glycine debilis, Roxb.

Seeds opaque. Inflorescence and young branches spreadingly tawny pilose. Calyx-teeth as long as the tube.

** *Pods glabrous to the naked eye.*

× *Flowers in racemes.*

T. (GLYCINE) LABIALIS, L.

Chittagong and Arakan.

Racemes appressed silk-hairy. Calyx-teeth as long as the tube. Seeds glossy. Leaflets up to 1½ inch long, not acuminate.

T. WALLICHII.

Prome Hills.

Desmodium Rottleri, apud Baker.

Racemes long-peduncled, almost glabrous. Leaflets obovate, retuse.

The few specimens seen by me are imperfect, but the terete stems, and more especially the large peculiar peltately adnate stipules at once remove it from *Desmodium Rottleri*, with which Baker identifies the plant (Kurz).

T. FLEXILIS, Bth.

All over Burma.

Racemes appressed silk-hairy. Calyx-teeth shorter than the calyx-tube. Seeds quite opaque. Leaves 2–4 inches long, acuminate.

× × *Flowers by 2-4, axillary.*

T. OXYPHYLLA, Bth. Tenasserim.

Habit of *T. flexilis*. Corolla $\frac{1}{2}$ in. long. Unripe pods $1\frac{1}{2}$ in. long, flat, glabrous.

GLYCINE, *Linnaus.*

Calyx-teeth free, the 2 upper ones connate. *Anthers* all fertile and conform.

* *G. soja*, L. Ava, cultivated.

Erect. Flowers in small axillary clusters. Pods 1- $1\frac{1}{2}$ in. long, almost falcate. Seeds 3 lines long, slightly compressed, pale-coloured.

The word 'soja' is a variation of the Japanese 'soya,' whence our word 'Soy,' for a sauce prepared in China and Japan from the seeds of one or more species of *Dolichos* or allied genera.

** *Leaflets more or less conspicuously resinose-dotted beneath.*

+ *Ovules 3 or more.*

DUNBARIA, *Wright et Arnott.*

Pods plain or slightly turgid, often falcate, not depressed between the obsolete strophioled seeds.

* *Ovary and pods sessile.*

D. FUSCA, Wall. Prome Hills.

Leaflets large, acuminate, sparingly but distinctly resinous-dotted beneath. Flowers in racemes.

D. CONSPERSA, Bth. Prome Hills.

Dolichos? rhynchosoides, Miq.

Leaflets small, bluntish. Flowers usually by pairs.

** *Ovary and pods conspicuously stalked.*

D. PODOCARPA, Kz. Maulmain.

Leaflets acuminate. Flowers usually by pairs or few, on a very short peduncle. Pods pubescent, $1\frac{1}{2}$ -2 inches long, 10-12-seeded, long-stalked.

D. CIRCINALIS, Bth. Maulmain (*vide* Baker).

Leaflets acute. Flowers in racemes. Pods spreadingly viscose-hairy, 1- $1\frac{1}{2}$ inches long, 5-6-seeded, shortly stalked.

ATYLOSIA, *Wright et Arnott.*

Pod transversely depressed or lined between the seeds. *Arillus* large grooved.

* *Twining under shrubs or herbs.*

× *Prostrate herbs with twining branches. Flowers 3-4 lines long, almost fascicled by 2-3.*

A. (DOLICHOS) SCARABEOIDES, L. Bhamo.

Dolichos medicaginus, Roxb.

Puberulous. Pods $\frac{1}{2}$ -1 inch long, tawny puberulous and hirsute.

× × *Corolla $\frac{1}{2}$ - $\frac{3}{4}$ inch long. Extensive twiners. Flowers racemose.*

A. BARRATA, Bth. All over Burma.

Dunbaria calycine, Miq.

Leaflets shortly pubescent on both sides. Racemes and pods long-pilose, the latter transversely torose, long-acuminate.

A. MOLLIS, Bth. Ava. Martaban and the Andamans.

Dunbaria Horsfieldii, Miq.

Leaflets beneath softly (often yellowish) puberulous. Pods oblong, transversely impressed between the seeds, yellowish or tawny velvety.

** *Erect shrubs or herbs.*

A. NIVEA, Bth.

Prome and Ava.

Stiff annual, little-branched. Leaflets beneath closely white or yellowish tomentose. Calyx slightly puberulous or almost glabrous. Corolla $\frac{1}{2}$ inch long.

CAJANUS, *DeCandolle.*

Pod transversely depressed between the seeds. *Arillus* or strophiole none.

* C. INDICUS, Spreng.

Cultivated all over Burma up to 3000 feet. Nicobars.

Cytisus cajan, L.

Cytisus pseudo-cajan, Jacq.

C. flavus, DC.

Peh-yen-khyung. Arhar in India.

An excellent vegetable, scarcely inferior to peas when young.

+ + *Orules* 1 or 2.

× *Funicle arising from the centre of the hilum.*

CYLISTA, *Aiton.*

Calyx accrescent and leafy, scarious-membranous, the lowermost lobe largest.

C. SCARIOSA, Roxb.

Pegu and Martaban.

RHYNCHOSIA, *Loureiro.*

Calyx not accrescent in fruit. *Pods* compressed. *Leaves* pinnately 3-foliolate.

R. MINIMA, L.

Ava and Prome.

Dolichos scarabaeoides, Roxb. non Willd.

Sub-genus EC-RHYNCHOSIA.

Seeds without arillus.

* *Pods very much longer than the calyx.*

× *Twining herbs.*

Leaflets acute. Racemes elongate, longer than the leaves, almost glabrous.

R. PILOSA, Wall.

Banks of the Irrawaddy near Segain.

Leaflets obtuse or rounded. Racemes filiform, shorter than the leaves, pilose. *Calyx-teeth* filiform. The foliage resembles that of *Atylosia scarabaeoides*, the flowers those of *Atylosia elongata*, Bth. (Kurz).

× × *Erect shrubs or under shrubs.*

R. BRACTEATA, Bth.

Ava and Prome.

Greyish velvety. Racemes longer than the leaves, paniced at the end of the branches, pod densely velvety.

** *Calyx as long as the corolla, in fruit nearly as long as the pods. Twiners.*

R. DENSIFLORA, DC.

Limestone hills near Segain, Ava.

Dolichos aurantiacus, Wall.

Flowers in dense short axillary racemes. *Pods* long-pilose, short.

Sub-genus PHYLLOMATIA, W. A.

Seeds with a waxy arillus.

* *Calyx-teeth broad, enlarging and leafy in fruit.*

R. RUFESCENS, DC.

Near Ka-thē on the Irrawaddy.

Cyanospermum Javanicum, Miq.

Half-twining, thinly pubescent. Flowers singly on the filiform viscid-pubescent racemes. *Pods* 1-seeded.

** *Calyx-teeth lanceolate, acuminate, not enlarging.*

R. CAUDICANS, Wall. Ava, Taong-doung and Yē-nān-choung.
R. *avensis*, Bth.

Stems, racemes, and under surface of leaflets white-tomentose. Pods 2-seeded.

FLEMINGIA, *Roxburgh.*

Calyx not accrescent in fruit. *Pod* turgid. *Leaves* digitately 3-foliolate.

Sub-genus EU-FLEMINGIA.

Erect shrubs or herbs. *Flowers* in racemes, panicles or head like spikes.

§ *Racemes one-sidedly-flowered, the upper ones collected into a terminal panicle. Floral bracts large, leafy, complicate, persistent. Leaves 1-foliolate. Pods 2-seeded. (Ostryodium, DC.).*

× *Floral bracts quite glabrous.*

F. CHAPPAR, Ham. Ava. Prome and Martaban.

Corolla yellowish, $\frac{1}{3}$ inch long. *Leaves* cordate-ovate.

× × *Floral bracts puberulous or pubescent.*

F. (HEDYSARUM) STROBILIFERA, L. All over Burma and the Andamans.
Kamorta and Nankowry.

Stipules not above 3 lines long, rather deciduous. Bracts rotundate and obsolete pointed, not ciliate. Corolla about 3 lines long, white or yellowish.

F. BRACTEATA, Wight. All over Burma.

Stipules stiff-subulate, up to $\frac{1}{2}$ inch long. Bracts more or less retuse, ciliate. Corolla purplish, about 2 lines long.

§ *Racemes spike-like, solitary or clustered in the leaf-axils, or in panicles, rarely reduced to axillary or terminal more or less involucred heads. (Flemingiastrum, DC. incl. Chalaria, W. A.).*

× *Flowers in racemes or panicles. Pods usually few-seeded.*

+ *Leaves 1-3-foliolate. Bracts small, persistent or deciduous.*

F. PANICULATA, Wall. Banks of the Attaran.

Leaves 1-foliolate. Racemes filiform, shorter than the leaves.

F. (HEDYSARUM) LINEATA, L. Ava. Pegu. Martaban.

Leaves 3-foliolate. Racemes slender, as long as or usually longer than the leaves.

+ + *Leaves digitately 3-foliolate. Spikes, while young, densely imbricate-bracted, the bracts deciduous long before opening of the flowers, or rarely persistent.*

° *Bracts not scarious, shorter than, or about as long as the buds. Low shrubs, the branches more or less terete or angular.*

† *Bracts deciduous before opening of the flowers.*

¶ *Low shrubs with a woody subterranean trunk.*

F. SERICANS, Kz. Prome and Hills East of Toung-ngoo.

Racemes small, silvery silk-hairy. *Calyx-teeth* falcately subulate, a line long, the lowermost one $1\frac{1}{2}$ line long. *Corolla* 2 lines long. *Petiole* winged, about an inch long.

F. FERRUGINEA, Grah. Ava, Taong-doung. Prome.

Racemes rather slender and lax. *Flowers* almost sessile. *Corolla* 2 lines long or a little longer. *Calyx-teeth* falcate-lanceolate, the lowermost one barely longer than the rest. *Petiole* winged, 1-2 inches long.

• • *Well-developed under shrubs.*

F. CONGESTA, Roxb. Ava and all over Burma.

Petiole usually not winged. Racemes dense, usually clustered and shorter than the petiole, greyish silk-hairy. Bracts linear-lanceolate, subulate-acuminate, about 4 lines long. Calyx $3\frac{1}{2}$ lines long, the lobes linear, subulate-acuminate, the lowermost much longer. Corolla $3\frac{1}{2}$ lines long, purplish, with a flesh-coloured purplish-streaked standard.

F. PROSTRATA, Roxb. Hills East of Toung-ngoo between 4000 and 5000 feet.

As preceding. Racemes appressed tawny-pubescent, much shorter than the narrowly-winged petiole. Pods densely resinose-glandular and puberulous.

The Burmese variety differs from Khasi specimens chiefly in the long-acuminate not wrinkled leaflets and the black-glandular pods.

F. SEMIALATA, Roxb. var. β only all over Burma.

Petiole narrowly winged. Racemes rather lax, greyish silk-hairy. Calyx 3 lines long, the lobes subulate. Bracts ovate-lanceolate, cuspidate. Corolla 3 lines long, rose-coloured, with greenish keel. Pods puberulous.

var. *a genuina*. Racemes elongate, more robust.

var. β *viridis*. Racemes simple, more lax and slender, more silk-hairy, always clustered in the axils of the leaves, and much shorter than the petiole; leaves of a thinner texture or less pubescent; flowers and pods usually smaller.

F. LATIFOLIA, Bth. var. β in the hills East of Toung-ngoo between 2000 and 4000 feet.

Petiole narrowly winged. Bracts and calyx appressedly brown or golden silk-hairy, the latter $\frac{1}{2}$ inch long, the lobes subulate with the lowermost one twice as long. Corolla $\frac{1}{2}$ inch long, white, with rose-coloured wings.

var. *a genuina*. Racemes more lax and more slender, branched.

var. β *grandiflora*. Racemes simple, shorter and more dense. Flowers about $\frac{1}{2}$ larger.

°° Bracts scarious and stiff, very much longer than the flower-buds. Branches and branchlets more or less triquetrous.

F. STRICTA, Roxb. All over Burma.

Tall under shrub. Petiole narrowly winged. Lower sheathing bracts up to 2 inches long. Calyx about 4 lines long, silvery silk-hairy, the lobes linear, acuminate, the lowermost one twice as long. Corolla nearly $\frac{1}{3}$ inch long. Pods minutely appressed puberulous.

× × Spikes short and condensed into heads. Bracts all persistent, the outer ones large and involucre-like. Pod inclosed in the calyx, 1-seeded (*Lepidocoma*, Jungh.).

F. CAPITATA, Zoll. All over Pegu and Martaban.

F. involucreata, Bth.
Lepidocoma trifoliatum, Jungh.

Erect under shrub. Bracts silky-pilose. Calyx $\frac{1}{2}$ inch long, the lobes subulate. Corolla $\frac{1}{2}$ inch long, minutely appressed silk-hairy. Pods silky-pilose.

Sub-genus RYNCHOSIODES, Bak.

Twining herbs or perennials. Flowers in long peduncled heads or dichotomous corymbs. Calyx-teeth almost equal. Pods 1- rarely 2-seeded, usually included in the calyx. Bracts minute, deciduous.

* F. VESTITA, Grah. Cultivated by the Karens of Martaban between 3000 and 5000 feet.

Flowers by 4-10 in long-peduncled heads. Calyx fulvous-pilose, $\frac{1}{3}$ inch long. Corolla appressed pilose, nearly $\frac{1}{2}$ inch long.

× × Funicle arising from the extremity of the linear hilum.

ERIOSEMA, DeCandolle.

Pod transversely depressed. Erect herbs, flowers axillary. Leaves simple.

E. TUBEROSUM, Ham.
E. *Chinense*, Voq.

Pegu and Martaban up to 4000 feet.

Sub-tribe GENISTIEÆ.

Stamens usually monadelphous, the filaments not dilated upwards. Anthers usually alternately longer and basifixed or nearly so, the others smaller and versatile. Leaves digitate. Pod often inflated.

* *Anthers dimorphous. Keel-petals firmly cohering.*

CROTALARIA, *Linnaeus*.

Keel beaked. Pod turgid or inflated. Flowers in terminal or leaf-opposite racemes. Herbs or under shrubs with simple or digitately 3-7-foliolate leaves.

A. Leaves simple.

+ *Racemes lateral and leaf-opposed.*

× *Stipules none or small, not decurrent.*

° *Almost glabrous. Slender erect annuals.*

C. FILIFORMIS, Wall.

Pegu Range.

Stipules half-lunate, persistent.

C. STOCKSII, Bth.

Tenasserim or Andamans (*vide* Baker).

Stipules very minute, deciduous.

°° *Silk-hairy or pilose.*

† *Prostrate or ascending small herbs. Flowers not above 2½ lines long.*

C. PROSTRATA, Roxb.

Nât-toung, East of Toung-ngoo (*vide* Mason).

Braets subulate, very minute. Stipules none. Pods 15-30-seeded.

C. ACICULARIS, Ham.

Chittagong. Pegu. Martaban.

Braets lanceolate, a line long. Stipules subulate, minute. Pods 12-15-seeded.

†† *Flowers ½-¾ inch long. Erect branched annuals.*

C. FERRUGINEA, Grah.

var. *a* frequent in the drier hill- and the pine-forests of Martaban and Ava, at 4000 to 5000 feet elevation.
var. *β* frequent along rocky river-beds in the tropical forests, from Ava and Martaban down to Tenasserim.

Tawny pilose. Stipules lanceolate, spreading. Pod 20-30-seeded.

var. *a genuina*. More or less spreading. Leaves narrower and more or less acute. All parts more densely rusty pilose.

var. *β pilosissima*, Miq. Erect and often less pilose, leaves broader and rounded or blunt at the apex.

× × *Stipules decurrent, and forming leafy wings to the branches.*

C. ALATA, Roxb.

All over Burma.

C. *bialata*, Roxb.

Erect annual. Flowers middling-sized, yellow. Pods stalked.

++ *Racemes terminal or terminating axillary branchings. More or less hairy-hirsute or appressed silky-hairy, rarely glabrous.*

° *Calyx divided to the base into lobes, the 2 upper much enlarged in fruit.*

† *Pod exerted from the calyx.*

C. ALBIDA, Heyne.

All over Burma.

C. *montana*, Roxb.

Flowers ¼ inch long, pale yellow, racemose. Braets linear, very minute. Pods 1½-2 times longer than the calyx, ½-¾ inch long.

†† *Pod more or less included and shorter than the calyx (Calyeinæ).*

¶ *Pod small, globular or ovoid-globose, sessile.*

C. LINIFOLIA, L. Pegu and Martaban.

C. cæspitosa, Roxb.

C. melanocarpa, Bth.

Erect annual of several feet. Racemes elongate.

C. NANA, Burm.

Small herb. Racemes shortened and head-like.

C. patula, Grah., is reduced by Baker to a variety of *C. nana*, Burm. I am unacquainted with the species (Kurz).

¶¶ *Pods linear-oblong to oblong.*

△ *Flowers yellow or pale yellow.*

C. CALYCINA, Schrank. Ava, Taong-dong and Tagoung.

C. stricta, Roxb. non Roth.

Flowers few, in short lax racemes. Fruiting calyx covered with long coppery-brown soft hairs. Pods an inch long. Bracts and bractlets large, lanecolate.

C. DUBIA, Grah. Chittagong, Pegu, and Martaban.

Flowers in dense heads. Calyx and pod $\frac{1}{4}$ inch long. Bracts and bractlets large, ovate, acuminate.

C. CHINENSIS, L. non Roxb. Pegu and Tenasserim.

C. barbata, Miq. non Grah.

Flowers? yellow, capitate. Calyx and pods $\frac{1}{4}$ – $\frac{1}{2}$ in. long. Bracts and bractlets linear.

△△ *Flowers blue.*

C. SESSILIFLORA, L. All over Burma.

Flowers in long racemes. Bracts and bractlets long, setaceous. Calyx $\frac{1}{4}$ – $\frac{1}{2}$ inch long. Pods $\frac{1}{2}$ inch long.

°° *Pods very much exerted from the calyx. Calyx-tube obliquely bell-shaped, the teeth rather short, barely enlarging in fruit.*

¶ *Bracts subulate, very minute. Flowers yellow.*

△ *Branches and branchlets woody, with medullary pith, terete.*

C. KURZII, Bak. Pegu Range and Martaban, var. β ranges up to 5000 feet.

Almost glabrous. Leaves acute. Racemes terminating axillary branchlets or reduced to axillary flower-clusters.

var. *a genuina*. Leaves longer and of a thinner texture. Flowers usually axillary and gradually passing into terminal or axillary racemes with all intermediate conditions on the same plant. Pods an inch long. Low-level form.

var. β *montana*. Leaves of a firmer texture and half the size. Flowers in true leafless elongate axillary and terminal racemes. Pods only $\frac{1}{2}$ an inch long. High-level form.

△△ *Branches herbaceous, fistulose, stout.*

C. ASSAMICA, Bth. Khakyen Hills. Ava.

Calyx and underside of the blunt or acute leaves densely appressed silky. Racemes all terminal. In Ava specimens the flowers sometimes grow indifferently in the place of the leaves from the leaf-branches, so that the flowers are either mixed up with the leaves (reduced flowering branchlets) or form incomplete racemes below the leafy summit. The species itself, however, may be nothing but a more pubescent hill-form of *C. retusa*.

C. MACROPHYLLA, Kz. Southern Pegu.

C. Kurzii, var. *luxurians*, Kz.

I have referred this form erroneously to *C. Kurzii*, but the stout hollow stems bring it nearer to *C. Assamica*, from which it differs not only in its much larger petioled leaves and in the calyx, but also in the pods, which are sessile and $1\frac{1}{2}$ -2 inches long. In habit it may be called a very luxuriant terminal-racemed form of *C. Kurzii* (Kurz).

C. RETUSA, L. Chiefly near the sea in Arakan and Pegu, but also found along the Irrawaddy in Prome. It has become a weed on Ross Island and the Andamans, but there very likely only introduced.

Thinly appressed silky-hairy. Leaves retuse to blunt. Racemes all terminal.

♂♂ Bracts ovate to ovate-lanceolate, up to 4 lines long, reflexed.

C. SERICEA, Retz. Arakan and the Pegu Range.

Glabrous. Leaves blunt to acute, almost sessile, glaucous-green. Pods stalked. Branches stout, fistulose.

** Ovary variously clothed, from villose to tomentose and appressed silk-hairy. Pods similarly clothed, rarely minutely pubescent or glabrous. Flowers racemose.

+ Stipules none, or small and subulate. Flowers yellow.

× Pods minutely appressed-pubescent, appearing glabrous to the naked eye. Calyx glabrous. Leaves narrow.

C. NERIFOLIA, Wall. Ava and hills East of Toung-ngoo.

Glabrous. Bracts linear, very minute. Leaves narrow-linear.

×× Pods and calyx brown or dark brown tomentose or pubescent, leaves narrow.

C. JUNCEA, L. All over Burma.

C. fenestrata, Sims.

C. tenuifolia, Roxb.

Pān. Paik-hsan. Sun hemp.

Stems sulcate, but not angular. Pods sessile, $1-1\frac{1}{4}$ inch long.

This plant is commonly planted for its fibre, which makes twine, rope and paper. The seed is sown very thickly, and in good soil the plants run up to 8 or 10 feet. The fibre is prepared in the usual way by soaking the plant and stripping the bark, and it is probable that more care and attention than is usually bestowed on this process would result in a greatly improved fibre as regards strength and appearance.

C. TETRAGONA, Roxb. Along rocky streams in Arakan and Pegu up to 3000 feet.

Stems sharply 4-angular. Pods shortly stalked, $1\frac{1}{2}$ -2 inches long.

+ + Stipules large, leafy, half-lunate. Flowers blue or rarely greenish-white.

C. VERRUCOSA, L. Ava. Prome and Martaban.

C. angulosa, Lam.

C. carulea, Jacq.

Stems angular, puberulous to glabrous. Leaves rhomboid. Pods pubescent.

B. Leaves digitately 3-7-foliolate.

C. QUINQUEFOLIA, L. In wet lands from Arakan to Tenasserim.

Leaves 5-foliolate. Flowers rather large, yellow, racemose. Bracts 3-4 lines long, linear, acuminate, reflexed. Pods glabrous, stalked, $1\frac{1}{4}$ - $1\frac{1}{2}$ inch long.

× Pods inflated.

+ Pods short, globular or obliquely ovoid, 1-2-4-seeded.

C. MEDICAGINEA, Lamk.

C. procumbens, Roxb.

Leaves 3-foliolate. Stipules and bracts minute, subulate. Flowers small, by 1-2 (rarely 3-4) terminating slender leaf-opposed peduncles. Pods acuminate, minutely appressed pubescent, 1-2-seeded.

++ *Pods oblong to linear-oblong, many-seeded.*

C. STRIATA, DC. All over Arakan and Pegu.

C. Brownei, Rehb.

C. Saltiana, And.

Pods indistinctly appressed-pubescent, linear-oblong, 1-1½ inch long.

C. BRACTEATA, Roxb. All over Burma.

Pods densely tawny-villous, boat-shaped-oblong, somewhat curved, ¾-¾ inch long.

×× *Pods much compressed (Priotropis, W. A.).*

C. CYTISOIDES, Roxb. Ava. Khakyen Hills and Tenasserim.

Habit of *C. striata*. Flowers yellow, racemose. Pods 1 inch long by ½ broad, acuminate at both ends, on a filiform stalk, glabrous.

Sub-tribe LOTIEÆ.

Stamens usually diadelphous (9+1), the filaments dilated upwards. Leaves digitately or pinnately compound.

* *Leaflets quite entire.*

PAROCHETUS, Hamilton.

Petals deciduous, free from the staminal tube, the keel rather acute. *Pod* 2-valved. *Flowers* solitary or in poor umbels. *Leaves* digitately 3-foliolate.

P. COMMUNIS, Ham. Ava and Tenasserim.

P. maculatus, R. Br.

Cosmiosa repens, Alef.

** *Veins of leaflets usually produced into marginal toothlets. Leaves pinnately 3-foliolate. Keel-petal blunt.*

× *Pod straight or nearly so.*

MELILOTUS, Jussieu.

Pod small, rotundate or oblong, more or less indehiscent.

M. ALBA, Desv. Prome. A weed in the Irrawaddy valley.

M. leucantha, Koch.

Trifolium Indicum, Willd.

Sub-tribe GALEGIEÆ.

Stamens 10, variously connate, the filaments filiform upwards. *Anthers* usually versatile. *Pods* dehiscent or indehiscent. *Leaves* unpaired pinnate, rarely simple.

* *Pods* dehiscent (very rarely indehiscent and small and 1-seeded) (*Eu-galegiæ*).

× *Pods* distinctly transversely chambered within, dehiscent, or 1-seeded and indehiscent.

† *Pods* 1-seeded and indehiscent. *Hairs* basifixed.

PSORALEA, Linnæus.

Anthers blunt. *Leaves* simple or 3-foliolate, the leaflets gland-dotted. *Seed* adhering to the pericarp.

P. CORYLIFOLIA, L. Ava and Prome.

†† *Pods* several-seeded and dehiscent.

◦ *Anthers* apiculate. *Hairs* fixed by the centre.

CYAMOPSIS, De Candolle.

Stamens monadelphously united into a tube. *Leaflets* entire or toothed.

* *C. PSORALIOIDES*, DC. Burma, cultivated (*vide* Mason).
Dolichos fabaformis, L'Her.
Lupinus trifoliatus, Cab.

Pch-pa-swōn.

The pods are esteemed a good vegetable.

INDIGOFERA, *Linnaus*.

Stamens diadelphous (9+1). *Leaves* pinnately many-1-foliolate.

Sub-genus SPHERIDIOPHORA, Desv.

Ovary 1-ovuled. *Pods* very short, 1-seeded.

I. LINIFOLIA, Retz. Arakan and Pegu.

All parts appressed silk-hairy. Leaves simple, small. Pods almost globular.

Sub-genus ET-INDIGOFERA, Bth.

Ovary 2-more-ovuled. *Pods* usually elongate, rarely short.

* *Calyx* deeply cleft, the lobes subulate-acuminate. *Corolla* about twice as long as the calyx. *Annuals* or *perennials*.

+ *Pods* short, 2- rarely 3-seeded.

I. ENNEAPHYLLA, L. Limestone hills of Segain and about Prome.

Appressed pubescent. Leaves pinnate. Pods almost 4-angular, shortly hairy. Seeds cubical.

++ *Pods* many- or several-seeded, elongate.

° *Seeds* cylindrical.

* *I. TINCTORIA*, L. var. *a* cultivated in Prome and Pegu, and most probably elsewhere; var. *β* frequent in the open forests, and along river-banks, all over Burma.

Leaflets usually in 4 to 5 pairs. Racemes shorter than the leaves.

var. *a genuina*. Pods about an inch long and more slender, usually straight or only slightly curved, 7-10-seeded, the seeds about a line long, pale-coloured.

var. *β anil*, L.; *I. caerulea*, Roxb. *I. argentea*, var. *caerulea*, Bak. Pods more curved and reflexed, shorter, about ½ inch, long but sometimes longer, 3-4, but as often 1-6, and even up to 7-seeded, the seeds smaller, olive-coloured.

I cannot find any sufficient grounds for specifically separating the above two forms. The pod differs greatly on the same plant (Kurz).

I. ENDECAPHYLLA, Jacq. Ava.

I. debilis, Grah.

Leaflets in 1 or 2 pairs. Racemes very slender, much longer than the leaves.

In Burma the pods are more slender and more persistently pubescent (Kurz).

I. TRIFOLIATA, L. Tenasserim.

Leaves 3-foliolate. Racemes very short or reduced to clusters.

Seeds cubical or 4-angular-oblong.

I. VISCOSA, Lamk. Ava.

All parts (also the pods) viscose-pubescent. Leaflets in 4-7 pairs.

I. TRITA, L. Ava.

I. cinerea, Willd.

All parts appressed greyish or silvery pubescent. Leaves 3-foliolate. Pods thinly appressed pubescent.

I. HIRSA, L. Ava. Tenasserim.

All parts hirsute-pubescent. Leaflets in 3 or 4 pairs. Pods hirsute.

** *Calyx toothed, the teeth short, more or less acute. Corolla at least 3 times as long as the calyx and usually much longer. More or less woody shrubs.*

× *Leaves simple or 3-foliolate (often on the same plant).*

I. BRUNONIANA, Grah.

Pegu.

Whole plant greyish from minute appressed stiff hairs. Leaves 1-3-foliolate on the same plant. Stipules very minute.

I. CALONEURA, Kurz.

Pegu.

Softly tawny pubescent. Leaves 1-foliolate. Stipules about 2 lines long.

× × *Leaves unpaired pinnate.*

° *Pods 1½-2 inches long, more or less 4-gonous. Seeds cubical or 4-cornered.*

I. GALLEGOIDES, DC.

Pegu and Tenasserim up to 4000 feet.

I. uncinata, Roxb.

I. Zollingeriana, Miq.

Stipules 2-3 lines long. Pods minutely appressed pubescent.

I. PULCHELLA, Roxb.

Ava and Pegu.

I. arborea, Roxb.

Stipules minute. Pods glabrous.

°° *Pods about an inch long, terete. Seeds cylindrical.*

I. VIOLACEA, Roxb.

Pegu and Tenasserim.

Differs from the above in the pod and the cylindrically oblong pale-coloured seeds. It is in my eyes nearer akin to *I. elliptica*, from which it deviates only in the size and colour of the seeds.

I. ELLIPTICA, Roxb.

Pods glabrous. Stipules minute.

Indigo is produced by various species of *Indigofera*, but mainly by *I. tinctoria*.¹

°° *Anthers blunt. Hairs basifixed.*

SESBANIA, *Persoon.*

Style not bearded, the stigma minute. Flowers in axillary racemes. Leaves pinnate. Herbs or under shrubs, rarely trees.

Sub-genus AGATI, Desv.

Flowers 2-3 inches long, falcately recurved in bud, the standard acute or bluntish.

* S. GRANDIFLORA, Roxb.

Cultivated all over Burma.

Pouk-hpyu.

Small glabrous tree. Flowers showy, white or scarlet.

Sub-genus EU-SESBANIA, Bth.

Flowers less than an inch long, straight in bud, yellow or brown-purple, the standard broad, more or less notched.

* *Racemes drooping from the base. Small trees.*

* S. SESBAN, L.

Cultivated all over Burma.

S. Egyptiaca, Pers.

S. picta, Pers.

Yc-thu-gyi.

Glabrous. Pods 1½-2 lines broad, somewhat angular from the prominent sutures.

** *Racemes erect from the base, but often overhanging. Shrubby annuals.*

S. POLYPHYLLA, Miq.

Grassy pastures along the Koladyne River.

¹ For a full history of the development of the Indigo trade, consult Balfour's Cyclopaedia of India.

Æschynomene cannabinata and *spinulosa*, Roxb.

S. aculeata, Pers.

Pods rather convex on both sides, 1½-2 lines broad; standard ½ inch long. Seeds cylindrical.

S. COCHIN-CHINENSIS, DC.

Swamps in Arakan and Pegu.

Æschynomene pubulosa, Roxb.

S. cannabinata, Pers.

Dunchi, or Dhanehi hemp, of Bengal.

Pods rather flat, 2-3 lines broad, narrowly bordered; standard ⅔ inch long, seeds more or less compressed-rhomboid.

Sesbania is a genus of no great utility save as yielding a coarse fibre, an excellent charcoal for the manufacture of gunpowder, and a hedge or trellis plant in gardens and betel plantations, as near Maulmain (Parish). The hemp is coarse, but durable, and resists wet better than many others.

× × *Pods not chambered within, many-seeded.*

TEPHROSIA, *Persoon.*

Vexillary stamen only at the middle adnate to the staminal tube. *Pods* thin coriaceous. Herbs, under shrubs, or rarely shrubs. *Leaves* pinnately many-1-foliolate.

* *Flowers in axillary or leaf-opposed racemes, rarely reduced to 2 or a few only. Leaves unpaired pinnate, rarely simple.*

× *Calyx-teeth short, deltoid (Brissonia, Neck.).*

T. CANDIDA, DC.

Chittagong and Tenasserim.

Kiesera sericea, Rwdt.

Shrub, silky pubescent. Corolla ¾-1 inch long, white. Racemes terminal and lateral. Pod appressed silk-hairy.

× × *Calyx-teeth narrow, cuspidate, as long as the calyx-tube (Reinera, Manch.).*

+ *Flowers in racemes.*

◦ *Racemes peduncled, leaf-opposed, and terminal.*

T. (GALEGA) PURPUREA, L.

All over Burma.

G. lanceifolia, Roxb.

Almost glabrous or very thinly appressed silk-hairy. Pods glabrous or nearly so.

◦◦ *Racemes axillary and terminal, sometimes reduced.*

T. PAUCIFLORA, Grah.

Paglā-myo.

Similar to the preceding, but racemes short or reduced to a few (2) flowers only.

T. (GALEGA) TINCTORIA, L.

var. β only near Ava.

G. Hayneana, Roxb.

Racemes long-peduncled, many-flowered. Leaves pinnate, leaflets in 3-6 pairs, appressed silvery silk-hairy. Pods glabrescent.

var. *a genuina*. The indument more or less tawny. Leaflets oblong.

var. β *coccinea*, Wall. The indument silvery-white. Leaflets short and more or less obovate, the base usually cuneate. This plant yields a blue dye like indigo.

T. HOOKERIANA, Kütz.

Racemes long-peduncled, many-flowered. Leaves pinnate, leaflets in 6-9 pairs, thin appressed silk-hairy. Pods densely brownish silk-hairy.

T. GRAHAMII, Wall.

Prome.

Racemes long-peduncled, few-flowered at the apex. Leaves simple, or with a pair of diminutive basal leaflets. Rest as in *T. tinctoria*.

+ + *Flowers solitary or by pairs in the leaf-axils.*

T. (GALEGA) SENTICOSA, L. Ava, Yē-nān-choung.
G. pentaphylla, Roxb.

Silvery silk-hairy. Leaflets in 2-3 pairs. Pods appressed silvery pubescent.

** *Flowers solitary or paired in the leaf-axils, very small. Leaves simple*

T. TENUIS, Wall. Ava, Segain.

All parts thinly silk-hairy. Leaves linear. Peduncle capillary.

MILLETTIA, *White et Arnott.*

Filaments diadelphous (9+1), filiform. *Pod* woody or coriaceous. Trees or woody climbers. *Leaves* pinnate.

Sub-genus NOTHO-MILLETTIA, Miq.

Stamens diadelphous (9+1 and 7+1). *Seeds* usually not compressed. Trees.

M. ATROPURPUREA, Wall. *E.T.* T. forests of Pegu and Tenasseim.

Kwē-tanyeng or Tanyeng-ngu (Kurz).

Glabrous. Corolla purple, glabrous. *Stamens* 9+1. *Pods* coriaceous, the valves very convex and smooth.

M. paniculata, Miq., differs only in its larger and more flattened pods. Miquel ascribes to this species a very abnormal diadelphism, viz. 7+1. *Pongamia glandulosa*, Griff., from Mergui, remains doubtful, as Griffith says nothing of the stamens, while he describes 10 hypogynous glands surrounding the ovary; he compares the tree to *M. atropurpurea* (Kurz).

Sub-genus EU-MILLETTIA, Bak.

Stamens monadelphous, the tenth vexillary stamen more or less free at the base only. *Seeds* much compressed.

* *Standard not auricled at the base.*

+ *Trees.*

× *Valves of pod without prominent ledges or wings on the margins, flat or slightly convex, glabrous or nearly so.*

° *Pod-valves not rough from warts or lenticles.*

M. (MUNDULEA) PULCHRA, Bth. Ava Hills.

Thyt-pagān (Kurz).

Young parts and leaves beneath slightly pubescent. Corolla glabrous, lilac. Pods appressed puberulous.

M. BRANDISIANA, Kz. Pegu Range.

Thyt-pagān (Kurz).

Young parts slightly pubescent. Corolla pubescent, lilac. Pods glabrous.

M. (PONGAMIA) CANA, Grah. *C.* Ava. Yē-nān-choung.

Leaves beneath sparingly appressed grey-hairy. Corolla glabrous. Pod obscurely "grey-canescens."

°° *Pod-valves rough from warts or lenticles, glabrous.*

M. (PONGAMIA) PENDULA, Grah. Pegu Range up to 2000 feet.

M. leucantha, Kz.

Thi-wyn.

Young shoots silky pubescent. Corolla glabrous, white. Pods thick, lenticellate. Heartwood very dark purplish brown, hard, tough and durable. When perfectly

seasoned, barely to be distinguished from Yendaik. Selected planks would form a handsome 'rosewood.' For strength and toughness it is surpassed by few woods. Weight 63 lbs. Highly deserving attention. The wood is yellowish when freshly cut, soon turning to purple, and then darkening still more (W. T.).

M. OVALIFOLIA, Kz. *T.* Prome.

Glabrous. Corolla glabrous, blue. Pod thick, warted.

× × *Valves of pod extended into prominent ledges or wings.*

M. GLAUCESCENS, Kz. Pegu Range and Martaban.

Young shoots slightly pubescent. Leaflets bluntish acuminate. Racemes almost glabrous. Corolla steel-blue, glabrous. Pods sharply edged.

M. PUBINERVIS, Kz. Toukya-gat Valley.

As preceding, but racemes pubescent. Corolla white, glabrous. Pods unknown.

M. TETRAPTERA, Kz. Promo and Ava.

Shortly tomentose, especially while young. Leaflets rounded at the apex. Corolla pale blue, glabrous. Pods with 4 waved marginal wings.

+ + *Woody climbers.*

× *Corolla glabrous. Ovary more or less pubescent. Pod glabrous.*

M. PACHYCARPA, Bth. Khakyen Hills.

Young shoots and leaves beneath pubescent. Calyx broader than deep. Corolla white. Pods fleshy coriaceous, torose.

M. MONTICOLA, Kz. Martaban Hills over 6500 feet.

As preceding, but glabrescent. Flowers much smaller, lilae. Calyx longer than wide. Pod unknown.

× × *Corolla, at least the standard, velvety or silky pubescent outside.*

M. (ROBINIA) PANICULATA, Roxb. Chittagong. Ava.

M. cinerea, Bth.

Pongamia heterocarpa, Wall.

Leaves glabrous. Flowers racemose, in terminal panicles. Pods torose, tawny.

M. (PONGAMIA) SERICEA, DC. *S.S.* Tropical forests East of Young-ngoo.

Leaves appressed silvery or coppery silk-hairy beneath. Flowers in lateral racemes. Pods flat, not torose, brown velvety.

M. CÆRULEA, Baker. Upper Tenasserim.

Leaves glabrous. Flowers in axillary short peduncled racemes. Pods brown.

** *Standard auricled at the base on both sides of the claw.*

× *Corolla glabrous.*

M. LEIOGYNA, Kz. *S.S.* Nakawā-choung, Toukya-gat.

Young shoots rusty tomentose. Corolla violet. Ovary quite glabrous.

× × *Corolla, at least the standard, velvety or silky pubescent outside.*

Leaflets blunt or apiculate, rarely shortly acuminate. Branches brown.

M. EXTENSA, Bth. *S.S.* Ava to Tenasserim.

Da-ma-nā-hweh-hyeh (Kurz).

Flowers purple. Racemes elongate, longer than the petiole. Pods glabrous when fully ripe.

M. MACROPHYLLA, Roxb.

Flowers white. Racemes elongate, much longer than the petiole. Pods tawny or brown tomentose even when fully ripe.

M. FRUTICOSA, Roxb. S.S.

Pegu.

Flowers rose-coloured. Racemes much shorter than the petiole. Leaflets obtuse. Pods fawny or brown tomentose.

° ° *Leaflets glaucous beneath, long- and caudate-acuminate. Branches grey.*

M. CAUDATA, Bth. S.S.

Tephrosia urophylla, Wall.

Low scandent shrub, almost glabrous.

** *Pods indehiscant, usually many or several-seeded (Dalbergiæ).*

× *Pods wingless.*

PONGAMIA, *Ventenat.*

Filaments long. Pod flattish, firmly fleshy coriaceous. Leaflets opposite.

P. (ROBINIA) MITIS, L.

Coasts of Arakan, Tenasserim, the Andamans, and Nicobars.

P. glabra, Vent.

Galedupa Indica, Lamk.

Theng-weng or Thi-wyn (Kurz).

Kurz describes the timber as white, turning yellowish, and fibrous. It must not be confounded with the true *Thyt-wyn* (*Millettia pendula*), to which it bears no resemblance either in look or qualities. It is, however, a graceful tree, with glabrous green leaves. The seeds are bean-shaped, and yield an oil, used in lamps and for some industrial purposes, but bitter and acrid, and used externally only as a cure for itch. A maund of seeds will yield thirteen pounds and a half of oil, at a net cost of a little over two rupees. It would make a good road-side or avenue tree.

DREPANOCARPUS, *E. Meyer.*

Filaments alternately shorter. Pods reniform or crescent-shaped, coriaceous or drupaceous, 1-3-seeded. Flowers white or purple. Leaflets alternate.

Sub-genus EU-DREPANOCARPUS. (Trees or woody climbers.)

Stamens united into a single sheath.

× *Corolla glabrous. Pods usually 1-seeded (Selenolobium, Bth.).*

D. SPINOSUS, Roxb. S.S.

Chittagong to Tenasserim.

Yē-ehin-yē (Kurz).

Leaflets $\frac{1}{2}$ inch long. Calyx a line long.

This and the following are referred by Bentham to *Dalbergia*, but the pods are not winged and the cell-cavity extends from suture to suture. Strictly speaking, the pods of *Dalbergia* cannot be called winged, for the broad thin margins of the pod are simply consolidated so as to leave (as in *Pterocarpus*) only a central cavity for the seed (Kurz). Kurz too says the powdered root absorbs alcohol, and consequently, if administered in water, destroys the effects of alcoholic intoxication !!

D. MONOSPERMA, Dalz.

Tidal forests of Upper Tenasserim.

Leaflets about an inch long. Calyx $1\frac{1}{2}$ lines deep.

Sub-genus PONGAMIOPSIS.

Stamens united into 2 separate sheaths. Corolla glabrous. Pods 1-3-seeded, moniliform-constricted between the seeds.

D. (DALBERGIA) RENIFORMIS, Roxb.

Pegu and Tenasserim.

Htouk-mā (Kurz).

Curious on account of the joints being dimorphous on the same or on different pods. They are either normally thick-coriaceous and as flat as those of the following species, and have the seeds much compressed; or they are firmly fleshy and up to

half an inch thick, in which case the seeds are larger and scarcely compressed. This latter state is not attributable to the agency of insects, but seems to be normal development. The full-grown foliage so much resembles that of *Dep. inundatus*, Mart., that I should experience some difficulty in distinguishing between the two species when out of flower or fruit (Kurz).

D. (DALBERGIA) CUMINGII, Bth. *W.C.* Tenasserim.

Panicles almost glabrous. Pod-joints flat and thick-coriaceous, wrinkled-veined. A dyewood, and yields the 'Kaju lakka' of commerce (Kurz).

× × *Pods winged along one or both sutures.*

DALBERGIA, *Linnaeus.*

Filaments alternately shorter. *Pods* oblong to linear, all round extended into a chartaceous or coriaceous wing. Trees or wooly climbers. *Flowers* from white to rose and purple. *Leaflets* alternate.

Sub-genus DALBERGARIA, Bth.

Stamens united into 2 separate sheaths of 5 each.

* *Erect trees.*

× *Pods velvety.*

D. CANA, Grah.

Pegu and Tenasserim.

Leaves bluntish acuminate. Panicles lax, puberulous. Flowers purple.

× × *Pods quite glabrous.*

+ *Leaflets rather large, apiculate, acute or acuminate.*

D. PURPUREA, Wall.

Martaban and Tenasserim.

Thyt-pōk.

Leaflets retuse-apiculate. Panicles lax, puberulous. Flowers white or purplish.

D. GLOMERIFLORA, Kz.

Prome Hills, above 1000 feet.

Leaflets acute or shortly acuminate. Panicles short and compact. Calyx glabrous. Flowers white.

+ + *Leaflets blunt or retuse, rather small.*

D. NIGRESCENS, Kz.

Ava and Prome.

Thyt-seh-nweng (Kurz).

Panicle rather compact. Pedicels short or very short. Leaves nigrescent.

D. PANICULATA, Roxb.

Ava and Prome.

Ta-pouk-pou (Kurz).

Panicle lax. Pedicels slender. Flowers white or purplish. Leaves not nigrescent.

** *Woody climbers. (Leaflets blunt or retuse.)*

D. VOLUBILIS, Roxb.

Ava, Chittagong, and Tenasserim.

Leaflets 11-13. Panicles densely pubescent. Bractlets minute.

D. STIPULACEA, Roxb.

Ava, Chittagong, Pegu, and Tenasserim,

D. ferruginea, Roxb. (*vide* Baker).

up to 3500 feet.

Douk-ta-lōng-nweh (Kurz).

Leaflets 17-21. Panicles glabrous. Bractlets small, but conspicuous.

Sub-genus SISSOA, Bth.

Stamens united into a single slit sheath.

* *Erect trees. Flowers white.*

× *Bractlets fallen long before expansion of the flowers.*

D. LATIFOLIA, Roxb.

The Andamans.

D. emarginata, Roxb.

D. Javanica, Miq.

Leaflets 3-7, almost orbicular to obovate, notched or blunt. All parts glabrous.

D. CALTRATA, Grah.

Ava, Pegu and Upper Tenasserim.

Yen-daik.

Young shoots appressed silky puberulous. Leaflets 7-11, more or less oblong, notched or blunt.

× × *Bractlets black, short and broad, deciduous but still present at flowering time.*

D. GLAUCA, Wall.

Ava. Pegu and Upper Tenasserim.

D. orata, var. *obtusifolia*, Baker.

Ma-da-mā (Kurz).

Leaflets blunt, more or less notched and mucronate.

D. OVATA, Wall.

Pegu and Upper Tenasserim.

Ma-da-mā (Kurz).

Leaflets acuminate, smaller or more coriaceous.

** *Woody climbers.*

× *Leaflets in 5-7 pairs. Inflorescence, etc., glabrous.*

D. FOLIACEA, Wall.

Ava. Pegu and Upper Tenasserim.

Flowers blue. Panicle ample, terminal. Leaflets more or less oblong.

D. THOMSONI, Bth.

Kambala Toung in the Pegu Range.

Flowers white. Panicles small, axillary. Leaflets more or less obovate.

× × *Leaflets in 11-41 pairs. Inflorescence and young branchlets rusty pubescent.*

D. TAMARINDIFOLIA, Roxb.

Andamans and Tenasserim.

Derris pinnata, Lour.

Leaflets $\frac{1}{3}$ - $\frac{1}{2}$ inch long. Panicles or cymes very short.

The pods of the Burmese species (= *D. rufa* and *multijuga*, Grah.) differ a good deal from those figured by Roxburgh, and they are much narrower. The pods of the Assam plant are unknown to me, but Mr. Simons calls it "a large tree 30 to 40 feet high." The matter requires further inquiry (Kurz).

D. VELUTINA, Bth.

Pegu and Tenasserim up to 4000 feet.

Leaflets 1-2 inches long. Panicle ample.

The heartwood of some species of *Dalbergia* is excellent, being tough and durable, and dark and handsome when polished, such as *D. latifolia* and *D. caltrata* ('Yendaik'). Weight of well seasoned wood, 58 lbs. *D. paniculata* yields a good pale-coloured timber, and *D. cana* a worthless one according to Kurz.

PTEROCARPCS, *Linnaeus.*

Filaments equally long. *Pods* almost orbicular or broadly oblong, seed-bearing in the centre and surrounded by a broad complete wing. *Trees.* *Flowers* yellow. *Leaflets* alternate.

P. INDICUS, Willd.

Tropical forests of the Pegu Range, Tenasserim, and the Andamans.

P. flavus, Lour.

P. Dalbergioides, Roxb.

Pa-douk.

Pods about an inch across, almost glabrous (even while young), the stylose point far above the base. Calyx more glabrous. Leafless in hot season.

A splendid timber is the Pa-douk (*P. Indicus*), resembling a coarse mahogany,

though paler. Weight, when thoroughly seasoned, 61 lbs. With that insagacity peculiar to 'Departments,' the Pa-douk is largely chosen for planting as a 'roadside' or 'avenue' tree, for which purpose it is singularly ill fitted, as it affords little shade when shade is most required, smells atrociously when in blossom, and is nowise comparable, for the end in view, to the different species of *Ficus* and *Eugenia*. As a timber tree it is surpassed by none—if matched by any,—and the freshly sawn wood is most fragrant. Dr. Mason thus writes of it: "The gum kino tree is a majestic evergreen, whose yellow papilionaceous flowers, clustering amid the bright drooping foliage, scent the air, like the large magnolias, for several hundred yards around. It is propagated by simply planting large branches in the ground at the commencement of the rain. There are, however two species, the red and the white, as distinguished by the Burmese, the red producing the finest timber, but the white padouk is by far the finest ornamental tree." Kurz describes both species as shedding their leaves in the hot season, and such is their undoubted habit when planted along roads, but it is not improbable the above luckless and inaccurate passage may have let the 'Department' into selecting so inappropriate a tree for roadside planting. The gum exuded by *Pterocarpus* constitutes the true gum kino of the Pharmacopœia (Pulv. Kino. Co.). According to Dr. Pemberton it possesses the singular property of not acting as an astringent unless diarrhœa is present.

P. MACROCARPUS, Kz. Rare in Prome, common in Tenasserim.

Pods almost 1½–2 inches in diameter, when young densely velvety-pubescent, the stylose point at the basal corner. Calyx rusty pubescent.

DERRIS, *Loureiro*.

Filaments alternately shorter. *Pod* flat, thin or coriaceous, winged along one or both sutures. Trees or woody climbers. Leaflets opposite.

Sub-genus BRACHYTERUM, W. A. (EU-DERRIS, Bth.).

Standard equally tapering at the base, with or without 2 basal callosities. *Stamens* monadelphous. *Pods* narrowly winged along the vexillary suture only.

* *Standard without basal callosities.*

× *Flowers in simple or almost simple racemes.*

+ *Pods lanceolate, acuminate or acute at both ends.*

D. (DALBERGIA) ROBUSTA, Wall. *T.* Pegu. Ava. The Andamans.
D. Krowee, Roxb.

Erect tree. Leaflets almost acute, mucronate.

D. SCANDENS, Roxb. *E.S.S.* Tropical forests all over Burma and the
Mi-joung-nweh (Kurz). Andamans. Kamorta.

Scandent shrub. Leaflets notched.

+ + *Pods oblong or orbicular, with rounded ends. Scandent shrubs.*

D. (PONGAMIA) ULIGINOSA, DC. *E.S.S.* Same localities as the last. Nicobars.
Galedupa uliginosa, Roxb.

All parts, also the pods, glabrous.

D. ELEGANS, Bth. *S.S.* Swamp forests of Pegu and Tenasserim.
Rusty pubescent. Pods pubescent.

× × *Flowers racemose, collected into panicles.*

D. SINUATA, Thw. *S.S.* Tropical forests of Pegu and Tenasserim.
D. polyarthra, Miq.

Myouk-gông-nyin (Kurz).

Glabrous. Pods sinuately constricted between the seeds. Corolla ½ inch long.

** *Standard with 2 basal callosities (Paraderris, Miq.).*

D. (PONGAMIA) ELLIPTICA, Wall. S.S. Upper Tenasserim.

Pongamia colubilis, Zoll. and Mor.

Pongamia Horsfieldii, Miq.

Young shoots densely silk-hairy. Flowers 10 lines long. Ovary villous.

Sub-genus AGAXOTE, Miq. (DIPTERODERRIS, Bth.).

Standard equally narrowed at the base, and without callosities. *Stamens* monadelphous, or the vexillary one free. *Pods* distinctly winged at both sutures.

D. ALENA, Bth. S.S. Tenasserim.

Glabrous. Lateral nerves beneath very faint, immersed.

Kurz adds from the Nicobars:

D. THYRSIFLORA, Bth. Tropical forests of Kamorta.

D. polythyrsa, Miq.

CÆSALPINIÆ.

The uppermost one of the imbricate or valvate petals (standard) innermost in bud. Stamens free or connate.

* *Anthers erect and basifixæd, rarely almost versatile, usually opening by 2 apical pores, rarely opening by longitudinal slits.*

Sub-tribe CASSIÆ.

Leaves unpairedly or abruptly pinnate. Sepals free to the disk, usually imbricate. Ovary or ovary-stalk free.

* *Petals all developed.*

CASSIA, *Linneus*.

Sepals imbricate. Stamens 5—10. Leaves abruptly pinnate. Trees, shrubs or herbs.

Sub-genus FISTULA, DC.

Filaments of the 3 lower stamens very long and arcuate, the others short or imperfect. *Pod* terete, elongate, indischent. *Seeds* horizontal.

* *Racemes slender and elongate, drooping, destitute of bracts. Flowers yellow.*

C. FISTULA, L.

All over Burma.

C. rhombifolia, Roxb.

Ngu-gyi (Kurz).

All adult parts glabrous. Calyx very deciduous, velvety. Petals an inch long.

** *Racemes often corymb-like, more or less erect, with persistent bracts. Flowers pale or intensely pink-coloured. Longer filaments thickened node-like at middle.*

C. NODOSA, Roxb.

Tropical forests of Chittagong and Upper Tenasserim.

Ngu-thein (Kurz).

Leaflets shortly acuminate, on petiolules 1—2 lines long. Bracts narrowly lanceolate.

C. RENIGERA, Wall.

Ava and Prome.

Ngu-shwē (Kurz).

Leaflets retuse or blunt, pubescent, almost sessile. Bracts cordate-ovate.

Sub-genus SENNA.

Perfect anthers 7 or 10, opening by terminal pores or short slits. Pods opening along one or both sutures. *Seeds* transverse or oblique.

* *Pods usually not elastically opening. Funicle of seed filiform (Senna genuina).*

× *Pods compressed and often flat, sometimes winged (Chamæsenia).*

‡ *Perfect stamens 10 (Psilorhagma).*

C. GLAUCA, Lamk. S. var. *a* in the dry forests of Ava and Prome.
var. *β* only cultivated in Pegu.

Senna arborescens and *speciosa*, Roxb.

C. suffruticosa, Koen.

Leaflets bluntish or rounded, more or less glaucous beneath. Flowers yellow, in corymb-like racemes. Bracts small, persistent. Pods black, very flat, shortly stalked.

var. *a genuina*. All parts more glabrous; leaflets larger, bluntish or acute, more glaucous beneath.

var. *β Kanigii* (*C. fruticosa*, Koen.; *C. speciosa*, Roxb.). The young parts more pubescent. Leaflets $\frac{1}{2}$ –1 inch only, retuse, or rounded, less glaucous beneath.

‡‡ *Perfect stamens 7. Pods much compressed. Flowers yellow.*

° *Pods not winged.*

† *Pods straight and acute. Trees or shrubs.*

△ *Stipules none or very deciduous. Petals $\frac{1}{2}$ inch long.*

C. STAMEA, Lamk. T. var. *a* all over Burma. var. *β* Ava and Prome only.

C. florida, Vhl.

C. Sumatrana, Roxb.

Mai-zali or Meh-zali (Kurz).

Adult parts glabrous. Bracts small, persistent, obovate with a subulate point longer than the blade. Leaflets in 6–10 pairs, $1\frac{1}{2}$ –2 inches long. Pods velvety.

var. *a genuina*. Leaves glabrous, the leaflets more glaucous beneath.

var. *β puberula*. Rachis of leaves puberulous, leaflets puberulous (especially while young), but less glaucescent beneath. A low rather stunted tree.

Brandis, in his list of woods in 1862, describes this tree as "Cultivated, heart-wood almost black, used for helves, walking sticks, mallets, etc.," and in Gamble's manual the wood is described as "dark brown, nearly black, very hard," with the same statement as above reproduced of its serving for mallets, helves and walking sticks. Now there is some mistake here; and whatever tree Dr. Brandis had before him when he penned his description, it was not, in my opinion, that commonly known in Pegu as Mai-zali. *Mai-zali*, or *Meh-zali*, is a common tree, and its heartwood is a very peculiar dark or blackish brown, with a silky sheen; but as weak as rotten wood almost, and this is so well understood that the natives ascend the tree with great caution. It is indeed the weakest wood I know, and possesses none of the properties attributed to it (W.T.).

C. TIMORIENSIS, DC. E.T. All over Burma.

Toung-mai-zali (Kurz).

All parts pubescent. Bracts leafy, broad-ovate, about $\frac{1}{3}$ inch long. Leaflets in 10–20 pairs, $1-1\frac{1}{4}$ inch long. Pods glabrous.

△△ *Stipules large, cordato-semilunate, persistent.*

C. AURICULATA, L. S. Common about Ava.

More or less pubescent. Leaflets in 8–10 pairs, $\frac{1}{2}$ – $\frac{3}{4}$ inch long. Bracts ovate to obovate-lanceolate, 3–4 lines long. Petals nearly an inch long. Pods shortly and rather thinly pubescent.

‡‡ *Pods lunate.*

C. OBOVATA, Collad. S. Ava. Yē-nān-choung.

Senna obtusa, Roxb.

Calyx glabrous. Petals 3–4 lines long. Pods shortly stalked, glabrous.

°° *Pods broadly 4-winged. Flowers large, orange-yellow.*

C. ALATA, L. *S.*

All over Burma.

Shrubby herb, almost glabrous. Leaves abruptly pinnate, the rachis almost winged-angular. Braets yellow, obovate-oblong, about an inch long, deciduous. Pods glabrous. The bruised leaves and simple cerate, in equal parts, are an excellent application for 'ringworm.' The leaves are also supposed to possess tonic properties (Waring, Manual of Therapeutics).

× × *Pods more or less terete to 4-gonous. Seeds transverse, oblique, or rarely parallel with the valves. Herbs, flowers yellow.*

+ *Seeds transverse or oblique.*

C. OCCIDENTALIS, L.

Common all over Burma. Kamorta.

C. sophora, L.

Leaves abruptly 4-pinnate, glabrous, leaflets in 4-12 pairs, acuminate. Calyx glabrous. Petals about $\frac{1}{2}$ inch long. Ovary glabrous.

+ + *Seeds parallel with the valves.*

C. TORA, L.

All over Burma.

Senna toroides, Roxb.

Leaves abruptly pinnate, leaflets in 3-2 pairs, blunt. Petals nearly $\frac{1}{2}$ inch long. Ovary shortly pubescent.

** *Pods opening elastically at both sutures. Funicle very short. Perfect anthers 10, or fewer by abortion, opening by slits. Flowers yellow, small. Herbs (Lasiorhegma).*

C. PUMILA, Lamk.

Prome.

Senna prostrata, Roxb.

More or less prostrate. Leaflets in 8-15 pairs, $2\frac{1}{2}$ - $3\frac{1}{2}$ lines long. Basal gland of rachis long-stalked. Pedicels 1-2 lines long.

C. MIMUSOIDES, L.

var. *a* common all over Burma. var. *β*
a shade-loving form in Tenasserim.

Erect, branched. Leaflets in 15-30 pairs, 1-3 lines long. Basal glands of rachis sessile. Pedicels up to $\frac{1}{2}$ - $\frac{3}{4}$ inch long.

var. *a angustissima*, Lamk.; *Telfairiana*, Hook.; *sensitiva* and *tenella*, Roxb.

Leaves almost sessile, the rachis often marginate. Leaflets only about a line long, very narrow. Pods nearly glabrous. All parts more or less glabrous.

var. *β C. myriophylla*, Wall.; *C. mimosoides*, *β myriophylla* and *auricoma*, Bth.; *Senna dimidiata*, Roxb. Leaves on a short pubescent petiole. Leaflets 2-3 lines long, oblong to linear, the rachis marginate or not. Pods more copiously appressed pubescent, while young usually pilose from yellow soft spreading hairs.

The timber of *C. fistula* and *C. renigera* is strong and hard, but of small scantling. The leaves of *C. oborata* and some other species constitute 'senna' of the Pharmacopœia, and the seeds of *C. fistula* are surrounded by a black sweetish laxative pulp, used in electuaries. As an ornamental tree *C. fistula* somewhat resembles the laburnum when in flower.

** *Anthers versatile, opening by longitudinal slits.*

Sub-tribe BAUHINIEÆ.

Leaves simple, 2-foliolate or simply pinnate. Calyx gamosepalous, or the sepals free to the disk, imbricate or valvate. Ovary-stalk adnate to the calyx-tube or rarely free.

* *Leaves simple and more or less 2-lobed, or 2-foliolate (Eu-bauhinia).*

BAUHINIA, Linnaus.

Petals unequal. Calyx gamosepalous or valvate. Pods dehiscent. Leaves palmately 5-many-nerved.

* *Trees or erect shrubs, without tendrils.*

Sub-genus PILEOSTIGMA, Hochst.

Stamens 10, all fertile. *Style* short or wanting, the stigma peltate. *Flowers* small.

B. MALABARICA, Roxb. *E.T.* Mixed forests of Pegu.

Bwē-zyn.

Calyx valvate, the segments all free. Glabrous trees.

The leaves are boiled and eaten as 'greens.'

B. RACEMOSA, Lamk. *T.* Deciduous forests of Prome.

B. parviflora, Vhl.

Hpa-lān.

Calyx spathaceous. Young shoots and under side of leaves pubescent.

Sub-genus EU-BAUHINIA.

Stamens 10, 5-9 sterile or reduced to staminodes, very rarely all 10 fertile.

× *Calyx spathaceous.*

+ *Pods sessile or acuminate and barely stalked.*

B. BRACHYCARPA, Wall. Ava, Taong-doung.

Pods minutely tomentose.

B. POLYCARPA, Wall. Pegu and Upper Tenasserim.

Pods glabrous.

++ *Pods long-stalked.*

B. MONANDRA, Kz. Upper Tenasserim.

Swē-tan (Kurz).

Fertile stamen one only. Leaves shortly pubescent beneath.

B. VARIEGATA, L. *T.* var. β in Ava, Prome and the Yoonzaleen Valley (*vide* Parish).

Fertile stamens 5. Young shoots puberulous. Leaves glabrous.

var. α *purpurascens*, Voigt. The 4 narrower petals purple, the fifth broader one tinged with cream and red.

var. β *candida*, Voigt. non Ait. The 4 narrower petals white or very pale purple, the fifth lower one somewhat sulphur-coloured in the centre, or purple towards the borders and yellow in the centre.

×× *Calyx-lobes valvate, reflexed and free to the base, or only slightly cohering. Pods long-stalked.*

+ *Pods glabrous. Petals white or purple.*

B. ACUMINATA, L. *S.* All over Burma.

B. isopetala, Griff.

Ma-hā-hlai-gā-hpyoo (Kurz).

A shrub, the leaves minutely puberulous beneath. Calyx in bud terete.

B. PURPUREA, L. *T.* Irrawaddy Valley.

Ma-hā-hlay-gā-nī (Kurz).

A tree, the leaves glabrous. Calyx angular in bud, irregularly bursting.

var. α *genuina*. Flowers purple.

var. β *triandra*, Roxb. Flowers white, often with a yellowish blotch on the lower petal.

++ *Pods brown-pubescent. Flowers yellow, turning orange-coloured.*

B. ELONGATA, Korth. *E.T.* Tropical forests in Pegu and Tenasserim.

B. mollissima, Wall.

Phanera velutina, Bth.

Leaves velvety. A small evergreen tree.

** *Scandent shrubs, with hook-tendrils.*

Sub-genus PHANERA, Lour.

Calyx-tube more or less elongate. *Calyx-lobes* valvate, all expanding or becoming reflected, rarely the one or other cohering. *Style* more or less elongate.

× *Ovary and pod glabrous.*

° *Pods stalked. Flowers racemose, large.*

B. DIPHYLLA, Symes. *S.S.* Ava and Promc.

Leaves 2-foliolate, the leaflets free to the base. Bracts or bractlets none.

B. INVOLUCELLATA, Kz. *S.S.* Martaban.

Leaves united into a 2-cleft leaf. Bractlets very large, almost leafy.

°° *Pod sessile. Flowers rather small, corymbose.*

B. GLAUCA, Wall. *E.S.* Tropical forests of Pegu and Tenasserim.

Lobes of the leaves rounded. Pedicels and calyx glabrous.

B. PIPERIFOLIA, Roxb. Tenasserim.

Phanera glabrifolia, Bth.

Lobes of the leaves acuminate. Pedicels and calyx appressed silk-hairy.

×× *Ovary, and usually also the pod, villous-pubescent or puberulous.*

° *Pod and ovary sessile.*

† *Adult leaves glabrous, the lobes acuminate to acute, and bluntish.*

B. MACROSTACHYA, Wall. Khakyen Hills.

B. scandens, Roxb. non L.

Racemes elongate, appressed silk-hairy. Pedicels stout.

B. ORNATA, Kz. Eastern Slopes of Pegu Range.

Myouk-hlĕ-gā.

Racemes corymb-like, contracted, sparingly puberulous. Pedicels slender.

†† *Leaves tomentose or pubescent, the lobes rounded.*

B. VAHLII, W.A. *S.S.* Tenasserim.

B. racemosa, Vhl. non Lamk.

All parts brown-tomentose or pubescent. Petals an inch long. Racemes elongate.

°° *Pod and ovary stalked.*

B. ROSEA, Kz. Martaban, Kāma-hpyu-choung.

Flowers rose-coloured, in corymb-like racemes; style shorter than the ovary, villous, thick.

“A *B. VahlII* inter alia differt stylo et floribus minoribus” (Kurz).

B. FERRUGINEA, Roxb. *E.S.S.* Tropical Forests East of Toung-ngoo over 2000 feet. Great Nicobar.

Phanera excelsa, Bl.

P. albolutea, Miq.

P. Griffithiana, Bth.

Flowers yellowish-white to yellow, in short racemes. Style elongate, slender.

Sub-genus LASIOBEMA, Korth.

Calyx-tube almost none, the lobes tooth-like. *Style* very short. *Pods* 1-2-seeded.

B. ANGUINA, Roxb. E.S.S.

Tropical Forests of Chittagong and Hills East of Young-ngoo.

Lasiobema Horsfieldii, Miq.

Glabrous or nearly so. Ovary and pods glabrous.

The wood of *Bauhinia* is of little value and no beauty, but the elegant creepers of the genus are some of the most striking objects in a tropical forest. The leaves and flowers of some species are eaten, as are the seeds, which in some of the scandent species are of very large size.

* * * * * *Leaves abruptly pinnate (Anaherstieæ).*

× *Calyx-tube short, the disk basal or nearly so (Cynometriceæ).*

+ *Petals 5 or fewer.*

CYNOMETRA, Linnæus.

Sepals 4-5. *Petals* 5, imbricate. *Stamens* 10 or many. *Pod* fleshy, indehiscent or tardily dehiscent. *Leaflets* in 1 to many pairs.

× *Racemes short and umbel-like, puberulous.*

* C. RAMIFLORA, L.

Cultivated in Tenasserim. Nicobars.

Myeng-ka-pen (Kurz).

Leaves and rachis glabrous. Leaflets larger, usually in a single pair; 1½-2 inches long, edible.

C. BIJUGA, Spanoghe. E.T.

Tropical forests of Arakan, Tenasserim, the Andamans, and Nicobars.

Rachis of leaves puberulous, slenderer. Leaflets smaller, usually in 2, very rarely in 3 pairs. Pods about ½ inch long, insipid.

× × *Racemes longer or shorter, bracted.*

* C. CAULIFLORA, L. E.T.

Cultivated (*fide* Mason).

Pedicels glabrous or puberulous. Leaflets in a single pair.

× × *Disk at the top of a prolonged calyx-tube (Eu-anherstieæ).*

+ *Petals* 1-5. *Trees.*

° *Calyx-tube elongate.*

† *Petal one.*

AFZELIA, Smith.

Calyx-segments 4, much imbricated. *Petal* clawed. *Stamens* 3-8, free, with or without a few minute staminodes. *Pod* large, woody or coriaceous. *Seeds* not arillate. *Leaves* abruptly pinnate.

A. BIJUGA, Colebr.

Coast forests of the Andamans. Kamorta and Katchall.

Jonesia triandra, Roxb.

Inflorescence and calyx puberulous. Pods ½-1 foot long, woody. Leaflets usually bluntish.

A. RETUSA, Kz.

Tidal forests of the Andamans.

Inflorescence and calyx glabrous. Pods 3-4 inches long, thin coriaceous. Leaflets notched.

†† *Petals* 3-5.

TAMARINDUS, Linnæus.

Petals 3, with the rudiments of 2 others. *Staminodes* teeth-like. *Stamens* monadelphous, only 3 of them developed. *Pod* turgid, indehiscent, the acid mesocarp pulpy.

* T. INDICA, L. *E.T.*

Cultivated all over Burma. Nicobars.

Maji.

Kurz describes the heartwood as "dark-coloured and resembling ebony, sometimes beautifully dark-reddish veined." This is hardly correct, as the wood is not black, but a reddish-purple when fresh, seasoning to a brownish-purple. The fully-seasoned heartwood weighs 86 lbs., and it is the heaviest, hardest and handsomest wood I know. Its hardness is so great as to chip or spoil any but the most seasoned tools, and it is a matchless wood for ornamental turnery. A very large tree would, however, only yield a plank a foot broad. Small logs of the heartwood would be valued in England for turning (W.T.).

AMHERSTIA, *Wallich.*

Petals 5, 3 of them nearly equally long, and like the lowermost one, very broad, the 2 others minute or rudimentary. *Stamens* diadelphous (9+1).

A. NOBILIS, Wall.

Planted around kyoungs, chiefly in the southern parts of Burma. Wild along streams in Martaban (Parish).
Thaw-kah.

Dr. Mason was uncertain as to the precise locality of the wild tree, but Mr. Parish, a most competent authority, declares it exists wild in Martaban. Dr. Mason describes this rare tree as of "low stature, with slender pendulous branches clustered under its tufted summit of lively green, and draped with large pea-blossom-shaped flowers of brilliant red and yellow, which hang down from its graceful arches in tassels, more than a yard long." Dr. Wallich also writes: "There can be no doubt that this tree when in full foliage and blossom is the most strikingly superb object which can possibly be imagined. It is unequalled in the flora of the East, and I presume not surpassed in magnificence and elegance in any part of the world." The following poetical picture is from the pen of Mrs. Ellen H. B. Mason, the helpmate and fellow-labourer for many years of my deceased friend. Trochla is a village on the Salween, where Wallich discovered the tree.

"Ho, Trochla! thy tide
Hath a beautiful bride,
The child of an iris-wreathed shower;
With veils flowing down
From her emerald crown,
Whose fringes unfold,
In scarlet and gold,
A glorious sight,
Ever graceful and bright—
The queen of proud Ava's wild bower.

Tall sweet-blossomed trees
Are wooing the breeze
O'er highland, and dingle, and glade;
But, though they allure
With their fragrance so pure,
The Amherstia is fairest,
The noblest, the rarest;
Nor all the rich flowers
Of Albion's bowers
Can vie with its purpling shade."

Mr. Parish's remarks on this tree, which completely establish its claim to be considered as indigenous to Burma, are contained in the *Journal of the Asiatic Society of Bengal* for 1865, p. 135 and p. 145, and are worth reproducing here:—

"While at Beling on the way, I rode out in company with Col. Fytche and Capt. Harrison to a place called *Xothanaiong*, about 7 miles off, to see the Amherstia trees there. This place had often been mentioned as one where the Amherstia was

to be seen in great perfection, and where indeed it might perhaps be wild. I was well rewarded, for a prettier little spot I never visited. The Amherstias, growing in a well-shaded place and watered by a perennial stream, which tumbles down a steep granite hill, and is ingeniously directed hither and thither, in large bamboo troughs, were indeed to be seen in the wildest luxuriance of growth. But Kothanaiong is a sacred spot. Here are Pagodas, Pongyee-houses, Zayats all around. A flight of steps leads from the bottom to the top of the overhanging hill, which is about 600 feet high, and on which are more sacred buildings. The Amherstias, seen only round the principal Pagoda, were undoubtedly planted, although they are now left to take care of themselves and have a wild appearance. Evidently, this is not a native habitat of the tree."

Dropping down the Yunzaleen, however, by boat from Pahpoo, on the second day, Mr. Parish found a fine Amherstia in full flower, which he regarded without hesitation as a wild tree. Mr. Parish cogently remarks: "Now my reasons for saying that this was a *bonâ fide* wild tree are these: in all this district, the Valley of the Yunzaleen, there are no Pagodas or Pongyee-houses, or spots sacred to the Burmese, where they have erected buildings. The inhabitants of this district, in fact, are Karens, and not Burmese, and these Karens are exceedingly few and scattered. After leaving Pahpoo, we did not see a single village on the banks all the way until we came to the junction of the Yunzaleen with the Salween. There are indeed, no doubt, a few villages a little way from the bank, here and there hidden among the trees; but these generally consist of but two or three houses; neither are they settled villages, for the custom of the Karens is to change the site of their houses continually. Besides, the regular Karens, not being Buddhists, do not build Pagodas, nor do they ever trouble themselves to plant ornamental trees, as the Burmese always do, in their sacred places. Again, the spot where this Amherstia was seen was not at all a likely spot for an Amherstia to have been planted by any one; but one of the wildest places imaginable. Had it been on a rising ground, or on a high bank alone, or on any prominent point on the river, I should have suspected that a hand had placed it, but it was on a low and sloping part of the bank, struggling for life with *Calamus*, *Bauhinæa*, and tall grasses and such other tangled stuff as forms the common vegetation of our river banks in the wildest places, and behind again was dense jungle of the tallest trees. However, notwithstanding all this, had it been seen in a fairly peopled district, I should have doubted, but in such a wild uninhabited country as the Yunzaleen is, I see no reason for suspecting that it was not a genuine native. Had Wallich's first tree been here, I am satisfied that the idea of its *not* being wild would never for a moment have occurred to him. I am perfectly satisfied that the tree seen by me was a wild one. That the Amherstia in a wild state may be very scarce is not improbable; but that it should not exist any longer in that state, though possible, is to say the least, very unlikely."

+ + *Petals none.*

SARACA, *Linnaeus.*

Sepals 4. *Stamens* 3-9. *Pods* coriaceous, 2-valved. Trees.

*S. INDICA, L. *E.T.* Wild in the tropical forests of Arakan (Boronga Island, *Jonesia Ahsoca*, Roxb. at 1000 feet elevation); also Tenasserim; much *J. Zollingeriana*, Miq. planted around monasteries all over the country.

A-thor-kā-bō.

One of the loveliest trees when in full blossom that the East produces. When they first open, the blossoms are a fine orange colour, which gradually changes to red, and at night they exhale a delicious perfume. It is a pity it is not more extensively cultivated in the gardens of Europeans.

Sub-tribe EUCLESALPINIÆ.

Leaves usually abruptly bipinnate. Sepals free to the disk, valvate or imbricate. Ovary or ovary-stalk free.

× *Sepals valvate or nearly so.*

POINCIANA, *Linnaeus.*

Pod 2-valved, flat, coriaceous. *Leaves* bipinnate, the leaflets all developed. Unarmed.

* P. REGIA, Boj. Cultivated as an ornamental shrub.

Calyx quite glabrous. Petals very large, waved, usually crimson.

PARKINSONIA, *Linnaeus.*

Pod turgid-moniliform, indehiscent. *Petiole* very short, spine-like, with 2-4 much elongate pinnæ of minute and often quite reduced leaflets. Armed.

* P. ACULEATA, L. Cultivated in Ava and Prome.

A good tree to form hedges.

× × *Sepals imbricate. Trees or woody climbers.*
+ *Climbers, usually armed.*

CÆSALPINIA, *Linnaeus.*

Pods not winged, indehiscent or 2-valved, several-seeded. *Stigma* small.

Sub-genus CÆSALPINARIA.

Albumen none. *Pods* coriaceous, 2-valved. *Filaments* very long and slender, quite glabrous. Erect shrubs or trees, unarmed.

* C. (POINCIANA) PULCHERRIMA, L. Cultivated all over the country.

Doung-sök.

Sub-genus EU-CÆSALPINIA.

Seeds albuminous. *Pods* various. *Filaments* as long as, or somewhat longer than, the petals. Usually scandent shrubs, more or less armed with prickles.

A. Valves of pod dry, coriaceous or almost chartaceous.

Sub-genus NUGARIA, DC.

Scandent thorny shrubs, rarely trees. *Pods* rigidly or thinly coriaceous, 2-valved or indehiscent, smooth. *Seeds* compressed or not. *Stamens* as long as, or a little longer than the petals.

* *Seeds flat and compressed. Pods 2-valved. Leaflets large.*

C. NUGA, Miq. Arakan, Tenasserim, the Andamans,
C. paniculata, Roxb. Kamorta, and Katchall.
C. Chinensis, Roxb.

All parts quite glabrous.

** *Seeds hardly compressed. Pods 2-valved or indehiscent, or nearly so, the sutures usually thickened. Leaflets small.*

C. SAPPAN, L. Pegu and Tenasserim.

Small tree. Leaflets unequally oblong, retuse. Pods tardily dehiscing.

Dr. Mason remarks:

“In the valley of the Tenasserim, between the latitudes of Tavoy city and the mouth of the Tavoy river, the hills that border the valley on the eastern side abound in sapan wood, which is used extensively as a red dye. Considerable quantities are exported every year from Mergui, and that province is usually supposed to contain the tree, though it is really within the Province of Tavoy; but the facility of water communication from the interior to Mergui makes that the only port to which the wood is conveyed. It is rather singular that this narrow locality is the only one in the Provinces, so far as I am aware, in which the tree is found. The tree has a much wider range, the Karens inform me, on the Meinam side of the mountains in Siam. More than five hundred thousand pounds have been exported from Mergui during

some years between 1830 and 1840; but latterly the forests have not been so productive." Dr. McClelland writes: "It is found in the immediate vicinity of Prome, growing in the small hills of that place. It is also seen near Thoungzai, in the northern part of the Rangoon district;" but Dr. Brandis says: "Not wild in Pegu."

C. SEPIARIA, Roxb. S.S. Burma (*vide* Mason).

Su-kyin-bō (Kurz).

Scandent shrub. Leaflets ovate, acute. Pods 2-valved.

Sub-genus GUILANDINA, L.

Scandent thorny shrubs. *Pods* coriaceous or thin coriaceous, 2-valved, the valves echinate or glandular-hirsute. *Seeds* not compressed. *Stamens* as long as, or somewhat longer than, the petals.

* *Pods echinate. Seeds almost globose.*

B. BONDU, L. S.S. All over Burma and the Andamans.

Kalein (Kurz). Kamorta and Katchall.

Branchlets, etc., more or less brown or tawny-pubescent. *Stipules* none. *Bracts* straight and erect.

** *Pods glandular-hirsute when fully ripe. Seeds oblong.*

C. MIMOSOIDES, Lamk. S.S. Toung-ngoo.

C. simora, Ham.

All parts more or less glandular-puberulous and prickly.

B. Pods fleshy-coriaceous, torose.

Sub-genus CYLINDROCARPUS, Zoll.

Thorny scandent shrubs. *Pods* indehiscent, the sutures thickened. *Seeds* not compressed. *Stamens* as long as, or somewhat longer than, the petals.

C. TORTUOSA, Roxb. Tenasserim.

Panicle shortly tomentose and prickly.

C. DIGYNA, Roth. All over Burma.

C. oleosperma, Roxb.

C. gracilis, Miq.

Panicle glabrous and unarmed.

PTEROLOBIUM, E. Browne.

Pods samaroid, indehiscent, the upper end produced into a conspicuous wing-like appendage, 1-seeded. *Ovary* 1-ovuled.

P. MACROPTERUM, Kz. S.S. Pegu and Tenasserim.

Kyoung-gyet-nweh (Kurz).

MEZONEURUM, Desfontaines.

Pod flat, several-seeded, indehiscent, the upper suture extended into a wing. *Stigma* small.

M. GLABRUM, Desf. var. β frequent in the Irrawaddy zone of Pegu. var. γ not unfrequent in the dry forests of Prome.

Leaflets in 10 to 8 pairs, $\frac{1}{2}$ inch long, blunt or retuse.

var. *a genuinum*. Glabrous or nearly so. Leaflets usually alternate.

var. β *enneaphyllum*, W. A. Glabrous or the secondary rachises and young shoots slightly puberulous. Leaflets glabrous or nearly so, usually opposite.

var. γ *pubescens*, Desf. The young parts more or less velvety pubescent or puberulous. Leaflets opposite or nearly so, beneath shortly pubescent.

M. (CESALPINIA) CUCULLATUM, Roxb. All over Burma.
M. macrophyllum, Bl.

Kyoung-shyt.

Leaflets in 3-4 pairs, 1½-2 inches long, bluntish acuminate.

+ + *Erect trees, not armed.*

PELTOPHORUM, Vogel.

Pods flat, several-seeded, indehiscent, both sutures extended into a wing. *Stigma* peltate. *Stamens* 10, free.

P. (CESALPINIA) FERRUGINEUM, Dene. Beach forests of the Andamans.
Pedicels only 2-3 lines long. *Pods* with coriaceous wings.

ACROCARPUS, Wight.

Pods as in preceding, but indehiscent and winged along the upper suture only. *Stigma* minute. *Petals* narrow, almost equal. *Stamens* 5, free.

A. FRAXINIFOLIUS, Wight. Pega Range.

Mai-a-nhen (Kurz).

Flowers green. *Petals* 3 lines long or longer. *Pods* 17-18-seeded.

Sub-order MIMOSEÆ.

Flowers regular, the petals valvate in bud, free or more usually united into a shorter or longer tube. *Stamens* definite or indefinite, free or connate.

MIMOSIEÆ.

Stamens definite, usually 10 or 5, or twice as many as the petals.

Sub-tribe MIMOSIEÆ VERÆ.

Anthers gland-tipped or not. *Stamens* free. *Calyx* valvate in bud.

* *Anthers* gland-tipped.

× *Flowers* in spikes or racemes.

ADENANTHERA, Linnæus.

Pods 2-valved, often falcate or circinate, transversely chambered between the seeds. *Flowers* in spikes or racemes. *Erect trees*. *Leaves* bipinnate.

A. PAVONINA, L. var. β in Tropical forests all over Burma and the adjacent
Entada arborea, Griff. islands up to 3000 feet. Great Nicobar.

A. Gersenii, Scheff.

var. *a genuina*. Seeds about $\frac{1}{8}$ inch in diameter.

var. β *microsperma*, T. and B. Seeds half the size.

A handsome tree, heartwood red and durable.

ENTADA, Adams.

Pods large, the indehiscent joints separating from the persistent thickened sutures. *Flowers* in spikes. *Tendrils*-bearing woody climbers. *Leaves* bipinnate.

E. (MIMOSA) SCANDENS, L. All over Burma, Kamorta and Nankowry.

E. porsatha, DC.

E. Rumphii, Scheff.

This gigantic creeper, with pods more than a yard long and four inches broad, is one of the most striking of its class. The seeds are roasted and eaten, and are eagerly sought in the tree tops by both Burmans and Karens at the risk of their necks.

× × *Flowers in oblong or globose heads.*

NEPTUNIA, *Lourviro.*

Pods flat, 2-valved, thin coriaceous. Flowers in dense heads. Erect herbs. Leaves bipinnate.

- N. (DESMANTHUS) NATANS, Willd. In stagnant waters in Pegu and Tenasserim.
N. oleracea, Lour.
Mimosa natans, Roxb.
N. plena, Ldl. non Bth.

** *Anthers not gland-tipped.*

× *Pods more or less jointed, the joints receding from the persistent sutures.*

MIMOSA, *Linnaus.*

Flowers in dense spikes or heads. Shrubs or herbs, with bipinnate leaves.

- * M. PUBICA, L. A weed, introduced and now common from Ava to Pegu.
 The sensitive plant.

+ + *Valves of pod thick and woody, falcate.*

XYLIA, *Bentham.*

Pods woody, tardily dehiscent. Flowers in globose heads. Leaves bipinnate.

- X. (MIMOSA) XYLOCARPA, Roxb. All over Burma up to 3000 feet.
X. dolabriformis, Bth.

Pyn-ga-do. Pegu Ironwood.

The ironwood of Pegu is hard, strong and durable. The seasoned wood weighs 68 lbs. Kurz says: "recommended for spars"; but surely no "Tar" in his senses would select such a heavy wood for the purpose! and I take the above as a specimen of the glib rubbish which gets copied and re-copied *ad nauseam* by heedless compilers. An excellent wood for all purposes demanding strength and durability, and where weight is no objection.

Sub-tribe PARKIEÆ.

Calyx imbricate in bud. Stamens monadelphous.

PARKIA, *R. Brown.*

Stamens 10, in neuters reduced to long filaments. Flowers in large long-peduncled heads, the lower ones neuter, the upper ones fertile. Trees with bipinnate leaves.

* *Calyx-lobes obovate-cuneate.*

- P. INSIGNIS, Kz. Tropical forests East of Toung-ngoo.
 Myonk-tanyet (Kurz).
 Leaflets an inch long, pubescent beneath, penninerved. Receptacle regular.

** *Calyx-lobes short, rotundate (not cuneate-narrowed).*

- P. LEIOPHYLLA, Kz. Tropical forests of Pegu Range.
 Leaflets $\frac{1}{2}$ inch long, quite glabrous, 1-nerved, with a lateral basal nerve. Receptacle irregular.

ACACIÆÆ.

Stamens indefinite, free or connate.

Sub-tribe ACACIÆÆ VERÆ.

Stamens free.

ACACIA, *Willdenow.*

Pods various, dehiscent or not. Flowers in heads or dense spikes. Trees or shrubs, sometimes climbing, with bipinnate leaves or the leaves reduced to phyllodes, armed or unarmed.

* *Trees or erect shrubs, the branchlets armed only with paired diverging stipulary or infra-stipulary prickles.*

× *Flowers in spikes.*

+ *Pod-valves chartaceous, transversely reticulate-veined, the sutures nerve-like or almost keeled.*

A. FERRUGINEA, DC.

Burma.

Glaucous-green, glabrous. Leaflets oblong-linear, blunt, 3-5 lines long. Flowers yellow.

+ + *Pod-valves coriaceous, the margins not or hardly prominent.*

A. (MIMOSA) CATECHU, L.

var. *a* Ava and Pegu. var. *β* Ava.

Shā.

Spikes glabrous or pubescent, yellow. Leaves glabrous or slightly pubescent. Bark much cracked and rough, dark brown.

var. *a genuina*. *Mimosa catechuoides*, Roxb. Young parts all slightly appressed pubescent but soon glabrescent. Full-grown leaves glabrous or the leaflets ciliate, the rachis slightly pubescent. Spikes shorter and thicker, like the calyces more or less appressed pubescent. Corolla about twice the length of the calyx.

var. *β Sandra*, DC. All parts glabrous or the very young shoots slightly pubescent. Full-grown leaves and rachis quite glabrous. Spikes elongate and slender, quite glabrous. Corolla glabrous, about $\frac{2}{3}$ longer than the glabrous calyx.

Terra japonica, *Catch*, or *Āth*, is the inspissated extract obtained by boiling chips of the wood. The wood is dark red, very hard, and handsome, but easily dressed and free from knots, and in aspect is equal to mahogany. Weight of selected pieces when seasoned 69 lbs., but runs lighter in ordinary samples.

A. (MIMOSA) SUMA, Roxb.

Ava.

A. catechu, Bth. and Bedd.

Spikes tomentose, white. Leaves while young greyish pubescent. Bark rather even and smooth, white.

× × *Flowers in globular heads, yellow.*

+ *Pods dry-coriaceous, flat, dehiscent.*

A. LEUCOPHLEA, Willd.

var. *a* along the Irrawaddy. var. *β* Prome
up to 1000 feet.

Bark whitish. Flower-heads arranged in ample terminal panicles.

var. *a genuina*. Flower-heads the size of a pea, the stout peduncles, and also the pods, shortly tomentose. Leaves slightly, the rachis more or less, pubescent.

var. *β A. microcephala*, Grah. Flower-heads half the size, the slender peduncles and the inflorescence puberulous. Pods when ripe, leaves and rachis glabrous.

+ + *Pod thick, torose, fleshy-coriaceous, indehiscent.*

* A. FARNESIANA, Willd.

Cultivated all over Burma.

Nan-lon-kyaing (Mason).

Glabrous or nearly so. Leaves $1\frac{1}{2}$ -3 inches long, leaflets 2-3 lines long.

** *Woody climbers, without stipulary spines, but the branchlets armed along their whole length with sharp recurved prickles. Flower-heads globular.*

× *Pods fleshy-coriaceous, often somewhat constricted between the seeds.*

A. (MIMOSA) RUGATA, Lamk.

var. *β* all over Burma and the Andamans.

Leaflets in 10-20 pairs, up to $\frac{1}{2}$ inch long. Flower-heads small, yellowish.

var. *a genuina*. Ovary villous. Softer parts more pubescent.

var. *β A. concinna*, DC. Ovary glabrous. All softer parts more glabrous.

× × *Pods dry, chartaceous or thin coriaceous, flat.*
 ° *Ovary and pods pubescent.*

A. (MIMOSA) CÆSIA, L. S.S. var. β in Tropical forests of Pegu Range.
Mimosa torta, Roxb.

Leaflets in 15-40 pairs, 3-6 lines long. Flower-heads small, white, in panicles.

var. *a genuina*. Leaflets only about 3 lines long, more rigid, bluntnish, with or without a mucro. Branches terete.

var. β *elegans*. Leaflets about ½ inch long, bristly acute, less rigid. Branches 5-angular, retrorsely prickly along the corners.

°° *Ovary and pods glabrous.*

A. (MIMOSA) INTSIA, L. S.S. Chittagong and Khakyen Hills.
A. oxyphylla, Grah.
Mimosa cæsia, Roxb.

Leaflets in 8-20 pairs, ½ inch long. Peduncles tawny tomentose.

A. (MIMOSA) PENNATA, L. S.S. var. *a* all over Burma. var. β Ava.
A. prensans, Lowe.

Su-yit (Kurz).

Leaflets in 30-40 pairs, 2-3 lines long. Flower-heads the size of a large pea. Panicles and young branchlets puberulous or tomentose, not pruinous.

var. *a genuina*. Panicles puberulous. Flower-heads the size of a large pea. Young branchlets shortly puberulous. Leaflets glabrous. Rachis glabrous or slightly pubescent. Pods linear-lanceolate, acuminate at both ends.

var. β *A. canescens*, Grah. Panicles and young branchlets tomentose. Leaflets ciliate. Rachis tomentose. Pods linear-oblong, rounded at both ends, smooth. coloured.

A. PRUNESCENS, Kz. *H. C.* Southern Pegu. Also the Khakyen Hills.

As preceding, but branchlets and panicles pruinous. Leaflets up to ½ inch long. Flower-heads twice the size. This species has flower-heads twice the size of those of the preceding; and the branchlets, inflorescence, and peduncles are more or less pruinous, with or without an admixture of tomentum. It is a powerful climber, with somewhat compressed dark-coloured stems up to 3 feet girth. The tough reddish bark and fibre are used for poisoning fish.

Sub-tribe INGIEÆ.

Stamens connate. Flowers in heads or dense spikes.

* *Seeds without an arillus, but on longer or shorter funicles.*

ALBIZZIA, Durazzo.

Pods straight. Trees with bipinnate leaves.

Sub-genus ET-ALBIZZIA.

Pods straight, very flat, the sutures slightly thickened. Flowers white.

* *Pinnæ numerous (10-18). Leaflets linear, 1-6 lines long, in very numerous pairs.*

× *Leaflets bluntnish, the nerve central or nearly so.*

A. MYRIOPHYLLA, Bth. *E.T.* Tenasserim.
Mimosa microphylla, Roxb.

Leaflets very narrow, glabrous. Flower-heads small, in terminal panicles.

× × *Leaflets more or less acute, the nerves marginal or nearly so.*

A. (MIMOSA) STIPLATA, Roxb. *E.T.* Chittagong, Tenasserim, and the Andamans
M. Smithiana, Roxb. up to 4000 feet. Kamorta.

Bō-mē-zā or Bōn-meh-zā.

Stipules very large, obliquely ovate, acuminate. All parts more or less shortly pubescent. Corolla nearly 4 times as long as the calyx.

A. ELEGANS, Kz. *E.T.* Pegu Range.

Stipules none or obsolete. Full-grown parts glabrous or nearly so.

Very similar to the preceding, but a much more elegant tree. Flowers and fruits unknown. I have the very same plant from the island of Banka (Sumatra) (Kurz).

** *Pinnæ* in 2-6 pairs. *Leaflets ovate to oblong, $\frac{1}{2}$ -1 $\frac{1}{2}$ inch long, in several pairs.*
× *Leaflets sessile.*

A. (MIMOSA) ODORATISSIMA, Roxb. *T.* Pegu and Tenasserim.

A. micrantha, Boiv.

Flowers small. Calyx minute. Corolla 1 $\frac{1}{2}$ line long. Pods blackish.

Thyt-ma-gyi (Kurz) or Thym-maji.

A. LEBBEK, L. *T.* Pegu. Tenasserim and the Andamans.

Mimosa sirissa, Roxb.

Kō-kō.

Flowers conspicuous. Calyx 1 $\frac{1}{2}$ line long. Corolla 4 lines long. Pods yellowish.

× × *Leaflets shortly petioluled. Pinnæ* in 4-3 pairs.

A. (MIMOSA) PROCERA, Roxb. *T.* Pegu and Tenasserim.

M. elata, Roxb.

Syt.

Leaflets blunt or somewhat acute, $\frac{1}{2}$ -1 inch long, glaucescent beneath. Pods tapering at the base, linear, smooth, brown.

*** *Pinnæ* in a single pair. *Leaflets few only, large, acuminate.*

A. (MIMOSA) LUCIDA, Roxb. Ava and Prome.

Tor-that-hpyu (Kurz).

Glabrous. Pods broad, very flat.

Sub-genus PITHECOLOBIUM, Mart.

Pods twisted circinate or serew-like or curved. *Flowers* white.

* *Flowers pedicelled, or head-like umbels or racemes. Trees.*
+ *Branchlets terete.*

A. JIRINGA, Jack. Pegu and Tenasserim.

Mimosa Djiringa and *Kæringa*, Roxb.

Pithecolobium lobatum, Bth.

Leaves with a single pair of pinnæ. Leaflets in 2-3 pairs, smooth and glossy. Seed-bearing lobes of pod about an inch long and broad.

++ *Branchlets sharply angular.*

A. (MIMOSA) HETEROPHYLLA, Roxb. Tenasserim from 4000 to 6000 feet.

Pithecolobium angulatum, Bth.

P. acutangulum, Miq.

Leaves with about 12 pairs of pinnæ. Leaflets in 4-8 pairs, while young shortly and softly pubescent like all younger parts, acuminate.

** *Flowers sessile, in small heads.*

A. GLOMERIFLORA, Kz. Hills East of Toung-ngoo from 4000 to 7000 feet.

Erect shrub. Leaves with a single pair of pinnæ. Leaflets in 4-8 pairs, almost glabrous, glaucous beneath.

The following species are added by Kurz from the Nicobars:

- | | |
|--------------------------------------|------------------------------|
| A. LITTORALIS, T. et B. | Nankowry. Great Nicobar. |
| A. (PITHECOLOBIUM) BUBALINA, Bth. | Kamorta. Nankowry. |
| <i>P. oppositum</i> , Miq. | |
| A. (PITHECOLOBIUM) CLYPEARIA, Bth. | Katchall. |
| A. (PITHECOLOBIUM) FASCICULATA, Bth. | Tropical forests of Kamorta. |

Kurz adds: "I follow v. Mueller and Scheffer in throwing together *Albizzia* and *Pithecolobium*, the differences pointed out by Bentham appearing to me not to be of generic value.

This genus yields excellent timber for furniture and fittings, the wood being light, lasting (when not exposed to the weather), easily planed and dressed, and handsome in appearance. *A. stipulata* (Bön-meh-zā) is a light brown wood, somewhat like walnut, and when seasoned weighs 28 lbs., though Kurz (so frequently inaccurate when misled through following Brandis in the matter of timbers) states it to be "heavy," Brandis giving 66 lbs., which is undoubtedly wrong for the seasoned wood. *A. odoratissima* (Thyt-maji) is a similar wood, but closer-grained, and runs up to 54 lbs., and is highly to be commended for ornamental furniture. *A. lebbek* (Kō kō) is a handsome brown wood of open grain, 47 lbs. weight. *A. procera* (Syt) give a light brown wood of 34 lbs. only. All these are admirable light woods, not so heavy as Kurz's remarks would lead one to suppose, but I allude, of course, always to the thoroughly seasoned timber.

* * * *Seeds conspicuously arillate.*

INGA, Willdenow.

Pods circinnate or cochleate. Trees or shrubs with simply pinnate leaves.

* I. (MIMOSA) DULCIS, Roxb. Cultivated.

Order CONNARACEÆ.

Flowers usually hermaphrodite, regular or nearly so. *Calyx* 5-cleft, often persistent, imbricate or valvate. *Petals* 5, free, or sometimes slightly coherent at the middle, imbricate, rarely valvate. *Stamens* perigynous or hypogynous, sometimes distinctly declinate, 5 or 10, very often alternately shorter, and sometimes imperfect. *Filaments* usually united in a ring at the base. *Anthers* usually opening inwards, didymous. *Disk* none, thin or incomplete. *Ovary* of 5 distinct 1-celled carpels, either all perfect, or 1 fertile and the rest abortive, rarely reduced to 2, or 1 carpel, with 2 erect or ascending ovules in each. *Styles* subulate or filiform. *Ripe carpels* usually solitary, sessile, or stalked, follicle-like, usually dehiscing along the inner, rarely along the outer suture, 1- or very rarely 2-seeded. *Seed* with or without arillus, the testa thick, often fleshy below the middle and arillus-like. *Albumen* fleshy or none. Trees or shrubs, often scandent, with alternate 1-3-foliolate or pinnate leaves. *Leaves* usually small, in racemes or panicles.

CONNARIEÆ.

Calyx imbricate. *Seeds* without albumen.

ROFREÆ, Aublet.

Sepals enlarged in fruit, imbricately-cupular. *Follicle* sessile. *Seeds* arillate.

* *All parts* quite glabrous. *Leaflets* in few (not above 6) pairs, acuminate.

R. PULCHELLA, Planch. S. Mergui.

Leaflets $1\frac{1}{2}$ -2 inches long, the rachis and petiolules very slender.

R. COMMUNATA, Planch. E.S. Tropical forests of Chittagong, Tenasserim, and the Andamans.

Leaflets 5-3 inches long, the rachis and petiolules stout.

** *Inflorescence, leaf-rachis, and often the leaflets beneath puberulous or shortly pilose. Leaflets in numerous pairs, small, usually retuse or rounded.*

× *Sepals erect and cupular-closing.*

R. VILLOSA, Planch. S.S. Tenasserim.

Leaflets pubescent or pilose beneath.

R. WALLICHIANA, Planch. Tenasserim. Nicobars.

Leaves glabrous on both sides.

× × *Sepals spreading.*

R. STENOPETALA, H. f. (non Griff. ?) S.S. Mergui.

Leaflets obliquely ovate or obovate, 2-lobed at the summit.

Kurz adds :

R. FLORIBUNDA, Miq. Tropical forests of Katchall and Nankowry.

CONNARUS, *Linnaeus.*

Sepals not enlarging or deciduous. Follicle stalked. Seeds arillate.

* *Follicles perfectly glabrous and smooth on the walls inside.*

C. STICTOPHYLLUS, Kz. Tenasserim and Siamese province of Radbooree.

Rachis of leaves and midrib beneath pubescent, or almost glabrous, the nervation thin, much net-veined, especially while young, conspicuously bullate-dotted on the areoles. Follicles sessile, $\frac{1}{2}$ inch long.

** *Follicles more or less pubescent or velvety within.*

× *Petioles and leaflets beneath, or the nerves only, pubescent.*

C. SEMIDECANDRUS, Jack. Mergui.

Leaflets pubescent on the midrib beneath, nerves very slender, in 5 pairs, follicles tomentose.

C. GRIFFITHII, H. f. Mergui.

Leaflets finely rusty pubescent beneath, the nerves very indistinct.

× × *Leaflets perfectly glabrous. Follicles stalked.*

+ *Follicles chartaceous or thin coriaceous, deeply striate.*

C. PANICULATUS, Roxb. Chittagong.

A large tree. Follicles about an inch long or somewhat longer.

This tree is said to yield a useful timber. A species is said to occur near Rangoon (*C. speciosa*, MacClelland, Gwē-douk), which has a bright scarlet pod, whose seeds yield abundance of oil.

C. GIBBOSUS, Wall. From Chittagong to Tenasserim up to 2000 feet.

Climber. Follicles about an inch long or somewhat longer.

C. LATIFOLIUS, Wall. Tenasserim. South of Maulmain.

Apparently as preceding, but the follicles nearly cylindrical.

+ + *Follicles woody.*

C. GRANDIS, Jack. Tenasserim or the Andamans.

Leaflets thick coriaceous, large. Follicles about 2 inches long.

Kurz adds from the Nicobars :

C. MAINGAYI, H. f. From Great Nicobar.

CNESTIDIEE.

Calyx calvate, 5-parted. Seeds with or without albumen.

× *Seeds with albumen.*

CNESTIS, *Jussieu.*

Carpels 5-7, sessile, pilose or hispid within. *Leaves* unpaired pinnate.

C. PLATANTHA, Griff. Pegu and Tenasserim up to 3000 feet.

C. fluminea, Griff.

Tor-kyet-louk or Kyet-mouk-ni.

A scandent shrub. *Sepals* a line long. *Leaflets* usually opposite.

C. RAMIFLORA, Griff. *S.* or *T.* Tropical forests of the Andamans.

Rourea dasyphylla, Miq.

C. ignea, Planch.

Sepals 2 lines long. *Flowers* long, pedicelled. *Leaflets* often alternate.

× × *Seeds without albumen.*

ELLIPANTHUS, *Hooker, f.*

Sepals erect. *Carpels* solitary, tomentose or velvety within. *Leaves* 1-foliolate.

** *Leaves* glabrous or nearly so. *Follicles* glabrous within.

E. CALOPHYLLUS, Kz. Tropical forests of the Andamans.

Leaves and *petiole* glabrous, the former 4-6 inches long, nerves beneath very slender.

E. HELFERI, H. f. Tenasserim or the Andamans.

Petiole and *midrib* beneath puberulous. *Leaves* 2-3 inches long, nerves strong beneath.

** *Leaves* pubescent or tomentose beneath. *Follicles* glabrous within.

E. TOMENTOSUS, Kz. Southern end of Pegu Range and Tenasserim

Nerves beneath very slender. *Follicles* 1½-2 inches long.

This Order is of small importance economically, consisting of small trees and scandent shrubs. The handsome Zebra wood of Demerara is said, however, to be produced by a species of this Order, *Omphalobium Lambertii*.

Series II. DISCIFLORÆ.

Torus usually thickened or expanded into a disk, either free or adnate to the ovary, or to the calyx, or to both, rarely reduced to glands or wanting. *Ovary* superior, or partially immersed in the disk, divided into cells, with axile placentas, or the carpels distinct.

SAPINDALES.

Flowers often irregular and unisexual. *Disk* tumid, adnate to the base of the *Calyx* or lining its tube. *Stamens* perigynous, or inserted upon the disk, or between it and the ovary, usually definite. *Ovary* entire, lobed, or apocarpous. *Ovules* one or two in each cell, usually ascending with a ventral raphe, or reversed, or pendulous from a basal funicle, rarely many, horizontal. *Seed* usually exalbuminous. *Embryo* often curved or crumpled. *Leaves* usually compound.

Order ANACARDIACEÆ.

Flowers hermaphrodite or unisexual, usually regular. *Calyx* 3-7-cleft or parted, rarely spathaceous, or irregularly slit, the sepals sometimes wing-like, enlarging, or the tube or base of tube thickened and turning fleshy. *Petals* 3-7, rarely none, free, or very rarely united with the torus, sometimes enlarging into wings. *Disk* usually annular, rarely the torus raised and stalk-like. *Stamens* usually twice as many as petals, usually inserted at the base of the disk, all perfect or variously imperfect. *Anthers* dehiscent inwards. *Ovary* superior, usually 1-celled,

with 1-3 styles, or 2-5-celled, or very rarely of 2 to 5 distinct carpels, with a solitary ovule in each cell, in male flowers reduced to 4 or 5 style-shaped rudiments. *Fruit* superior or very rarely half-inferior, free or adnate to the engrossed calyx-tube or disk, 1- or rarely several-celled, usually drupaceous and indchiscent. *Seed* erect, horizontal or pendulous. *Albumen* none or scanty. *Radicle* inferior or superior, Trees or shrubs, rarely climbing, with alternate or rarely opposite, often crowded simple or compound leaves. *Stipules* none. *Flowers* small, variously arranged.

ANACARDIÆÆ.

Ovary 1-, very rarely 2-celled.

* *Leaves* (in Burmese species) ternately or pinnately compound.

× *Calyx* in no way enlarging after flowering.

+ *Ovule* suspended from near the summit of the cell.

ODINA, Roxburgh.

Petals 4-5, imbricate in bud. *Stamens* 8-10. *Styles* 3-4 in the male flowers, the ovary 4-5-partite.

O. WODIER, Roxb.

All over Burma and the Andamans and Nicobars.

Nab-hē or Na-bch.

Kurz describes the heartwood as of a reddish-brown colour and a good wood for cabinet work. For some reason or other trees from east of the Bay of Bengal seem to yield a heavier wood than that grown in India. The average weight from seven samples given by Gamble (*Manual of Indian Timbers*, p. 111) from India is 43 lbs., whilst four samples from east of this bay give an average of 57 lbs. I consider 40 lbs. about the weight of the fully-seasoned wood. It is a good wood. Kurz says the tree yields a yellowish gum, and that the bark is good for tanning.

+ + *Ovule* suspended from a free erect basilar funicle.

RHUS, Linnæus.

Petals 4-6, imbricate in bud. *Stamens* 4-10. *Styles* 3. *Leaves* compound, very rarely simple. Trees or shrubs.

* *Leaves* 3-foliolate.

R. PANICULATA, Wall.

Ava and Prome.

Glabrous, the leaflets entire.

** *Leaves* unpaired-pinnate.

R. JAVANICA, L.

Ava and Hills East of Toung-ngoo.

R. semialata, Murr.

R. Bucki-amela, Roxb.

Tomentose, the leaflets serrate-toothed, in 4-6 pairs. Endocarp smooth and bony.

R. KHASIANA, H. f.

Chittagong (*vide* Hooker).

Petiole very slender and glabrous, the leaflets in 8-12 pairs, incised-serrate. Endocarp fibrous.

TAPIRIA, Jussieu.

Petals 5, imbricate in bud. *Stamens* 10. *Styles* in female flowers single and short, in the males 4-5. *Climbers*.

T. HIRSETA, Roxb.

Chittagong. Ava. Khakyen Hills.

× × *Calyx-lobes* much enlarging and becoming leafy and wing-like.

PARISHIA, Hooker, f.

Flowers 4-, rarely 3-merous. *Stamens* 4, rarely 3. *Style* 3-cleft at the summit.

P. INSIGNIS, H. f. E.T.

Tenasserim and the Andamans.

** *Leaves simple.*

× *Petals variously enlarged under the fruit.*

SWINTONIA, *Griffith.*

Sepals 5. *Stamens* 5. *Drupe* sessile and subtended by the wing-like petals.

× *Leaves opaque and glaucous beneath.*

S. SCHWENCKII, Teysm. and Binn. Tropical forests of Chittagong, Pegu Range, and Tenasserim.

Pedicels $\frac{1}{2}$ –1 line long. *Petals* hardly a line long. *Drupe*s oblong.

× × *Leaves one-coloured and glossy.*

S. GRIFFITHII, Kz. Mergui.

Leaves greyish green, the nerves and net-venation conspicuous. *Pedicels* 3–5 lines long. *Petals* 2 lines long.

S. HELFERI, H. f. Tenasserim.

As the above, but leaves dark-brown, the net-venation obsolete. *Drupe*s obovoid.

MELANORRHOEA, *Wallich.*

Calyx spathaceous, 5-parted. *Stamens* numerous. *Drupe* stalked and subtended by the wing-like spreading petals.

Thyt-si (*generic*).

M. GLABRA, Wall. Tenasserim South of Tavoy.

Leaves glabrous. *Panicles* usually minutely puberulous. *Fruit-stalk* nearly $1\frac{1}{2}$ inch long, slender.

M. USITATA, Wall. Ava. Pegu Range. Tenasserim up to 3000 feet.

Leaves beneath and panicles pubescent or villous. *Fruit-stalk* short and thick.

Mason writes: "The celebrated black-varnish tree is cultivated in the Tenasserim Provinces, but I never saw it growing there spontaneously. In Tonng-ngoo, however, it is so abundant in the forests, that in some of the Christian villages, the posts of the chapels are exclusively of this tree, and it makes very fine timber, the *lignum vite* of Pegu. The varnish, says Major Berdmore, mixed with the ashes of bones, is used as a paste for sticking glass on boxes and images. Native doctors also use it as a vermifuge for children, the dose being a quarter of a tickal of varnish to half a tickal of jaggery" (coarse sugar).

The term *lignum vite* is not a happy one, as it is of no extraordinary hardness, and in appearance the wood, when polished, closely resembles Mahogany. Its weight is 54 lbs. The 'varnish,' or sappy exudation, is a thick yellowish clay-coloured fluid, which flows from incisions in the bark, and turns a brilliant black on drying. Natives dread cutting the live tree, owing to the irritating quality of the sap which spurts out under the axe. The timber would, I think, become a favourite one in Europe if introduced into the market, and the tree deserves propagation in localities suited to it. It abounds in Martaban.

× × *Petals not enlarging after flowering.*

+ *Calyx-tube* much enlarging and becoming fleshy, either bearing the superior nut or more or less inclosing the same and forming an inferior drupe.

† *Nut* more or less inclosed in the fleshy calyx. *Ovary* inferior.

DRIMYCARPUS, *Hooker, f.*

Petals imbricate in bud. *Stamens* 5. *Style* 1, with a capitate stigma.

D. RACEMOSUS, Roxb. Chittagong and Eastern Slopes of Pegu Range.

The genus hardly differs from *Nothopegia*, except in the free ovary and in the attachment of the ovules, and stands much in the same relationship to it as *Holigarna albicans* does to *Semecarpus* (Kurz).

HOLIGARNA, *Hamilton*.

Petals valvate in bud. *Stamens* 5. *Styles* 3. *Disk* annular or obsolete. *Petiole* furnished with 2-4 tubercles or barb-like excrescences.

H. HELPERI, Hook. *E.T.*

Pegu Range and Tenasserim.

H. longifolia, H. f. non Roxb.

Semecarpus Grahamii, Wight (apud Kz.).

Leaves glabrous or rarely pubescent beneath. Nut entirely inclosed in the obliquely ellipsoid or elliptical perfectly glabrous calyx of an inch length.

Wood heavy, brown, but perishable and apt to be 'wormed.' The tree yields a black varnish.

H. (*SEMECARPUS*) *LONGIFOLIA*, Roxb., is quoted by Mason (probably for the last species), but not mentioned by Kurz.

SEMECARPUS, *Linnaeus*.

Petals imbricate or valvate in the bud. *Stamens* 5. *Styles* 3. *Disk* rather broadly annular. *Petiole* without excrescences.

A. Nut adnate to the endocarp, barely exerted. Ovary superior.

S. ALBESCENS, Kz. *E.T.*

Tropical forests of Pegu and Tenasserim.

Holigarna albicans, H. f.

Leaves glabrous or pubescent and whitish beneath. Nut velvety, the hypocarp sappy, veined, and puberulous. Exudes a black varnish.

B. Nut seated on the endocarp.

* *Ovary tomentose or pubescent.*

× *Hypocarp* (enlarged base of the calyx) as large or nearly as large as the nut.

S. ANACARDIUM, L.

Chittagong.

S. cuneifolia, Roxb.

Leaves coriaceous, blunt, densely pubescent or tomentose, and strongly net-veined beneath. Nut not or scarcely oblique. Yields a bright gum.

S. PANDURATUS, Kz.

Chittagong, Pegu, and Martaban up to 2000 feet.

S. cuneifolia, Kz. (non Roxb.).

Chē-ben.

Leaves (full-grown) chartaceous, sharply acuminate, softly pubescent beneath, the net-venation faint. Nut very oblique.

The nuts of this and the last, and perhaps other species, yield an indelible marking ink, hence called 'Dhobie' nuts in India.

"I formerly identified this species with Roxburgh's *S. cuneifolia*, but Hooker reduces this to *S. anacardium*, and, I think, correctly so, as it is a tree of Hindustan" (Kurz).

× × *Hypocarp* very small.

S. HETEROPHYLLUS, Bl. *E.T.*

Beach forests of the Andamans, Katchall and Car Nicobar.

Leaves coriaceous, acuminate, quite glabrous or pubescent, and very glaucous beneath, the net-venation strong. Nut very oblique, $1\frac{1}{2}$ -1 inch across.

Like *S. albescens*, but has flowers more than twice as large, and very stout panicles (Kurz).

** *Ovary quite glabrous.*

S. SUBPANDURIFORMIS, Wall.

Chittagong and Arakan.

Leaves chartaceous, acuminate, glabrous. Panicles quite glabrous. Nut an inch broad.

S. SUBRACEMOSUS, Viz.

Prome.

A simple-stemmed shrub with a large subterranean trunk. Leaves chartaceous, minutely pubescent beneath and glabrescent. Panicles densely puberulous. Nut only 3-4 lines long.

The timber of this genus is worthless, being white and perishable, but the nuts are used for marking clothes by washermen, the colour being fixed by lime water. The nuts are also used as mordants. The acrid juice of the nut and an oil prepared from it are used externally by natives to alleviate rheumatic pains, by rubbing in over the part affected.

ANACARDIUM, Roxburgh.

Petals imbricate in bud. *Stamens* 8 to 10, all or few of them anther-bearing. *Style* filiform. *Torus* stalk-like.

A. OCCIDENTALE, L. E.T.

Beach forests of Chittagong, Tenasserim and the Andamans.

Thi-hō-thayet. Cashew nut-tree.

Nut kidney-shaped, seated on a fleshy glabrous orange-coloured edible *hypocarp* of the size of a small pear. The bark exudes an astringent pellucid gum, and by incision, a juice which forms an indelible ink. The *pericarp* of the nuts yields an acrid, vesicating oil, and the nuts themselves by expression a bland edible one. When roasted, the nuts are excellent.

++ *Calyx* unchanged in fruit. *Ovules* pendulous from a basal funicle.

BUCHANANIA, Roxburgh.

Calyx 3-5-toothed. *Stamens* 10. *Carpels* 5 or 6, of which one only fertile. *Styles* as many, short.

* *Leaves* and *panicles* tomentose or pubescent.

‡ *Leaves* tomentose or pubescent on both sides, large.

B. LATIFOLIA, Roxb.

All over Burma.

Lên-lwôn. Lôn-bo (Kurz).

Panicles stout and stiff. Flowers 2 lines across, sessile and crowded. The seeds are good eating, especially when roasted, also the fresh fruit.

B. LAXIFLORA, Kz.

Martaban and Pegu.

Panicles slender, grey pubescent. Flowers barely a line in diameter, pedicelled.

** *Leaves* glabrous and more or less glossy, usually fuscous in drying.

× *Panicles* rusty puberulous.

B. GLABRA, Wall.

Maulmain.

Petiole $\frac{1}{2}$ inch long. Flowers a line across. Flowers shortly pedicelled, crowded.

×× *Panicles* quite glabrous. *Flowers* pedicelled.

B. ARBORESCENS, Bl. E.T.

Tenasserim.

B. lucida, Bl.*B. petiolaris* and *B. Bancana*, Miq.*B. subobovata*, Griff.*B. laxiflora*, Kz. J.A.S.B. ii. 1872. p. 304.

Leaves equally decurrent at the base. Pedicels very slender. Petals a line long, reflexed. Panicles longer than the leaves.

B. ACUMINATA, Wall. E.T.

Andamans and Tenasserim.

Leaves equally decurrent at the base. Pedicels short and stout. Petals 2-3 lines long, erect. Panicles as long as or longer than the leaves.

B. LANCEIFOLIA, Roxb. *E.T.* Chittagong. Andamans.

Leaves very unequally decurrent at the base, large. Pedicels very slender. Petals a line long, reflexed. Panicles crowded, shorter than the leaves.

Kurz adds from the Nicobars:

B. PLATYNEURA, Kz. Kamorta.

GLUTA, *Linnaeus*.

Calyx spathaceous. *Stamens* inserted on the stalk-like torus. *Style* filiform.

G. TAVOYANA, Wall. *E.T.* Tenasserim, south of Tavoy.

Syndesmis Tavoyana, Wall.

Thayet-thytsi (Kurz). Chē (Mason).

Leaves coriaceous, the petiole not above 6 lines long, stout and marginate. Panicles and calyx puberulous.

I fear nothing but a variety of Linné's *G. Renghas* (Kurz).

G. ELEGANS, Kz. *E.T.* Coasts of Tenasserim.

Leaves chartaceous, the petiole long and slender, not or only at the apex marginate. Panicles and flowers perfectly glabrous.

G. LONGIPETIOLATA, Kz. Andamans.

A tree common on the shores of the Andamans, with large green long-petioled leaves unlike those of any other species. Flowers and fruits unknown.

Gluta (*Syndesmis*) yields good timber, equalling mahogany in appearance. Dr. Mason remarks: "Tavoy red-wood makes handsome furniture, and is used in Tavoy for the same purposes to which guano-wood¹ is applied at Maulmain. When the wood is steeped in ferruginous mud, it turns jet-black, and looks like ebony. The large cylinder knobs, one or two inches in diameter, so often noticed in the ears of Karen women at Tavoy, are made of this wood after the colour has been changed." It seems strange if the word 'chē,' which in Pegu undoubtedly applies to a white wood (*Semecarpus*), is in Tavoy applied to a red wood like *Gluta*; if so, it is a striking example of the confusion that may result by trusting to vernacular names. The timber (*Gluta Tavoyana*) is of a fine red colour, works easily, and looks like a coarse mahogany. Its weight when fully seasoned is 52 lbs.

BOUEA, *Meisner*.

Calyx 3-5-parted, valvate in bud. *Stamens* 3-8, all anther-bearing. *Style* short. *Leaves* opposite.

* B. OPPOSITIFOLIA, Roxb. *E.T.* Tenasserim and the Andamans, and May-an. cultivated all over Burma.

Panicles small, sessile or nearly so, quite glabrous. Petals $\frac{1}{2}$ line long. Drupes orange or orange yellow. Dr. Mason says: "There are two varieties, one bearing an intensely sour fruit, and the other one as insipidly sweet."

B. BURMANICA, Griff. *E.T.* Thoungyeen Valley.

B. Brandisiana, Kz.

Panicles large, long-peduncled, puberulous. Petals a line long or longer. Drupes bluish-black.

MANGIFERA, *Linnaeus*.

Calyx 4-5-parted. *Petals* 4-5, the nerve usually thickened. *Anther-bearing stamens* 1-5. *Style* filiform. *Leaves* alternate.

* *Petals and stamens free, the former inserted at the base of the cushion-like or cupular disk.*

× *Panicles and calyx more or less puberulous or pubescent, rarely almost glabrous. Fertile stamen 1.*

¹ Pterocarpus.

M. LONGIPES, Griff. *E.T.* Swamp forests in Pegu and Tenasserim.
Thayet-thyt-ni (Kurz).

Panicles and the 3-6 lines long pedicels very slender, glabrescent or almost glabrous. Petals linear-subulate. The lateral nerves very thin.

* *M. INDICA*, L. *E.T.* All over Burma and the Andamans,
Thayet. also cultivated.

Panicles stout. Pedicels short and thick. Petals yellow, streaked red, hardly 2 lines long. Disk fleshy, 5-lobed. Drupes obtuse, 3-4 inches long.

Wood coarse, pale-coloured, and said to decay under exposure to wet, but strong and very useful for common purposes. It is said to hold a nail more firmly than any other. The darker heartwood of old trees sometimes yields selected planks of some excellence. The fruit of the mango is, all over the East Indies, what the apple is in Europe.

M. CALONEURA, Kz. *E.T.* Pegu Range.

Panicles stout. Petals hardly 2 lines long. Disk 5-lobed. Drupes 1-2 inches long, blunt. Net venation minute and strongly prominent on both sides.

× × *Panicles and calyx perfectly glabrous.*

M. SYLVATICA, Roxb. *E.T.* T. forests of Martaban, where rare.
Hseng-neng-thayet (Kurz).

Panicles stout. Pedicels 3-4 lines long, thick. Petals white, about 3 lines long. Disk cup-shaped. Drupes acuminate.

** *Petals and stamens connate with the base of the stalk-like torus, rarely the latter wanting altogether.*

M. FELIDA, Lour. *E.T.* Southern Tenasserim, cultivated (*vide* Mason).
La-môt (Kurz). Horse Mango (Mason).

Leaves coriaceous and shining, almost polished beneath. Flesh of drupe soapy.

Dr. Mason says, "This is a large mango cultivated at Mergui, and is quite a favourite with the natives. It has an odour resembling the 'dorian,' and, like that, has been introduced from the Straits."

SPONDIÆÆ.

Ovary 2-5-cell-d. Ovules pendulous. Leaves pinnate.

Spondias, *Linnaeus*.

Flowers polygamous. *Stamens* 8 or 10. *Styles* 4 or 5, free at the summit.

S. MANGIFERA, Willd. All over Burma up to 3000 feet.

S. pinnata, Kz.

Gwē (Kurz).

There are two varieties of this, the one with leaflets and drupes as big as a duck's egg, the other with these parts only half the size, but differing in no other respects. Wood worthless (Kurz).

Dracontomelum, *Blume*.

Flowers hermaphrodite. *Stamens* 10. *Styles* 5, thick, connate at their summits, and resembling ovaries.

D. MANGIFERUM, Bl.

T. forests of the Andamans.

D. sylvestre, Bl.

D. pulverulum, Miq.

This Order yields some useful timbers, fruits, fragrant gums and varnishes. Foremost among the fruits stands the Mango, *Mangifera Indica*, which in the East takes the part of the apple in Europe, as a fruit in universal use and esteem. The

Pistachio-nut, *Pistachio vera*, is another fruit widely cultivated, but the native country of which is unknown, and the Cashew-nut, *Anacardium occidentale*. Mastic, a resin much used to sweeten the breath, is produced by several trees of the Order, and others yield astringent barks used in tanning. A fine black varnish is yielded by *Melanorrhwa* and *Holigurna longifolia*.

Order SABIACEÆ.

Flowers hermaphrodite or polygamously diœcious. *Calyx* 4-5-parted, imbricate. *Petals* 4-5, equal or unequal, alternating with or opposite to the sepals, imbricate. *Stamens* 4-5, opposite the petals, inserted at the base of the small disk, or on the torus, free or cohering with the petals, usually 2 only perfect, the others reduced to scales, rarely all fertile. *Anthers* didymous, the cells opening by a transverse slit or deciduous hood. *Ovary* 2-3-celled, with 1-2 horizontal or suspended ovules in each cell. *Styles* cohering, or the stigmas sessile. *Ripe carpels* 1-2, drupaceous or dry, indehiscent, compressed-kidney-shaped or almost globular, the endocarp crustaceous or bony, 1-seeded. *Albumen* none or scanty. *Cotyledons* much folded. *Radicls* inferior. *Stipules* none. Shrubs or trees, rarely climbers, with alternate, simple or pinnate leaves. *Flowers* usually minute.

SABIA, *Colebrooke*.

Stamens 4-5, all perfect. *Ovary* 2-3-lobed. *Drupe*s usually compressed.

* *Glabrous*. *Flowers* paniced.

S. LIMONIACEA, Wall. S.S. Chittagong.

Flowers about a line across, the pedicels short and thick. Leaves coriaceous.

S. VIRIDISSIMA, Kz. Tropical forests of South Andaman.

Flowers nearly 4 lines in diameter, the pedicels capillary and long. Leaves membranous.

Maout and Decaisne observe: "*Sabia* is very remarkable for the opposition of its bracts, sepals, petals, stamens, and ovarian carpels, which is perhaps unique in the vegetable kingdom." The snake-nut (*Ophiocaryon*) belongs to this Order, and is so-called from the coiled embryo, resembling a snake coiled up in the nut.

MELIOSMA, *Blume*.

Stamens 5, very unequal. *Ovary* 2-3-celled. *Drupe*s more or less globose.

M. SIMPLICIFOLIA, Bl. E.T. Chittagong, Ava Hills, Tenasserim.

Sir J. Hooker says the wood is of excellent quality.

Order SAPINDACEÆ.

Flowers usually polygamous. *Sepals* 4-5, free or united, imbricate, or rarely valvate. *Petals* 4-5, rarely fewer, sometimes minute, or wanting, frequently bearing a basal scale inside. *Disk* various, sometimes unilateral, rarely wanting. *Stamens* 8, rarely fewer, or more, inserted round the ovary, within the disk or sometimes unilateral. *Anthers* erect, or versatile. *Ovary* entire, or lobed, 1-4- (usually 3-)celled, with 1-2, rarely more, ascending, or rarely almost horizontal ovules in each cell. *Style* simple, or more or less divided. *Fruit* dry, or succulent, dehiscent, or indehiscent, entire, or separating into lobes, or cocci. *Seeds* with or without an arillus.

The majority of *Sapindaceæ* are readily recognized by having the disk outside, not inside the stamens, and by the 8 stamens in a 5-merous flower with a 3-merous ovary.

A. Seeds with albumen. Stipules present.

STAPHYLIEÆ.

Flowers regular. *Stamens* inserted outside the disk. *Leaves* opposite.

TURPINIA, *Ventenat*.

Ovary 3-celled. *Fruit* entire, indehiscent. *Leaves* pinnate, or rarely simple.

T. POMIFERA, DC. *E.T.*
T. sphaerocarpa, Hassk.

Tropical forests of Chittagong, Pegu,
and Martaban.

Htonk-shā-mā (Kurz).

Leaves apiculate to abruptly acuminate. Flowers about 2 lines across. Fruits the size of a cherry, fleshy. Wood heavy, close-grained, but soon wormed (Kurz).

T. NEPALENSIS, Wall. *E.T.* var. β frequent in the drier hill-forests and the
Xanthoxylon montanum, Bl. pine-forests of Martaban, at 3000 to 7200
feet elevation.

Donk-ya-mā (Kurz).

var. *a genuina*. Panicles very slender and lax, as long as or longer than the leaves, the ultimate branchings almost filiform.

var. β *Nepalensis*, Wall. Panicles shorter and more compact, stiff.

B. Seeds without albumen. Stipules none.

a. Stamens inserted outside or on the disk. Flowers regular.

DODONIÆÆ.

Stamens inserted outside the disk. Capsule septicidally dehiscent. Leaves alternate.

DODONÆA, Linnæus.

Sepals valvate. *Petals* none. *Ovules* by pairs. *Leaves* usually simple.

D. VISCOSA, L. *S.*

Sandy beaches of Tenasserim, from
Amherst to Mergui; also Andamans,
Narcondam Island.

D. angustifolia, L.

D. dioica, Roxb.

D. Burmanniana, DC.

D. pentandra, Griff.

The younger shoots and leaves sticky. Leaves almost entire, with the margins often revolute, coriaceous.

ACERINÆÆ.

Stamens inserted on the disk. Samaras indehiscent. Leaves opposite.

ACER, Linnæus.

Disk annular. *Samaras* 2. *Leaves* simple or palmately lobed.

× *Leaves simple, not lobed, with 3 basal nerves.*

A. NIVEUM, Bl. *E.T.*

Ava, Hookhoom Valley, and Nāt-toung
in Martaban 4000 to 7000 feet.

A. laurinum, Hassk.

Leaves usually whitish beneath, the petiole 1-2 inches long. Cymes glabrous, branchlets blackish.

A. LEVIGATUM, Wall. *T.*

Upper Tenasserim.

Leaves one-coloured, the petiole 3-6 lines long. Cymes paniced, glabrous. Branchlets pale brown.

× × *Leaves 3-lobed and 3-nerved.*

A. ISOLOBUM, Kz.

Martaban 5000 to 7000 feet.

Leaves 5-6 inches long and broad, rounded at the base, and long-petioled, 3-lobed, lobes spreading, pointed, smooth on both sides, 3-nerved and reticulate. A large and smooth tree. Flowers and fruit unknown.

b. Stamens inserted inside the disk, sometimes unilateral.

SAPINDIÆÆ.

Leaves alternate, or rarely (in Æsculus) opposite. Flowers regular or irregular.

* *Fruit indehiscent, drupaceous, fleshy or rarely corticate or crustaceous.*

× *Fruit entire, 1-4-celled.*

° *No petals. Flowers polygamously dioecious.*

SCHLEICHERA, Willdenow.

Calyx small, valvate or nearly so. *Disk* unilateral. *Seeds* arillate. *Leaves* abruptly pinnate.

S. TRIJUGA, Willd.

Common in leaf-shedding forests from Ava to Tenasserim.

Jio.

Dr. Mason remarks: "The fruit of this tree resembles the wild 'rambutan' (*Nephelium lappaceum*) in everything except that is covered with prickles half an inch long. It is rarely seen in the market, but would be a valuable addition to the dessert. The tree grows among the hills of Tavoy."

The wood is a pale lively brown, very handsome, hard, close-grained and tough, weighing 68 lbs., and is a most valuable one, being both useful for strength, and commendable when polished for beauty (W.T.).

°° *Petals present, furnished with scales. Flowers polygamously monoecious.*

LEPISANTHES, Blume.

Flowers regular. *Disk* regularly annular. *Leaves* pinnate.

L. MONTANA, Bl.

Tavoy.

L. Browniana, Hiern.

Leaves quite glabrous, not stiff. Racemes short and dense, clustered to almost solitary, axillary. Pedicels robust, $\frac{1}{2}$ line long. Petals inside and scale glabrous.

L. BURMANICA, Kz.

Tenasserim.

L. montana, Hiern. non Bl.

A small palm-like tree. Leaves large and stiff. Leaflets slightly puberulous on the midrib beneath, rigid. Racemes in larger or smaller axillary panicles. Pedicels capillary, $1\frac{1}{2}$ -2 lines long.

"Leaves very similar to those of *L. sessiliflora*, Bl. I fear that I am to a certain degree to blame for Hiern's misidentification of the plant, in having referred Brandis' specimens, as also my own, to Blume's *L. montana*, under which name I also put it down in my preliminary Report on the Pegu forests. It was hardly possible to avoid such mismatchings in a Report which was drawn up in less than fifteen months, in which period more than 1000 species had to be named, and keys furnished for the discrimination of the species" (Kurz).

HEMIGYROSA, Blume.

Flowers irregular. *Disk* unilateral, cushion-like. *Leaves* pinnate.

H. CANESCENS, Roxb.

Tenasserim.

Fruit fleshy, 3-gonously ovoid, the size of a bullet, densely greyish velvety.

× × *Fruit divided deeply or to the base into 3-2 lobes, the lobes often solitary by abortion.*

° *Flowers irregular. Arillus none.*

† *Leaves pinnate. Trees.*

DITTELASMA, Hooker, f.

Fruit deeply 1-3-lobed, the lobes drupaceous, globose. *Testa* bony. *Embryo* curved. *Disk* half crescent-shaped.

D. KARAK, DC. *E.T.*

Pegu Range and Tenasserim.

Sapindus polyphyllus, Roxb.

PANCOVIA, Willdenow (ERIOGLOSSUM, Bl.).

Fruit to the base 1-3-lobed, the lobes oblong. Testa membranous. Embryo straight. Disk unilateral.

P. RUBIGINOSA, Roxb. E.T.
E. edule, Bl.

Tropical forests of Pegu, Tenasserim,
and the Andamans.

Tseik-chē. 'Goats' dung.'

Wood white, with pinkish-brown heartwood. Strong and durable. It receives its native name from the wood presenting, when sawn into planks, small round black spots like segments of currants or goats' dung. These seem to be sections of imbedded woody thorns.

†† Leaves 3-1-foliolate. Shrubs or small trees.

ALLOPHYLLUS,¹ Linnaeus.

Flowers irregular with the place of the 5th petal empty. Sepals orbicular. Petals with scales. Fruit-lobes fleshy or sappy. Racemes simple or compound.

× Rachis of racemes more or less pubescent or villous.

A. SERRATUS, DC.

Coast forests from Chittagong to Tenasserim.

Schmidelia villosa, Wight.

All softer parts and leaves pubescent or villous-pubescent. Bractlets minute. Berries the size of a pepper-corn.

A. APORETICUS, Roxb.

Arakan up to 1200 feet.

Rather glabrous, the nerves of the leaves villous above. Racemes recurved, the bractlets linear-subulate, as long as or longer than the pedicels. Berries the size of a pea.

A. LITORALIS, Bl.

Chittagong, Tenasserim, the Andamans and Nicobars.

This species is placed first by Kurz in his enumeration of the species, though in his initial conspectus or key that position is occupied by *A. racemosus*, which species is not again alluded to. Are we to understand that the two are identical?

Hiern makes 2 species of Indian *Allophylli*, viz., those with 1- and those with 3-foliolate leaves, but this character falls to the ground, inasmuch as his *A. Zeylanicus*, var. *grandifolia* (= *Schmidelia chartacea*, Kurz, in Journ. As. Soc. Beng. 1871, 183), has sometimes 1- and 3-foliolate leaves on the same branch. I have not been able as yet to study this genus; but I have little doubt but that Hiern's eminently practical conclusions will not stand a scientific test (Kurz).

☉ Flowers regular.

† Seeds without arillus.

SAPINDUS, Plumier.

Fruit-lobes deeply or to the base separated, by 2-3 or often solitary by abortion, the pericarp crustaceous or coriaceous, smooth. Testa crustaceous or membranous.

× Leaves pubescent. Leaves unpaired-pinnate.

S. TOMENTOSUS, Kz.

Khakyen Hills.

All softer parts pubescent. Leaflets in 3-1 pairs with an odd one.

×× All parts glabrous.

× Leaves simple.

S. DANURA, Roxb.

Tidal forests of Pegu, Tenasserim, the
Andamans and Kondul.

Euphoria verticillata, Lindl. non Roxb.

¹ The probable etymology of this word would seem to point to its being spelt *allophyllus*, from *φύλλον*, rather than *allophytus*.

Leaves cordate at the narrowed base, the petiole very short and thick. Anthers yellow. Petals emarginate. The scale double, woolly. Fruit-lobes the size of a pea.

In this species abnormal leaves are often observed of a semipinnate and even perfectly pinnate shape. Roxburgh's *Scytalia verticillata* is in my opinion a different plant (Kurz).

S. RUBER, Roxb. *E.S.*

Chittagong.

S. attenuatus, Wall.

Leaves abruptly pinnate, glabrous.

°° *Leaves 2-foliolate.*

S. MICROCARPUS, Kz.

Siamese Province of Kanboree and probably Upper Tenasserim.

Petiole only about 2 lines long. Leaflets oblong, about 2 inches long, sessile. Panicles very slender. Fruit-lobes didymous, 1½–2 lines long.

Kurz also records from the Nicobars:

S. MONTANUS, Bl.

Kamorta and Nankowry.

XEROSPERUM, Blume.

Fruit-lobes separated to the base, by pairs or solitary, the pericarp crustaceous, tubercled. *Testa* fleshy and pilose within, resembling an arillus.

X. NORONHIANUM, Bl.

Tenasserim.

Mr. Hiern confounds two generically different plants, viz., the true Malayan plant and *Sapindus glabratus*, Wall., from Sylhet and the Khasi hills (Kurz).

†† *Seeds truly arillate.*

NEPHELIUM, Linnæus.

Fruit-lobes 1–3, separated to the base, the pericarp coriaceous to crustaceous, smooth or tubercled, muciculate, and echinate. *Seeds* enveloped by the arillus.

* *Petals none. Calyx toothed.*

° *Fruits covered with soft fleshy subulate or angular-conical prickles.*

N. GRIFFITHIANUM, Kz.

Khakyen Hills.

Kyet-mouk (generic).

Glabrous. Leaflets glaucous or whitish beneath. Prickles of the fruit fleshy, long, conically angular, truncate, glabrous.

Hiern identifies the above species with *N. mutabile*, Bl., a species which is distinguished at once by its irregularly tubercled fruit-lobes (hence Blume formerly confounded it with *Euphoria longana*). His description seems to have been drawn up from specimens belonging to two or three different species, but chiefly to *N. chryseum*, Bl. (Kurz).

N. LAPPACEUM, L.

Upper Tenasserim.

Scytalia rampoutan, Roxb.

Leaflets more coriaceous, pale-coloured beneath or almost 1-coloured. Fruits and prickles as in preceding, but quite glabrous.

°° *Fruits tubercled.*

* *N. (SCYTALIA) LITCHI*, Roxb.

Chittagong (cultivated).

Leaflets very coriaceous, small, the net-venation quite obsolete, the nerves thin and faint. Fruit-lobes ellipsoid-oblong, the size of a prune; tessellate.

A favourite fruit with Europeans, the fleshy layer enveloping the seeds being very refreshing and juicy. Mason says the tree will not thrive in Burma.

** *Petals present. Calyx cleft to $\frac{1}{2}$ or to near the base.*

N. RUBESCENS, Hiern.

Tenasserim.

Leaflets firmly coriaceous, glaucescent beneath, in drying fuscous, the lateral nerves thin and slightly prominent. Fruit-lobes oblong, shortly muciculate, the muciculae about a line long, sharp.

* N. HYPOLEUCUM, Kz.

Tropical forests on Eastern Slopes of Pegu Range and cultivated.

Leaflets thin coriaceous, more or less glaucescent beneath, the numerous (14-20) lateral nerves strongly prominent beneath. Fruit-lobes ovoid-oblong, the size of a plum, perfectly glabrous, strongly tubercled, as in *N. litchi*, but not tessellate.

* N. (EUPHORIA) LONGANA, Lamk.

Tropical forests on Eastern Slopes of Pegu Range, and cultivated.

As preceding, but leaflets usually smaller. Fruit-lobes globose, the size of a small cherry, obsolete tubercled or almost smooth, minutely tawny-velvety all over.

POMETIA, Forster.

Fruit-lobes 1-3, separated to the base, the pericarp corticate, smooth. *Seeds* arillate at the lower end. Hardly different from *Nephelium*.

P. TOMENTOSA, Bth. and H. f. Tropical forests of the Andamans and Katchall. *Eccecranthus eximius*, Thw.

Distinguishable at once from *P. pinnata*, Forst., by its small and very differently shaped fruits (Kurz).

** *Fruit a dry dehiscent capsule, the valves from woody to coriaceous and membranous.*

○ *Ovules solitary in each cell.*

× *Trees or shrubs. Leaves pinnate. Capsule coriaceous or woody. Flowers regular.*

† *Petals cucullate, or the blade shorter than the cucullate scale.*

PARANEPHELIUM, Miquel.

Petals broadly trigonous, smaller than the cucullate scales. *Style* long. *Capsule* 3-valved, woody, tubercled or muciculate. *Leaves* pinnate, the end-leaflets ternate.

P. XESTOPHYLLUM, Miquel.

Tenasserim (Maulmain district).

In HBC. are some leaves from the Khakyeen Hills which apparently represent a second Burmese species of this genus, if they should not be identical with Hiern's *Scyphopetalum*, the description of which is too imperfect to enable one to recognize the plant intended. They have the 3 end-leaflets similarly ternate, and in texture and nervature are almost the same as above (Kurz).

SCYPHOPETALUM, Hiern.

Style obsolete. *Petals* cucullate, without scale.

S. RAMIFLORUM, Hiern.

Ava, Hill-forests of Hookhoom Valley (Griff.).

I have not seen this plant, and place it near *Paranephelium* simply by guess. The petals are differently described and the style is said to be obsolete,—characters which would keep it distinct from Miquel's genus.

†† *Petals flat or nearly so, longer than the scale if present, or the petals minute or wanting altogether.*

CUPANIA, Linnaeus.

Calyx cup-shaped or the sepals distinct. *Capsule* 3-quetrous or didymous.

Sub-genus EU-CUPANIA.

Capsules clavate-pyriform, conspicuously 3-lobed or angular, coriaceous.

* *Petals present, furnished with a double scale.*

× *Leaves and panicles glabrous.*

C. GRIFFITHIANA, Kz. Tenasserim.
C. *pleuropteris*, Hiern.

Leaflets opaque, glaucescent beneath, nerves thin. Rachis narrowly winged upwards.

Hiern's *C. pallidula* (Maingay, 442; Griff. 982) is *C. pleuropteris*, Bl. (Kurz).

C. GLABRATUS, Wall. Tropical forests of Eastern Slopes of
Pegu Range and Martaban.

Leaflets glossy, 1-coloured, strongly nerved and net-veined. Rachis terete.

I do not know what Hiern describes under the above name, but generally, I think, he has my plant under view. *Sapindus squamosus*, Roxb., is *Cupania regularis*, Bl., differing from it (*Sapinduca* 4. Java, Horsfield Coll. is the typical form) in having the petiolules not incrassate (Kurz).

× × *Leaflets beneath and panicle shortly tawny pubescent.*

C. FUSCICULA, Kz. Tenasserim.

Leaflets chartaceous, fuscous in drying, opaque.

** *Petals none or minute, without scales.*

C. LESSERTIANA, Camb. Tropical forests of Mergui and the Andamans.

Net-venation minute and obsolete. Filaments glabrous. Leaflets in 2 pairs.

C. SUMATRANA, Miq. Tenasserim; rare in Pegu Range.

Net-venation strong and prominent on both sides. Filaments exerted, pubescent.
Leaflets not fuscous.

C. HELPERI, Hiern. Tenasserim (or Andamans).

Net-venation thin but prominent. Filaments short, pubescent. Leaflets fuscous.

Sub-genus ARYTERA, Bl.

Capsule divided to nearly the base into 2 divergent lobes, coriaceous.

C. ADENOPHYLLA, Planch. Tenasserim. Nankowry.

Leaflets chartaceous, reddish fuscous beneath, glabrous. Panicles tawny puberulous.

× × *Twining tendril-bearing under shrubs. Leaves twice ternately foliolate. Capsule bladder-membranous, inflated. Flowers irregular.*

CARDIOSPERMUM, *Linnaeus*.

Sepals 4, the 2 outer ones small. *Petals* 4, with basal scales. *Disk* almost reduced to 2 round or linear glands opposite the lower smaller petals.

C. HALICACABUM, L. All over Burma and the Nicobars.

Pubescent or glabrous. Leaflets often acuminate produced. Flowers 1-1½ line.

C. CANESCENS, Wall. Ava.

Softly pubescent. Leaflets usually short and broad. Flowers 2-3 lines.

Kurz adds from the Nicobars:

C. JACKIANA, Hiern. Katchall and Car Nicobar.

◊◊ *Ovules by 2 or more in each cell. Trees.*

× *Capsule membranous or chartaceous. Flowers regular, the sepals free. Leaves pinnate, alternate.*

HARTFLIA, *Roxburgh*.

Petals without scales, but sometimes with inflexed lobes at the base of the blade.

Stigma linear, often twisted. *Capsule* didymously 2-lobed, chartaceous, not winged. *Seeds* arillate.

H. CYPANOIDES, Roxb.

Tropical forests of Chittagong and the Andamans.

Streptostigma viridiflorum, Thw.

H. imbricata, Thw.

ZOLLINGERIA, K̄wz.

Petals with a woolly scale. *Stigma* 3-toothed. *Capsule* by thinning of the cell-walls often 1-celled, 3- or rarely 2-winged, chartaceous. *Seeds* without arillus.

Z. MACROCARPA, Kz.

Prome District.

The genus is named in honour of the late H. Zollinger, the author of so many valuable botanical papers, which, owing to their being written in the Dutch language, remain almost unknown to the majority of botanists.

× × *Capsule* thick or fleshy-coriaceous. *Flowers* irregular, the calyx tubular or bell-shaped. *Leaves* digitate, opposite.

ÆSCULUS, *Linnaus*.

Flowers rather showy. *Stigma* simple.

Æ. ASSAMICA, Griff.

Upper Tenasserim.

The Order *Sapindaceæ*, or Soap-worts, is so named from the fruit of *Sapindus* frothing with warm water, and being considered a stronger detergent than a similar quantity of soap. Foremost among its useful products may be reckoned the Litchi (*Nephelium litchi*), the Longan (*N. longanum*), and the Rambutan (*N. lappaceum*), all delicious and wholesome fruits of China and the Malay countries. Other edible fruits also are yielded by this Order, of less note. A few species yield valuable timber, as the South African *Pteroxylon utile* and *Hippodromus alata*, and the Jio of Burma (*Schleichera trijuga*); while coarse strong timber is afforded by *Poncovia rubiginosa* and several other species. Narcotic and poisonous qualities prevail in some species, and *Serjania lethalis* is said to afford the Lechenquama bee a poisonous honey which causes madness, and even death, while *Paullinia curaru* yields the arrow poison *curaru*, used by the natives of Guiana. *P. pinnata* too is used to stupify fish. Another species, however (*P. sorbilis*), contains in its seeds a valuable bitter principle named *Guarana*, and the powdered seeds are used by the Brazilians to make a refreshing and febrifuge drink.

CELASTRALES.

Flowers hermaphrodite, regular. *Corolla* hypogynous or perigynous. *Disk* tumid, adnate to the base of the calyx-tube or lining it. *Stamens* as many as the petals or fewer, rarely twice as many, perigynous, or inserted outside the disk, or on its edge. *Ovary* usually entire. *Ovules* one or two on each cell, erect, raphe ventral. *Leaves* undivided, except in *Ampelides* and *Staphyleææ*.

Order AMPELIDEÆ.

Flowers regular, hermaphrodite or unisexual. *Calyx* entire, or 4-5-toothed. *Petals* 4-5, free, or cohering, valvate. *Stamens* 4-5, opposite to the petals, inserted outside of the disk. *Disk* free, or adnate to the ovary. *Ovary* more or less perfectly 2-6-celled, with 1-2 erect ovules in each cell. *Fruit* a berry, the dissepiments frequently disappearing. *Seeds* 1-6. *Albumen* ruminant. *Leaves* alternate, or opposite, simple or compound, the petiole expanded in a membranous stipule. *Flowers* small, in leaf-opposed, or axillary inflorescences, never solitary or clustered.

VITIS, *Linnaus*.

Stamens free. *Ovary* 2-celled, with 2 ovules in each cell. Tendril-bearing climbers. *Inflorescences* branched in the usual way, not dilated and confluent (*Vitis*).

§ Flowers in leaf-opposed or axillary true cymes. Flowers usually 4-merous (*Cissus*).

° Leaves compound, from simple and pedately 3-9 or more foliolate, to digitate, or if simple-leaved, jointed with the petiole (1-2-foliolate).

+ Leaves pedately or pinnately foliolate, very rarely spuriously digitate.

† Style short, spreadingly 4-lobed, or the 4-lobed or 4-cleft stigma sessile.

* Style short, spreadingly 4-lobed at the apex. Flowers often unisexual.

V. TUBERCULATA, Laws.

Pegu (*vide* Lawson).

Leaves 3-foliolate. Berries $1\frac{1}{2}$ inch in diameter. Seed obovoid, grooved on the back, the groove with a linear tubercle. Stem very warty.

Kurz suspects this may be a large-fruited 3-foliolate form of *V. lanceolaria*.

V. ASSIMILIS, Laws.

Hills East of Toung-ngoo 3000 to 4000 feet.

Flowers hermaphrodite. Leaves coriaceous, 3-foliolate, the leaflets very shortly petioluled.

V. OXYPHYLLA, Wall.

Tropical forests of Eastern Slopes of Pegu Range and Hills East of Toung-ngoo.

Flowers unisexual. Leaves sappy membranous, 3-foliolate to pedately 5-foliolate. Cymes short. Seeds oblong, smooth.

** Stigma sessile, 4-lobed or cleft. Flowers often unisexual.

V. LANCEOLARIA, Wall.

Both varieties, but more so var. β , common in

V. muricata, W.A.

the Tropical forests of Tenasserim and the

Cissus lanceolaria, Roxb.

Andamans, and the Eastern slopes of the Pegu

Kyi-ni-nweh or Kyi-ehi-nweh.

Yonā. Chittagong. Kamorta and Katchall.

Glabrous or the petioles and cymes often puberulous. Leaves pedate, or the upper ones often 3-foliolate, sappy coriaceous. Berries white, the size of a cherry or smaller. Seeds obovoid-oblong, rugulose, broadly and shallowly furrowed on the back.

var. *a lanceolaria*, Roxb. Cymes loose and ample, densely puberulous, the pedicels longer and slender. Petioles and petiolules puberulous.

var. β *tuberculata*, Bl. Cymes short and often somewhat compact, less puberulous or glabrous, the pedicels usually shorter and thicker. Petioles, etc., all glabrous. Berries and seeds usually smaller.

var. *a* is in my opinion the true Roxburghian plant, while var. β is Blume's *Cissus tuberculata* (Kurz).

V. SERRELATA, Wall.

Frequent along mountain-streams in Tropical forests

Cissus capreolata, Royle.

of Martaban, up to 3000 feet. Khakyen Hills.

Chittagong. var. β Khakyen Hills.

Glabrous. Leaves pedate, herbaceous-fleshy. Pedicels 2-3 lines long, umbellulate. Berries black, the size of a pea.

var. *a capreolata*. All parts quite glabrous.

var. β *subobtectata*. Branches and petioles rusty-pubescent, like those of *V. obtecta*, and forming a transition to it, the leaves partially becoming digitate.

V. OBTECTA, Wall.

Khakyen Hills.

Very much as the preceding, but young shoots and petioles rusty hirsute. Leaves spuriously digitate.

†† Style simple, entire.

* Leaves all 3-foliolate.

V. SEMICORDATA, Wall.

var. β in the drier hill-forests of the Martaban

V. Himalayana, Brand.

hills, east of Toung-ngoo, at about 3000 feet.

Glabrous. Cymes leaf-opposed, glabrous. Leaves glaucous beneath.

var. *a semicordata*, Wall. Young parts, inflorescence, leaflets beneath, shortly and sparingly hairy.

var. *β Himalayana*, Brand; *V. Neilgherrensis*, Wight; *Ampelopsis Himalayana*, Royle. All parts quite glabrous, leaflets glaucous beneath.

V. TRIFOLIA, L. In rubbishy spots, hedgerows, all over Burma, and *Cissus carnosa*, Lamk. forests, where it becomes a powerful climber. All parts puberulous, rarely glabrous. Cymes axillary, puberulous.

var. *a genuina*. All parts shortly greyish pubescent.

var. *β glabrata*. All parts glabrous or nearly so. Katchall.

I follow Miquel in adopting Linné's oldest name, which is evidently given in allusion to the trefoil (*Trifolium*) (Kurz).

** *Leaves pedate.*

× *Cymes leaf-opposed and terminating an axillary leafy or leafless shoot.*

V. TEYSMANNI, Miq. Chittagong.
V. mollis, Wall.

All parts densely puberulous or pubescent.

V. JAPONICA, Thbg. Pegu Range and Tenasserim, also
Cissus leucocarpa, Bl. Taong-doung, Ava.
V. cymosa, Roxb.

All parts glabrous. Leaves sparingly pubescent along the nerves beneath.

× × *Cymes truly axillary, long-peduncled.*

V. TENNIFOLIA, W. A. Pegu Range and Arakan, also in
bamboo forests in the Andamans.

Leaflets cuneate-obovate, rather blunt or acute, slightly pubescent along the nerves beneath. Seeds triangular with sharp margins, muricate on the back.

Possibly only a more luxuriant form of the preceding species, with more obtuse leaflets and truly axillary cymes (Kurz).

V. PEDATA, Wall. var. *a* frequent in leaf-shedding forests and in hedges
of the cultivated plains; var. *β* in tropical forests
of the Andamans, Kamorta, and Nankowry.

All parts pubescent to almost glabrous. Leaflets finely acuminate. Seeds hemispherical, smooth.

var. *a genuina*. Leaves pedately foliolate, pubescent.

var. *β glabrata*. As preceding, but pretty glabrous.

+ + *Leaves truly digitate.*

V. AURICULATA, Wall. Chittagong and Pegu Range.

Yin-noung-peing-nweh (Kurz).

All parts puberulous. Cymes axillary and terminal on axillary shoots. Leaflets 1½-2 inches long. Style simple.

V. ERYTHROCLADA, Kz. Tropical forests of Kambalu Toung.
Wun-u-nweh or Myae-zu-nweh (Kurz). Pegu Range, at 1000-2000. Also
Taong-doung. Ava.

Leaves glabrous. Leaflets 4-6 inches long, fleshy herbaceous. Cymes puberulous. Berries globose, style simple, bark red.

Amongst the digitate species, this comes nearest to *V. saponaria*, Seem.

V. (PANAX) MICRANTHUM, Wall.

V. campylocarpa, Kurz.

Dioecious, remarkable for its minute flowers, and in this respect resembling *V. pubiflora*, Miq. (syn. *V. peduncularis*, Lawson). Lawson says that it has no tendrils, but in this he is mistaken. I believe it to be Roxburgh's *C. feminea*, but

not having seen the female flowers, I hesitate to pronounce its identity with that species. Lawson confidently reduces *C. feminea* to a synonym of *V. lanceolaria*, but the digitate leaves alone forbid a comparison with it (Kurz).

°° *Leaves simple or very rarely (in V. Anamallayana) the uppermost ones 3-foliolate. Cymes leaf-opposite (except in V. Wallichii).*

× *Branches and branchlets cornered, sometimes almost winged and fleshy.*

V. QUADRANGULARIS, L. Waste spots and dry forests in Ava and Prome.

Branchlets very fleshy, 4-cornered, jointed. Leaves small, fleshy, bluntish crenate. Cymes simple.

V. PENTAGONA, Voigt. Chittagong. Arakan. Pegu Range. Andamans.

Branchlets bluntish 5-angular, thick and glossy. Leaves remotely bristly toothed, long-petioled.

V. DISCOLOR, Dalz. var. *a* Tropical forests and bamboo-jungles of Arakan, Tenasserim, and the Andamans. var. *β* in the Martaban Hills, East of Toung-ngoo.

Branchlets sharply 6-cornered. Leaves bristly serrate, herbaceous. Cymes compound. Seeds obliquely obovate, transversely wrinkled on the faces.

var. *a discolor*. Leaves usually spotted, purplish beneath, on very long petioles (at least the lower ones). Cymes peduncled.

var. *β sessilis*, Miq. Cymes sessile and umbellately branched from the base.

V. COSTATA, Wall. Arakan and Pegu.

As preceding. Leaves shorter petioled, while young appressed hairy on the nerves beneath. Seeds smooth, obovate.

× × *Branches and branchlets terete or nearly so.*

† *Cymes axillary. Branchlets angular?*

V. (LEEA) CORDATA, Wall.

Near to *V. pallida*, W. A., but distinguished by its axillary cymes.

V. WALLICHII, Kz. (non DC). Ava ('Mi-a-noung').

Leaves 3-lobed, glabrous, sappy membranous, large. Seeds globose, smooth.

†† *Cymes leaf-opposed.*

V. (CISSUS) REPENS, Lamk. Tropical forests of Chittagong, Burma, the Andamans and Kamorta.

V. glauca, Roxb.

Cissus Blumeana, Steud.

C. cerifera, T. et B.

Branchlets terete, whitish pruinous. All parts glabrous. Seeds smooth.

V. (CISSUS) ADNATA, Roxb. var. *a* rare in hill-toungyas of Martaban at 3000–4000 feet; var. *β* in all leaf-shedding forests and shrubberies, especially along choungs, all over Burma.

All parts, especially while young, rusty tomentose, more or less glabrescent. Leaves sharply acuminate, never lobed. Seeds obovate, shallowly lacunose.

var. *a glabrior*, Miq. All parts more glabrous, leaves only along the nerves beneath pubescent.

var. *β communis*. All parts more or less rusty tomentose. Leaves above glabrous or puberulous, beneath wholly or only along the nerves tomentose.

V. (CISSUS) VITIGINEA, L. Mixed and open forests, shrubberies and grass jungles, all over Burma; var. *riparia*, Wall., at Car Nicobar.

V. Linnæi, Kz. (non Wall.).

V. repanda, W. A.

Yin-noung-nwch (Kurz).

All younger parts rusty tomentose or pubescent, glabrescent. Leaves large, often somewhat 3-lobed, bluntish acuminate, deciduous. Seeds obovate, smooth.

§ *Inflorescence a modification of the tendrils, cymose-panicled, racemose, spiked, or the tendril-branches forming a panicle. Flowers 4- or more usually 5-merous.*

* *Flowers pedicelled, in loose or contracted panicles.*

† *Seeds 2-4 lines long, shallowly grooved and radiately furrowed on the back.*

× *Glabrous or nearly so.*

V. LATIFOLIA, Roxb. Frequent in the savannahs and village woods, but rare in the leaf-shedding forests, all over the Chin-douk-nweh-zouk (Kurz). Pegu plains, also Andamans in forests.

Cymose panicles ample, glabrous, with or without tendrils. Pedicels thick, nearly a line long. Leaves 3-5-lobed, the lobes usually acute.

× × *All parts more or less woolly-tomentose.*

V. BARBATA, Wall. Lower mixed forests of Ava, Martaban and Tenasserim; var. β Ava, Taong-doung.

Branchlets, peduncles and usually the petioles covered with a woolly tomentum intermixed with black spreading stiff hairs. Leaves almost glabrous.

var. α *genuina*. Leaves thinly lanate beneath, black hairs numerous.

var. β *Jenkinsii*. Leaves entire or lobed, their under-surface as well as the stems densely tawny or rusty woolly-tomentose, black hairs very sparingly distributed.

V. TOMENTOSA, Heyne. Hills East of Toung-ngoo 3000 to 4000 feet.

Branchlets, etc. woolly, without black hairs. Leaves lobed to palmately lobed. Panicles tendril-bearing, short and rather compact. Pedicels very short and thick.

†† *Seeds about a line long, furrowed on the back, almost smooth, glossy-black.*

V. LANATA, Roxb. Chittagong. Ava. Tenasserim.

Branchlets, etc., woolly, without black hairs. Leaves tawny woolly beneath, slightly lobed. Panicles usually tendril-bearing, woolly, large and lax. Pedicels very slender, $1\frac{1}{2}$ line long.

** *Flowers sessile, in spikes, the spikes forming elongate panicles.*

V. HELPERI, Laws. Tenasserim.

Young parts thinly and fugaciously woolly. Leaves pedately 5-7-foliolate, glabrous except on the nerves beneath. Spikes in very slender panicles.

V. POLYSTACHYA, Laws. Tenasserim or Andamans (*vide* Lawson).

Quite glabrous. Leaves digitately foliolate, glaucous green. Spikes puberulous, forming $1\frac{1}{2}$ -2-feet long stout panicles.

Rachis of inflorescence leafy expanded and fleshy-membranous, the flowers sessile, unisexual (Pterisanthes).

V. POLITA, Miq. Maulmain (*vide* Lobb).

Glabrous. Leaves simple. A very slender twiner.

Of the vine (*V. vinifera*, L.), Dr. Mason remarks: "The grape-vine may be seen in many of our gardens, but it very rarely produces fruit. I once saw a vine in Mergui, however, which had on it several fine bunches of grapes, and I have heard of grapes being occasionally brought to perfection in Maulmain."

V. vinifera is a native of Georgia and Mingrelia, and can be successfully cultivated¹ where the mean annual temperature does not fall below 66° Fahr. In the tropics the plant grows luxuriantly, but the fruit withers without ripening.

¹ For an account of the different sorts of grape usually met with in the Indian markets see Bell's *Afghanistan and its People*, p. 287.

The vine is a plant whose origin, so far as its culture is concerned, dates from prehistoric times, and is one of those plants which shows in a marked degree the effect of cultivation, which fact was clearly enunciated by Virgil in his charming Second Georgic :

“ Sponte sua quæ se tollunt in lumnis oras,
 Infecunda quidem, sed lacta et fortia surgunt ;
 Quippe solo natura subest. Tamen hæc quoque si quis
 Inserat, aut serobibus mandet mutata subactis,
 Exuerint sylvestrem animum ; cultuque frequenti
 In quæcunq; voces artos, haud tarda sequentur.”

Georgic II. line 47.

This same contrast which exists between the cultivated and uncultivated vine has been very happily seized by another Roman poet as a symbol of the advantages of matrimony :

“ Ut vidua in nudo vitis quæ nascitur arvo
 Nunquam se extollit, nunquam mitem educat uram,
 Sed tenerum prono deflectens pectore corpus
 Jam jam contingit summum radice flagellum,
 Hanc nulli agricolæ, nulli accoluere iuveni :
 At si forte eadem est ulmo conjuncta marito,
 Multi illam agricolæ, multi accoluere iuveni.”

Catullus, *Carm. Nup.* line 49.¹

LEEA, *Linnaeus.*

Stamens and petals united with the disk. *Ovary* 3-6-celled, with a solitary ovule in each cell. Erect shrubs or trees, without tendrils.

× *Leaves ample, simple or rarely 3-foliolate.*

L. MACROPHYLLA, Roxb. var. β frequent in the mixed forests, especially
 L. simplicifolia, Griff. the upper ones, of Pegu and Martaban.

Kyā-bēt-gyi.

Leaves simple, large, very glaucous and shortly puberulous beneath. Lobes of the staminal tube entire. Shrubby.

var. *a genuina.* Leaves larger and somewhat lobed, and puberulous beneath.

var. β *oxyphylla.* Leaves ovate, acuminate, less glaucous beneath, glabrous.

L. LATIFOLIA, Wall.

Prome.

Leaves simple and pinnately 3-foliolate, hardly glaucous, but minutely puberulous beneath. Lobes of the staminal tube notched. Shrubby.

× × *Leaves from simply pinnate to decompose.*

° *All parts (except the inflorescence in a few species) glabrous.*

† *Inflorescence with persistent and conspicuous bracts and bractlets.*

† † *Bracts and bractlets minute, usually already dropped before the flower-buds are properly developed.*

¹ So lies the solitary vine, prone in a naked field,
 Unfit to lift itself on high, or clustering grapes to yield,
 By its own weight bowed down to earth ; no comely youth or maid,
 No husbandman, delights to lie outstretched beneath its shade.
 But once, with some tall husband elm, effect its union gay ;
 And soon beneath its fruitful boughs will whispering lovers stray.

* *Leaves coriaceous. Flowers greenish-white or green with a purplish hue.*

K. PARALLELA, Wall. var. *a* Ava. Irrawaddy Valley. var *β* frequent
in the mixed forests and grass jungles of Pegu.

Leaves more or less glaucous, usually linear or lanceolate. Lobes of the staminal tube erect, notched. Seeds smooth and rounded on the back. Under-shrub.

var. *a genuina*. Leaves usually pinnate or occasionally bipinnate, leaflets oblong or oblong-lanceolate, more glaucous. Calyx-lobes rotundate.

var. *β angustifolia*, Laws. Leaves usually 2-3-pinnate, leaflets narrow-linear to linear, very acuminate, calyx-lobes in fruit obtuse, but not rotundate.

L. SAMBUCINA, Willd. Arakan, Pegu Range, Tenasserim, the Andamans,
L. staphylea, Roxb. Katchall, Kamorta, and Nankowry.
L. ottilis, DC.

Ka-let (Kurz).

Leaves dark-green, glossy. Lobes of staminal tube erect, notched. Seeds even and convex on the back. A tree.

"*Leea sambucina*, of the 'Flora of India' (not of authors), is a mélange of species, which Lawson explains, *more Kewensi*, by saying that there are transitional conditions so numerous that the species reduced by him cannot be maintained" (Kurz).

This is rather hard on Kew; but in all branches of natural science, both zoology and botany, it is a thankless task expunging shadowy species, but undoubtedly a meritorious one, since these shadowy species are the curse and opprobrium of science.

L. COMPACTIFLORA, Kz. Hills East of Toung-ngoo at 3000 feet.

Inflorescence with persistent and conspicuous bracts. Flowers sessile or nearly so.

L. GIGANTEA, Griff. Manlmain. Tavoy.

Leaves dark-green, glossy. Lobes of staminal tube reflexed, acuminate. Seeds tubercled-keeled, the edges tubercled-ribbed. A large shrub.

** *Leaves more or less membranous. Flowers red, orange, or scarlet.*

L. LETA, Wall. Ava. Tropical forests of South Andamans.

Leaflets 6-8 inches long. Inflorescence rusty-tomentose. Under shrub.

L. COCCINEA, Planch. Not rare in the savannahs of Pegu, rare
in the diluvial forests of Martaban.

Leaflets only 2½-4 inches long. Inflorescence glabrous or nearly so. Under-shrub.

† *More or less pubescent or stiff-hairy, at least the nerves beneath.*

‡ *Leaves usually simply pinnate.*

L. CRISPA, L. Chittagong and Pegu.

L. pinnata, Andr.

Kalet-theing (Kurz).

Leaflets coarsely serrate, acute, roughish pubescent along the nerves beneath. Nerves all parallel. Petiolules thick and short. Stems, petioles, and peduncles curled-winged. Bracts and bractlets long, lanceolate-subulate. Shrub.

L. PUMILA, Kz. Pegu and Martaban.

Dwarf, all parts robust and densely pubescent or almost tomentose. Petioles and petiolules terete. Cymes tomentose. Bracts minute. Under shrub.

‡‡ *Leaves usually 2- or 3-pinnate.*

L. ASPERA, Wall. Pegu.

Thakyā-nweh-than (Kurz).

Leaflets coarsely serrate, acuminate, roughish pubescent on the parallel nerves

beneath. Stems and petioles terete or nearly so. Peduncle compressed-cornered. Bracts and bractlets small, linear-lanceolate. Flowers greenish-white. Shrub.

L. ÆQUATA, L. Tropical forests of Tenasserim and the Andamans.

L. hirta, Hornem.

Ngā-mouk (Kurz).

All parts stiff-pubescent. Leaflets membranous, beneath densely gland-dotted. Petioles terete. Bracts large, broadly ovate, blunt. Under shrub.

L. ROBUSTA, Roxb. (non Laws.). Arakan and Pegu.

L. diffusa, Laws.

Almost glabrous or greyish puberulous. Leaves 2-3-pinnate. Leaflets puberulous or glabrous, not gland-dotted beneath. Bracts and bractlets none. Shrub.

L. robusta, Laws. = *L. Sundaica*, Miq. (Kurz).

L. RUBRA, Bl. Attaran Valley.

Stems, petioles, etc., quite glabrous. Leaflets small, sprinkled with white stiff hairs. Bracts or bractlets none. Under shrub.

Kurz adds from the Nicobars :

L. ACULEATA, Bl. Katchall.

L. GRANDIFOLIA, Kz. Katchall, Trice and Track.

L. SANGUINEA, Wall. Ava.

In his notes on Burmese Plants (J.A.S.B. ii. 1873, p. 66) Kurz describes *L. sanguinea*, Wall. ; but this species does not appear in his later paper.

Order RHAMNACEÆ.

Flowers regular, hermaphrodite, or rarely polygamous. *Calyx* 4-5-lobed or cleft, the tube persistent, and often adnate to the ovary or disk, valvate. *Petals* 4-5, alternating with the calyx-lobes, or none. *Stamens* 4-5, opposite to the petals if present. *Filaments* filiform, rarely dilated. *Anthers* small, often included in the petals, rarely exerted. *Disk* usually filling the calyx-tube, or lining it, or annular, rarely cup-shaped and free, or wanting. *Ovary* more or less inferior, 3- (or rarely 2-4-)celled, with a solitary erect ovule in each cell. *Style* short, with as many lobes as cells to the ovary. *Fruit* a drupe or capsule, the margin of the adnate calyx-base forming a ring at the base, or round, or at the summit of the fruit, the endocarp separating into as many cocci as cells, or forming a woody or bony 2-4-celled stone. *Flowers* small or minute, in cymes or umbel-like clusters, often collected in axillary, or terminal compound cymes, racemes or panicles.

ZIZYPHIEÆ.

Drupe containing a solid 1-3-celled putamen, or the fruit a capsule or indehiscent nut. *Ovary* superior or half-superior. *Disk* filling the calyx-tube.

* *Ovary* half-superior or superior. *Fruit* a nut, dry, coriaceous, 1-celled and 1-seeded, or a capsule.

VENTILAGO, Gaertner.

Nut produced into a long terminal wing, indehiscent.

× *Calyx* adnate to the drupe, small and basilar.

V. MADRASPATANA, Gaertn. S.S. Tenasserim.

Flowers in slender simple or branched racemes. Nut indistinctly puberulous, the wing only 1-1½ inch long.

×× *Calyx* adnate to the drupe for ½-⅓ of its length, and forming there a prominent ring.

◦ *Flowers and fruit more or less yellowish-pubescent or tomentose.*

V. CALYCLATA, Tul. Tenasserim.

V. *Madraspatana*, Roxb. non Gaertn.

Racemose panicles and flowers tomentose. Fruits puberulous, the wing $1\frac{1}{2}$ -1 inch long, the calyx reaching the middle of the nut.

◦ *Fruits quite glabrous, even when young.*

V. LEIOCARPA, Bth. S.S. Tenasserim.

All parts glabrous. Nuts about 3 lines in diameter, the calyx reaching the middle, and forming a sharp ring there, the wing rounded at the apex.

V. MAINGAYI, Laws. E.C.S. Tenasserim.

Glabrous? Nuts nearly $\frac{1}{2}$ inch across, the calyx broad and flat, occupying only the basal part of the nut, the wing shortly acuminate.

SMYTHEA, *Serrmann*.

Capsule lanceolate or urn-shaped, 2-valved.

S. CALPICARPA, Kz. S.E.S. Tenasserim.

Leaves serrate, chartaceous, glabrous save along the pilose midrib beneath.

** *Ovary superior. Drupe fleshy or dry, with a 1-3-celled hard putamen.*

ZIZYPHUS, *Jussieu*.

Leaves palmately 3-5-nerved.

* *Flowers in axillary cymes or clusters.*

◦ *Leaves more or less tomentose or pubescent beneath. Drupes sappy, quite glabrous.*

Z. JUJUBA, Lamk. All over Burma.

Zi. The 'byer' plum of India.

Leaves coriaceous, densely fulvous or whitish tomentose beneath, glabrous above. Drupe $\frac{1}{2}$ - $\frac{3}{4}$ inch long, the putamen 2-celled. Erect shrub or tree.

Wood close-grained, strong, heartwood dark brown. Bark used for tanning (Kurz).

This tree, so common throughout the jungles of India, yields a pleasant acid berry, the size of a small cherry. The cultivated fruit grows much larger, but it loses in flavour what it gains in size, being less acid and refreshing, and more mucilaginous, especially when cooked, than the wild fruit. Lac is found on this tree. The timber is small, and large trees too valuable for fruit to be cut down.

Z. ENOPLIA, Mill. S.S. All over Burma and the Andamans.

Z. *albens* and *napea*, Roxb.

Tor-zi-nweh (Kurz).

Leaves membranous, above thin, beneath densely silky pubescent. Drupe the size of a pea, the putamen 1- rarely 2-celled. Erect or scandent shrub.

var. *a glabrescens*. Leaves green on both sides, shortly and thinly pubescent.

var. *β ferruginescens*. Leaves tawny villous beneath. Usually a lofty climber.

var. *γ pedicellaris*, Wall. As preceding, but cymes longer peduncled and larger, pedicels about 3 lines long. Prome.

◦ *Leaves glabrous or sprinkled with a few hairs on the nerves beneath.*

Z. GLABRA, Roxb. S.S. Tropical forests of Chittagong, Tenasserim, and the Andamans.

Leaves green, thin chartaceous. Young drupes tawny tomentose, adult woody.

** *Cymes collected into leafy or leafless panicles. Drupes woody.*

Z. FUNICULOSA, Ham. E.S.S. Ava Hills.

Leaves glabrous, rigidly chartaceous. Drupes glabrous. Climber.

Z. rugosa, Lam. *T.* All over Burma.

Myouk-zi.

Leaves densely fulvous tomentose or pubescent beneath. Drupes glabrous. Kurz adds from the Nicobars :

Z. subquinquenervia, Miq. Tropical forests of Kamorta and Katchall.

BERCHEMIA, *Necker.*

Leaves penninerved.

B. floribunda, Brongn. *S.S.* Khakyen Hills.

Drupes slightly compressed, smooth or pruinous, bluish-black, containing a woody 2-celled putamen.

RHAMNIEÆ.

Fruit dry or drupaceous, containing 3 (rarely 2-4) indehiscent or 2-valved cocci.

* *Ovary* superior or half-superior. *Drupe* fleshy or dry, superior. *Disk* fleshy, filling the calyx-tube (*Rhamnea vera*).

SAGERETIA, *Brongniart.*

Flowers in terminal panicles. *Leaves* opposite or nearly so.

S. theezans, Brongn. Ava.

var. β *diospyrifolia*, Laws.

The leaves of this plant can be used as a substitute for tea.

SCUTIA, *Commerson.*

Flowers in fascicles or umbellets. *Leaves* opposite or nearly so.

S. (Rhamnus) circumscissus, L. Valley of the Attaran River.

S. Indica, Brongn. *S.*

Rhamnus myrtinus, Burm.

R. lucidus, Roxb.

A shrub armed with short curved spines, all parts glabrous.

COLUBRINA, *L. C. Rich.*

Flowers in cymes. *Leaves* alternate.

C. (Ceanothus) asiatica, L. *S.* Arakan, Tenasserim, the Andamans, Kamorta, Katchall, and Car Nicobar.

Kuē-nweh.

Leaves and cymes glabrous.

C. pubescens (Kz.). *S.S.* Pegu and Martaban.

Cymes and under surface of leaves pubescent.

Voight also records *C. macrophylla*, from Martaban.

** *Ovary* and fruit inferior, the latter crowned by the calyx-limb.

APTERON, *Kurz.*

Styles 2. *Fruit* globose, not winged. *Flowers* clustered, in terminal panicles.

A. lanceolatum, Kz.

Upper Tenasserim.

GOUANIA, *Linnaeus.*

Fruit dry, 3-cornered or winged. *Flowers* spicate or racemose, panieled.

G. leptostachya, DC. *S.S.*

All over Burma by streams and villages.

G. tiliifolia, Roxb.

Tor-yē-nyo-nweh.

Leaves glabrous or nearly so, crenate. Racemes puberulous, glabrescent. Disk glabrous, 5-horned. Capsules glabrous.

G. BRANDISII, Hassk.

G. integrifolia, Kurz (non Lamk.).

Leaves velvety above, densely tawny or rusty pubescent beneath, entire. Racemes rusty-tomentose. Capsules puberulous.

Order CELASTRINEÆ.

Flowers usually hermaphrodite. *Calyx* small, 4-5-lobed or parted, persistent, imbricate. *Petals* 4-5, imbricate. *Stamens* 3-5 (very rarely 2-10), inserted at the base of the disk, or its lobes. *Filaments* subulate, often short. *Anthers* 2-celled. *Disk* conspicuous, cushion-like or explanate or lobed. *Fruit* various, a capsule, drupe, berry, or samara. *Seeds* often arillate, sometimes winged. *Albumen* fleshy, or almost horny, or none. *Flowers* small, or minute, in axillary cymes, or racemes, or in terminal panicles. Most *Celastrineæ* are readily recognized by the peculiar large disk. From *Rhamnaceæ* they differ in having the stamens alternating with the petals.

Sub-order CELASTRACEÆ.

Stamens inserted outside the disk. *Seeds* albuminous.

* *Capsule or follicle dehiscent.*

× *Orules from the axis of the cells. Leaves opposite.*

EVONYMUS, Linnæus.

Petals free. *Disk* fleshy, broad. *Capsules* 3-5-lobed and celled.

† *Orules 2 in each cell.*

* *Flowers solitary or clustered in the axils of the leaves.*

E. JAVANICUS, Bl. E.T.

Tropical forests of Tenasserim, Katchall, Kondal, and Great Nicobar.

Flowers nearly 5-6 lines across. Petals fringed. Capsules sharply angular, on $\frac{1}{2}$ -1 inch long peduncles. Leaves glossy, entire.

E. CALOCARPUS, Kz. S.

Tenasserim.

Capsules globular, obtusely lobed, very shortly peduncled or almost sessile. Leaves green, opaque.

** *Flowers in dichotomous cymes.*

× × *Branchlets terete or nearly so, or somewhat compressed.*

E. GLABER, Roxb.

Chittagong and Tenasserim.

E. Timorensis, Laws.

Flowers small, usually 5-merous. Petals entire. Capsules angular. Leaves serrulate upwards.

× × *Branchlets sharply 4-cornered or almost winged.*

E. GRIFFITHII, Kz. E.S. var. α Ava. var. β not unfrequent in the damp hill-forests of the Nät-toung¹ ranges in Martaban, east of Young-ngoo, at 6000-7000 feet elevation.

Flowers small, in very slender cymes. Capsules small, smooth.

var. α *genuina*. Petioles thick, $\frac{1}{4}$ line long; leaves sub-sessile, sub-serrate.

var. β *dubia*. Petioles slender, 2-3 lines long. Leaves entire or nearly so.

var. β will prove a distinct species, but as my specimens are in very young bud only, I am unwilling to establish the species until better material comes to hand.

¹ Care must be taken not to confound the 'Nät-toung' in Martaban East of the Salween, with the 'Nät-toung' of the Arakan Range, W.S.W. of Thayet-myo.

†† *Ovules solitary in the cells.*

E. SCLEROCARPUS, Laws. *E.T.* Tropical forests of Kambalu Toung in the Pegu Range.

Bark red. Petals 4, greenish purple, concave-orbicular, without grooves. Capsules very rough from scurfy fissures and warts.

MICROTROPIS, Wallich.

Petals united at the base. Disk none or annular. Capsule 1-celled, 2-valved.

M. (EVONYMUS) GARCINIFOLIUS, Roxb. *E.S.* Martaban and Tenasserim between 5000 and 7000 feet.
M. discolor, Wall.

× *Cymes not much longer than the petiole, robust and crowdedly flowered.*

Leaves coriaceous, smooth, Capsules $\frac{1}{2}$ inch long, grey.

× × *Cymes much longer than the petiole, lax and dichotomously branched.*

M. BIVALVIS, Wall. *E.T.* Tropical forests of Tenasserim.

Leaves smooth, glossy above. Peduncle slender, 1-1 $\frac{1}{2}$ inch long.

M. LONGIFOLIA, Wall. *E.S.* Tenasserim.

Leaves coriaceous, wrinkled, especially above, opaque. Peduncle $\frac{1}{2}$ - $\frac{3}{4}$ inch long.

× × *Ovules erect. Leaves alternate.*

CELASTRUS, Linnaeus.

Ovary free. Capsules 2-4-celled, loculicidal. Seeds arillate. Flowers in panicles or racemes.

C. MONOSPERMA, Roxb. Khakyen Hills.

Cymes forming racemose panicles, axillary and terminal. Capsule 1-celled and 1-seeded.

× *Capsule 2-valved.*

C. ACUMINATUS, Wall. *E.S.* Ava Hills.

Cymes short and slender, axillary.

× × *Capsule 3-valved.*

C. MONTANUS, Roxb. *T.* Prome (?).

Cymes dichotomously branched, axillary.

C. PANICULATA, Willd. *S.S.* Ava to Pegu.

C. multiflora and *nutans*, Roxb.

Cymes forming racemose panicles, slender, terminal. Capsules with 3-6 seeds.

var. *a genuina*. All parts quite glabrous or nearly so.

var. *β pubescens*. Leaves beneath and the petioles pubescent. Panicles densely puberulous.

KURRIMA, Wallich.

Ovary free, styles 2. Capsule entire or 2-lobed, 1-2-celled, follicle-like and slowly dehiscent into 1 or 2 valves. Flowers in cymes or racemes, or paniced.

K. ROBUSTA, Roxb. *E.T.* Chittagong. Pegu Range. Tenasserim.

Kwē-douk.

Capsule an inch long, opening into 2 valves containing 1-2 large glossy black seeds enveloped in a yellow arillus. Wood brown, heavy, brittle (Kurz).

** *Fruit an indehiscent drupe or berry.*

SIPHONODON, Griffith.

Ovary half inferior, 5-celled. Berry large, with many pyrenes. Leaves alternate.

S. CELASTRINUS, Griff. *E.T.* T. forests of Pegu Range and Martaban.
Myouk-ō-shyt (Kurz).

Berries the shape and size of a small citron, on a cylindrical peduncle 4-6 lines long, the pyrenes surrounded by a granular hard reddish-yellow endocarp.

Sub-order HIPPOCRATLACEÆ.

Stamens 3, rarely 2-5, inserted within or on the disk. *Seeds* exalbuminous. *Leaves* opposite.

* *Fruit* an indehiscent berry, 1-many-seeded. *Seeds* not winged.

SALACIA, *Linnaeus*.

Inflorescences axillary. *Stamens* 3, rarely 2 or 4, inserted within the disk.

* *Cymes* peduncled and dichotomously branched, usually short.

S. LONGIFOLIA, Wall. *S.S.* Tenasserim.
S. floribunda, Wight.

Branches terete. Pedicels thick, 6-8 lines long. Sepals not ciliate. Filaments very short, complanate and reflexed.

S. TORTUOSA, Griff. *S.S.* Tenasserim.

Branches marked by decurrent lines and more or less angular. Pedicels about 4 lines long, slender, arising from the globose rusty-bracteole ends of the cyme-branches. Sepals fringed. Filaments nearly $\frac{1}{2}$ line long, terete and erect.

** *Flowers* springing from an axillary sessile tubercle or wart.

× *Flowers* large. *Petals* about 3-4 lines long.

S. GRANDIFLORA, Kz. *S.S.* Tenasserim.

Pedicels 2-3 lines thick. Leaves large, coriaceous.

× × *Flowers* minute or small, the petals less than 2 lines long.

† *Leaves* turning brown or dark-coloured in drying. *Filaments* very short and complanate.

S. VERRUCOSA, Wight. *S.S.* Tenasserim.
S. polyantha, Korth.

Branchlets dark-brown, corky-lenticellate. Leaves entire. Sepals ciliate. Ovary-cells 2-ovuled.

S. ROXBURGHII, Wall. *S.S.* Chittagong to Tenasserim.

Branchlets pale-coloured, sparingly lenticellate. Leaves serrate. Berries as large as a crab-apple, 2-3-seeded. Sepals not ciliate.

†† *Leaves* turning yellowish or pale green in drying.

° *Petals* clawed. *Filaments* terete, slender.

S. PRINOIDES, DC. *S.S.* Tidal forests of Chittagong, Tenasserim
Johnia Coromandeliana, Roxb. and the Andamans.
S. latifolia, Wall.

Petals a line long. *Pedicels* as long or longer than the petiole. *Berries* 1-seeded.

°° *Petals* sessile. *Filaments* very short and dilated.

S. FLAVESCENS, Kz. *S.S.* Tenasserim.

Pedicels few, short, 1-1 $\frac{1}{2}$ line long.

S. MULTIFLORA, Wight. *S.S.* Tenasserim.

Pedicels numerous, slender, longer than the petiole.

Kurz also gives from the Nicobars:

S. PLATYPHALLA, Kz. *S.S.* Katchall, Nankowry and Great Nicobar.

** *Fruit capsular or samaroid, dehiscent. Seeds winged.*

× *Ripe carpels samaroid, 2-valved. Stamens 3, inserted within the disk.*

HIPPOCRATIA, *Linnaeus.*

Ripe *carpels* usually 3. *Seeds* usually winged at the lower end. *Inflorescences* terminal or terminal and axillary. Some species yield edible nuts.

H. INDICA, Willd. S.S. Toukyeghat.

× *Petals* $\frac{1}{2}$ –1 line long, imbricated in the bud.

Petals about $\frac{1}{2}$ line long. *Leaves* glaucous.

H. FUSCESCENS, Kz. S.S. Maulmain.

Petals about a line long. *Leaves* turning brown in drying.

× × *Petals* about 2 lines long, valvate in the bud.

H. MACRANTHA, Korth. S.S. Chittagong to Tenasserim.

Flowers outside and *inflorescence* greyish puberulous. *Carpels* linear-oblong, 2–3 $\frac{1}{2}$ inches long.

H. LOBBII, Laws. S.S. Upper Tenasserim.

Petals inside densely greyish hairy.

Kurz also gives from the Nicobars :

H. NICOBARICA, Kz. S.S. Tropical forests of Katchall.

× × *Fruit* a capsule. *Erect trees or shrubs. Stamens* 5, inserted on the disk.

LOPHOPETALUM, *Wight.*

Capsule 3–4-celled and lobed. *Seeds* winged all round. Not gland-dotted.

* *Petals* ciliate-crested or lamellate on the upper side. *Disk* 5-lobed.

L. FIMBRIATUM, Wight. T. Martaban and Tenasserim.

Flowers nearly $\frac{1}{2}$ inch in diameter. *Crest* of petals fringed.

** *Petals* naked, in a dried state often turning wrinkled or corrugate on the inner face.

× *Panicles* glabrous. *Disk* smooth, in a dried state often conspicuously wrinkled. *Leaves* elliptical to ovate.

L. WALLICHII, Kz. T. Pegu and Tenasserim.

Moung-taing (Kurz).

Panicles brachiate and stiff. *Flowers* about 3 lines in diameter. *Disk* wrinkled.

L. LITTORALE, Laws. E.T. Low ground along the Pozoondoung Creek. Pegu.

As preceding, but *panicles* larger and slenderly branched. *Flowers* about 2 lines across. *Disk* wrinkled.

× × *Panicles* while young covered with a rusty-coloured or greyish tomentum.

L. FLORIBUNDUM, Wight. Southern Tenasserim.

Leaves lanceolate to oblong-lanceolate. *Petiole* 3–4 lines long. *Flowers* about 1–1 $\frac{1}{2}$ line across. *Disk* smooth or nearly so.

OLACALES.

Flowers regular, hermaphrodite, or unisexual. *Calyx* small. *Disk* free, cupular or annular, rarely glandular, or none. *Ovary* entire, 1- to many-celled. *Ovules* 1 to 3 in each cell, pendulous, raphe dorsal, integuments confluent with the nucleus. *Albumen* usually copious, fleshy. *Embryo* small. *Shrubs* or trees. *Leaves* alternate, simple, exstipulate.

Order ILICINEÆ.

Flowers regular, hermaphrodite or unisexual. *Calyx* 3-6-partite or lobed, imbricate. *Petals* 4 or 5, rarely more, or wanting, free or united at the base, hypogynous, imbricate. *Stamens* hypogynous, as many as the petals, or rarely more, free, or slightly adhering to the petals. *Filaments* subulate. *Anthers* opening inwards. *Disk* none. *Ovary* free, 3-5- rarely many-celled, with 1-2 pendulous ovules in each cell. *Style* none, or terminal. *Stigma* discoid or capitellate. *Fruit* a drupe containing a 2-5-celled stone or 4-8 crustaceous 1-seeded pyrenes. *Testa* membranous. *Albumen* copious, fleshy. Trees or shrubs, with alternate simple leaves. *Stipules* none. *Flowers* small, and in terminal cymes or clusters.

Sub-order ILICACEÆ.

Petals present. *Flowers* hermaphrodite.

ILEX, *Linnaus*.

Stamens 5. *Ovary* 4-8-celled.

* *Male inflorescence cymose, the female flowers clustered or solitary.*

I. GAULTHERIEFOLIA, Kz. *E.T.* Tenasserim.

Leaves 2-3½ inches long, beneath very opaque and brown. Sepals ciliate.

Dr. Hooker identifies this species with his *I. theaefolia*, but in this he is in error, his new species differing greatly, not only in the texture and polish of the leaves, but still more so in the inflorescence, doubly larger flowers, and very long pedicels; in my species they are only about ½ line long (Kurz).

** *Female flowers in simple or compound umbellets or cymes.*

◦ *Cymes head-like, contracted and small, on a long compressed peduncle.*

I. GODAYAM, Coleb. *E.T.* β not rare in Tropical forests of Martaban and Tenasserim. Glabrous, or the branchlets pubescent.

var. *α genuina*. Shoots, peduncles, and pedicels shortly puberulous. Calyx more or less pubescent or densely fringed.

var. *β sulcata*. All parts glabrous, except the puberulous pedicels, and calyx.

◦◦ *Cymes divaricately 2-cleft, on a rather short peduncle.*

I. MACROPHYLLA, Wall. Tenasserim.

Cymes divaricately 2-cleft. Leaves large, coriaceous. Branchlets pale-coloured.

I. CYMOSA, Bl.

Cymes twice or thrice dichotomously branched. Leaves beneath pale-coloured or glaucescent. Branchlets pure white. Style stout, distinct.

I. WALLICHI, H. f. Tenasserim.

As preceding, but stigma sessile.

Sub-order DAPHNIPHYLLACEÆ.

Flowers apetalous, unisexual.

DAPHNIPHYLLUM, *Blume*.

Stamens 5-18. *Ovary* 2-celled.

D. MAJUS, Muell. Tenasserim.

Calyx persistent? Pedicels about ½ inch long.

D. HIMALAYENSE, Muell. *E.T.* Martaban at about 5000 feet.

Calyx deciduous. Pedicels about 1-2 lines long.

One of the best known species of this Order is the Holly (*Ilex aquifolium*), the bark of which yields birdlime, and the wood of which is close-grained and hard. *Ilex Paraguensis* yields Paraguay tea, and several species are cultivated as ornamental plants. This *Ilex* must not be confounded with the tree which afforded so noble a simile to Horace in his ode to the Roman people, who had in view the Holm oak (*Quercus ilex*):

“Duris ut Ilex, tonsa bipennibus
Nigræ feraci frondis in Alcido,
Per damna, per cædes, ab ipso
Ducit opes, animumque ferro.”

Carm. IV. 4. line 57.

Order OLACINEÆ.

Flowers regular, hermaphrodite or rarely unisexual. *Calyx* small, 4-6-toothed, free or adnate to the disk. *Petals* 4-6, free, or more or less united, valvate. *Stamens* as many, or twice as many as (rarely fewer than) the petals, adnate to the base of the petals, or free and hypogynous. *Anthers* 2-celled, versatile, or rarely adnate. *Disk* free or adnate to the ovary or to the calyx, rarely divided into scale-like glands. *Ovary* free, or immersed in the disk, 1 or imperfectly 2-3-celled, with 2-3, or rarely a solitary pendulous ovule in each cell. *Style* simple. *Fruit* usually an indehiscent drupe. *Seeds* solitary, pendulous, or spuriously erect. *Albumen* present, or none. Trees or shrubs with usually alternate, simple leaves.

Sub-order OLACEÆ.

Stamens as many or twice as many (rarely fewer) as petals and *opposite to them*.

Sub-tribe EU-OLACIÆ.

Stamens anisomerous, or isomerous. *Ovary* 2-5-celled at the base, 1-celled at the apex or completely 1-celled, the placenta central with 2-5 pendulous ovules.

* *Stamens* twice as many as petals, or if fewer, accompanied by staminodes.

XIMENIA, *Linnaeus*.

Calyx not enlarging after flowering. *Stamens* all perfect.

X. AMERICANA, L. S.

Coasts of Tenasserim, the Andamans,

X. subscandens, Griff.

Car Nicobar and Katchall.

Pynleh-si or Pynleh-ku-yin (Kurz).

Drupe about an inch long, red, smooth, edible, containing a large not very hard nut. Wood of a yellow colour.

OLAX, *Linnaeus*.

Calyx inclosing the fruit. Perfect *stamens* 3, rarely 5. *Staminodes* 6 or fewer.

× *Enlarged calyx in fruit membranous, dry.*

O. SCANDENS, Roxb. S.S.

Ava. Chittagong and Tenasserim.

O. obtusa, Bl.

Toung-leh-lu or Lai-loo (Kurz).

Branchlets terete, like the under surface of the leaves and the racemes, puberulous.

O. ACUMINATA, Wall. S.

Ava, Mogoung River, and Khakyen Hills.

All parts also the racemes quite glabrous. Branchlets angular.

× × *Enlarged fruiting calyx coriaceous (fleshy in a fresh state).*

O. IMBRICATA, Roxb. C.

Chittagong. Tenasserim. Katchall.

Glabrous, the branchlets terete. Flowers 4-5 lines long.

- ** *Stamens as many as petals. Staminodes none.*
 × *Fruiting calyx much enlarged, adnate to the drupe.*

ERYTHROPALUM, Blume.

Ovary 1-celled. Tendril-bearing climbers with 3-nerved leaves.

- E. SCANDENS*, Bl. S.S. Tropical forests of Pegu Range on
Decastrophia inconspicua, Griff. Eastern slopes. Tenasserim.
E. populifolium, Planch.

STROMBOSIA, Blume.

Ovary to near the summit 3-5-celled. Trees with penninerved leaves.

- S. JAVANICA*, Bl. E.T. Tenasserim.

× × *Calyx in fruit unchanged.*

ANACOLOSA, Blume.

Disk in fruit much enlarged, adnate to the drupe and resembling an engrossed adnate calyx. Petals 6. Ovary 1 or imperfectly 2-celled.

- A. PUBERULA*, Kz. E.T. The Andamans, Kamorta, and Katchall.
 Calyx and pedicels densely puberulous. Drupe scarlet, thinly velvety.
A. GRIFFITHII, Mast. Mergui.

Calyx and slender pedicels glabrous.

Probably only a glabrous form of the preceding. The sepals and petals are not quite glabrous (Kurz).

- A. (GOMPHANDRA) CRASSIPES*, Mast. E.T. Rare in Pegu Range.

OPILLIÆ.

Stamens isomerous. Ovary 1-celled with a single ovule. Flowers hermaphrodite.

* *Perianth dichlamydeous, i.e. consisting of calyx and corolla.*

CANSJERA, Jussieu.

Spikes axillary, without bracts. Calyx inconspicuous, shortly 4-lobed. Corolla gamopetalous. Stamens 4, alternating with as many hypogynous scales or glands.

× *Spikes simple.*

- C. PARVIFOLIA*, Kz. Tenasserim.
 Leaves small, oval, notched or blunt, pubescent. Spikes very short, solitary.
C. RUEDII, Gmel. S.S. Tropical forests of Tenasserim, the
 Andamans, and Kondul.
 Leaves acuminate, opaque. Spikes solitary or by pairs.

× × *Spikes branched, rarely the uppermost ones almost simple.*

- C. ZIZYFOLIA*, Griff. S.S. Tenasserim.
 Leaves acute, glossy above. Spikes solitary.

NATSIAOPSIS, Kurz.

Spikes axillary, without conspicuous bracts. Calyx 4-lobed. Corolla gamopetalous. Stamens 4, free. Staminodes none.

- N. THUNBERGLEFOLIA*, Kz. S. Khakyen Hills.
 Female flowers unknown.

OPIA, Roxburgh.

Inflorescence while young conspicuously imbricate-bracted. *Petals five. Filaments filiform. Staminodes 5.*

- O. AMENTACEA*, Roxb. S.S. Pröme.

** *Perianth monochlamydeous.*

LEPIONURUS, *Blume.*

Inflorescence while young conspicuously imbricate-bracted. *Flowers* 4-merous. *Filaments* very short, complanate.

L. SYLVESTRIS, Bl.

Khakyen Hills.

Leptonium oblongifolium, Griff.

CHAMPEREYA, *Griffith.*

Inflorescence with very deciduous minute bracts. *Flowers* 5-merous. *Filaments* slender, exserted.

C. GRIFFITHIANA, Planch.

Tenasserim and the Andamans.

C. GNETOCARPA, Kz.

Tropical forests of Kamorta and Car Nicobar.

Wherever *Lepionurus* may be placed, *Champerèya* must accompany it (Kurz).

Sub-order ICACINEÆ.

Stamens as many as petals and alternating with them.

EU-ICACINEÆ.

Cotyledons small or dilated. *Trees* or erect shrubs.

* *Calyx* minutely toothed or lobed. *Petals* usually glabrous.

STEMONURUS, *Blume.*

Anthers pendulous. *Drupe* without fleshy appendage.

× *All parts* glabrous.

S. (GOMPHANDRA) PENANGIANUS, Miers. *E.T.* Tenasserim.

Leaves 2½-5 inches. *Cymes* leaf-opposite, the peduncle stiff and ½-1 inch long.

S. JAVANICUS, Bl. *E.T.*

Tenasserim.

Gomphandra affinis, Mast.

Leaves 2-3 inches long. *Cymes* slightly puberulous, axillary and peduncled. *Drupe*s elliptically oblong, the putamen sulcate.

× × *Younger branchlets* tomentose. *Petioles*, under surface of leaves, and *inflorescence* puberulous or tomentose.

S. (GOMPHANDRA) TOMENTELLUS, Kz.

Tenasserim (?).

Cymes peduncled, leaf-opposed.

APODYTES, *E. Meyer.*

Anthers attached at the back above the 2-lobed base. *Ovary* oblique. *Drupe* with a fleshy puffy sarcocarp, covering only the one half of the nut.

A. ANDAMANICA, Kz. *E.T.*

T. forests of the Andamans and Nicobars.

DAPHNIPHYLLOPSIS, *Kurz.*

Anthers attached to the back. *Drupe* berry-like. *Flowers* sessile, in heads.

D. CAPITATA, Kz. *E.T.*

Martaban, between 4000 and 6000 feet.

An incompletely known genus, but its position in *Olacineæ* is certain. *Inflorescence* is exactly that of *Ilex sulcata*, while the leaves resemble those of *Daphniphyllum Himalayense*. It is nearest allied to *Mappia* (Kurz).

** *Calyx* 5-cleft or the sepals distinct, imbricate.

GONOCARYUM, *Miquel.*

Flowers unisexual. *Drupe*s dry, woody. *Albumen* many-lobed.

G. GRACILE, Miq. Tenasserim.
Phlebocalymna Wallichii, Mast.

Leaves opaque. Drupes obtusely 1-3-angular, acute. The drupes in this species are obtusely angular, but the seeds being all aborted, no stress can, consequently, be laid upon this character, until perfected fruits with seeds become known (Kurz).

G. GRIFFITHIANUM, Miers. E.T. Southern Pegu and Tenasserim.
Platea Lobbiana, Miers.

Leaves glossy. Drupes terete, rounded at apex.

PHYTOCRENIEÆ.

Cotyledons foliaceous or fleshy. Flowers dioecious. Climbers. Fruit drupaceous.

* *Stamens alternating with the petals.*

× *Flowers in heads.*

PHYTOCRENE, Wallich.

Filaments longer than the anthers. Albumen lobed. Drupes villous or echinate.

P. GIGANTEA, Wall. W.C. Pegu Range and Tenasserim.

Male flower-heads usually more tawny, tomentose, on short but very thick pedunclets, numerous in very compound racemes terminating in the young state in short thick tomentose bract-like axes.

The stem of this great creeper contains a great quantity of limpid potable water, and is well known to the natives, who make use of it when thirsty in the forests.

P. BRACTEATA, Wall. South Tenasserim.

Male flower-heads somewhat smaller and usually greyish, tomentose, on short but slender pedunclets, few (8-5), in simple short racemes terminating in long bract-like greyish-tomentose slender axes.

The so-called bracts of the male inflorescences in this genus are, in my opinion, only the sterile end-branchings of the partial racemes (Kurz).

× × *Flowers in spikes, racemes, or panicles.*

SARCOSTIGMA, Wight and Arnott.

Flowers interruptedly spiked; filaments longer than the anthers. Staminodes none. Stigma sessile. Albumen none.

S. (CHAILETIA) EDULE, Kz. W.C. Tropical forests of the Andamans.

The nut is inclosed in a thin edible sweetish pulp.

Masters say that this species (*S. edule*) is probably only a form of *S. Kleinii*, but in this he is mistaken, for the latter differs by quite glabrous drupes and inflorescences; and he evidently confounds two species under this name. I would suggest to him to compare Maingay's No. 378 from Malaya (of which I have seen only leaves) with *S. Horsfieldii* (Kurz).

NATSIATUM, Hamilton.

Flowers racemose. Filaments very short, alternating with 5 staminodes.

N. HERPETICUM, Ham. C. Chittagong and Pegu Range.

Drupes the size of a pea, glabrous, black. Styles 2. Albumen fleshy.

* * *Stamens opposite to the petals.*

LODES, Blume.

Flowers cymose-panicled. Stamens 8, filaments very short. Stigma sessile. Albumen fleshy.

× *Pedicels not woody, slender.*

L. BRANDISII, Kz. C. Upper Tenasserim, Thoung-yeen.

Leaves oblong, not cordate at the base, membranous, the petiole $\frac{1}{2}$ – $\frac{3}{4}$ inch long. Pedicels slender, about $\frac{1}{2}$ line long.

I. TOMENTELLA, Miq. *E.C.*

Upper Tenasserim.

Leaves more or less oval, cordate at the base, coriaceous, the petiole 2–4 lines long. Flowers almost sessile.

× × *Pedicels thick and woody.*

I. HOOKERIANA, Baill. *W.C.*

Chittagong.

Drupes orange, smooth, about an inch long. Fruits and habit of *Sarcostigma*. An ovary, already engrossed, showed a solitary erect basal ovule (Kurz).

CARDIOPTERIS, *Wallich.*

Sepals and petals imbricate. *Fruit* dry, winged, juice milky. Annual twiners.

C. LOBATA, Wall.

Ava to Tenasserim.

C. hamulosa, Griff.

C. Javanica, Bl.

GERANIALES.

Flowers often irregular. *Disk* usually annular, adnate to the stamens or reduced to glands, rarely none. *Ovary* of several carpels, syncarpous or sub-apocarpous. *Ovules* one or two, rarely many, ascending or pendulous, raphe usually ventral.

Order CHAILLETIACEÆ.

Flowers hermaphrodite, or unisexual. *Sepals* 5, united, or free, imbricate, sometimes unequal. *Petals* 5, free, and equal, or connate and unequal, 2-cleft or 2-lobed. *Stamens* 5, alternating with the petals, and adnate to their base, alternating with as many hypogynous glands or disk-lobes. *Ovary* free, 2–3-celled, with paired pendulous ovules in each cell. *Styles* 2–3, free, or united higher up. *Stigma* simple, or capitate. *Drupe* dry, containing a 1–2-celled bony or crustaceous, sometimes 2-parted stone.

CHAILLEIA, *De Candolle.*

× *Nerves and net-venation beneath more or less conspicuous.*

C. GELONIODES, Bth. *E.T.*

Chittagong.

Cymes cluster-like and almost sessile. Leaves green, cuneately narrowed into a very short petiole.

C. MACROPETALA, Turcz. *E.T.*

Tenasserim.

Cymes spreading, peduncled? Leaves dark-brown in a dried state.

× × *Nerves and net-venation beneath very faint and almost impressed.*

C. HELFERIANA, Kz.

Tenasserim.

Cymes on a 2–3 lines peduncle. Leaves brown when dried, shortly petioled.

Order MELIACEÆ.

Flowers regular, usually hermaphrodite, rarely polygamous, diœcious. *Calyx* usually small, 4–5-lobed, or the sepals distinct, imbricate, very rarely valvate. *Petals* 4, 5, rarely 5–7 or 3 only, the filaments inserted outside on the disk, more or less united in a tube, very rarely quite free. *Anthers* sessile, or rarely stipitate, on the inside or at the summit of the staminal tube, 2-celled, the cells opening longitudinally. *Disk* various, free or adnate. *Ovary* 3–5-celled, with usually 2 (rarely 1–6 or more) ovules in each cell. *Stigma* disk-shaped or pyramidal. *Fruit* a capsule, berry, or

drupe, indehiscent or opening loculicidally, rarely septucidally. *Albumen* fleshy or none. *Radicels* superior. Trees or shrubs with alternate, usually pinnate leaves. *Stipule* none. *Flowers* usually small, in panicles.

A. Ovary-cells 1-2-ovuled. Seeds not winged.

MELIÉE.

Stamens united into a tube. Albumen thin, fleshy. Cotyledons thin.

* *Capsule loculicidally 5-valved.*

MUNRONIA, Wight.

Calyx-lobes 5, almost leafy. *Petals* adnate to the elongate staminal tube. *Disk* tubular, sheathing the ovary. *Leaves* pinnate or pinnately 3-foliolate.

M. (TURREA) PINNATA, Wall. S. Pegu Range.
M. *Wallichii* and *Neilgherria*, Wight.

** *Fruit a drupe.*

MELIA, Linnæus.

Calyx 5-6-parted. *Petals* free. *Disk* annular. *Drupes* containing a single 1-5-celled putamen. *Leaves* pinnate or decomposed.

* *Leaves simply pinnate. Ovary 3-celled.*

M. EXCELSA, Jack. E.T. Mergui (probably cultivated).
Leaflets entire.

*M. AZADIRACHTA, L. T. Ava and Prome.
Azadirachta Indica, A. Juss.

Then-bor-kha-ma-kha. The 'Neem' of India.

Leaflets serrate. *Drupes* small, by abortion 1-celled and 1-seeded.

Mason remarks: "It is cultivated by the Burmese for its medicinal qualities, for which it is famous all over India. The bark has been successfully used in India as a substitute for cinchona: the bitter oil of the fruit is a valuable anthelmintic: the seeds are used in the destruction of insects, and the leaves, remarks Dr. Wright, beaten into a pulp and thus externally applied, act as a charm in removing the most intractable form of psora and other pustular eruptions."

This valuable tree must not be confounded with the next species, which it much resembles. Kurz describes the wood as like mahogany, hard, heavy, and close-grained, durable and taking a good polish. The tree also exudes a gum. It is a tree highly deserving of being largely planted.

** *Leaves twice pinnate. Ovary and drupes 5-8-celled, some of the cells in fruit usually empty.*

× *Drupes* about $\frac{1}{2}$ inch long, oblong or elliptical.

M. AZADIRACHT, L. T. Ava. Prome.
M. *sempervirens*, Sw.
M. *sambucina*, Bl.

Kha-ma-khā. Bead tree.

Leaflets serrate; staminal tube blue or dark lilac, slender, glabrous outside, about 3 lines long.

The wood of this tree is pale brown, or reddish, rather loose-grained. It is light, and much used for coarse furniture, but is an inferior wood, though this tree is often mistaken for the last.

× × *Drupes* large, 1 inch long or longer. *Staminal tube* white.

M. BIRMANICA, Kz. T. Tropical forests of Martaban.
Tor-kha-ma-khā (Kurz).

Drupes twice as large, almost globose-obovoid, 5-8-celled; staminal tube 2 lines long, woolly at the summit; flowers larger, scurvy-tomentose outside.

CIPADESSA, *Blume.*

Calyx 5-toothed. *Petals* free, short. *Disk* cupular. *Drupes* with 5 horny pyrenes.

C. BACCIFERA, Miq. *E.T.* or *E.S.* var β Ava, Taong-doung.

Ekebergia Indica, Roxb.

Mallea Rothii, A. Juss.

var. *a. Rothii*. Leaflets coarsely serrate or serrate-toothed.

var. β . *integerrima*. Leaflets all entire.

TRICHILIEÆ.

Stamens united into a tube, very rarely free. *Ovary-cells* with one or two, rarely more ovules. *Albumen* none. *Cotyledons* thick.

* *Disk* free, tubular or cylindrical. *Style* usually elongate.

° *Leaves* pinnate (leaflets 5 or more).

DYSOXYLON, *Blume.*

Calyx small, 4- or 5-toothed, opened while in young bud. *Petals* valvate, free. *Ovary* 3-5 celled. *Capsule* pear-shaped, opening loculicidally. *Arillus* none.

× *Flowers* in panicles.

D. BINECTARIFERUM, Roxb. *E.T.* Chittagong.

D. macrocarpum, Thwaites.

Calyx, petals and reproductive organs perfectly glabrous.

D. PROCERUM, Hiern. *E.T.* Tropical forests of Pegu Range and Tenasserim.

Calyx, petals and staminal tube minutely pubescent.

× × *Flowers* in spikes or racemes.

D. CAULIFLORUM, Hiern. Tropical forests of South Andaman.

Spikes arising from the trunk or old branches, densely flowered. Leaflets opposite or nearly so, pale green.

SCHIZOCHITON, *Blume.*

Calyx usually campanulate, obscurely 4- rarely 5-toothed, open already in bud. *Petals* valvate or imbricate, united for $\frac{1}{3}$ to nearly $\frac{1}{2}$ of their length with the toothed or lobed staminal tube and appearing tubular. *Ovary* 3-4-celled. *Capsule* usually pyriform, opening loculicidally. *Arillus* complete or incomplete.

* *Flowers* almost sessile or very shortly and robustly pedicelled.

S. DYSOXYLIFOLIUS, Hiern. *E.T.* Upper Tenasserim.

Leaflets quite glabrous. Anthers 6.

S. GRANDIFLORUS, Hiern. *E.T.* Tropical forests of Martaban and Tenasserim.

Leaflets softly pubescent beneath. Anthers 6-7.

** *Flowers* on slender pedicels.

S. PANICULATUS, Hiern. *E.T.* Tavoy. Also Ava, Taong-doung.

Young parts and panicle and also the under surface of leaves pubescent.

° ° *Leaves* pinnately 3-foliolate.

SANDORICUM, *Cavanilles.*

Calyx tubular. *Petals* imbricate. *Berry* globular, indehiscent.

S. INDICUM, Cav. *E.T.* Tropical forests of Pegu Range and Tenasserim.

Thyt-to (Kurz) seed?

Wood dark brownish-grey, hard and heavy (Kurz). The name *Thyt-to* is, I believe, applied to a very different tree, with a light wood of 35 lbs. weight, and a pale-reddish colour something like *Pyongmā*. Mason says, "The sandoricum tree bears a fruit the size of an orange, occasionally called the wild mangosteen, to which it bears some resemblance. It has a fleshy acid pulp and makes a very good jelly, but has a peculiar odour. The natives eat the fruit raw and esteem it excellent."

** *Disk none, annular or confluent with the staminal tube. Style short or none.*

† *Anthers included, or almost included in the staminal tube. Seeds urillate.*

AGLAIÆ, Loureiro.

Petals 5. Anthers as many. Ovary 1-3-celled. Berry 1-2-celled, indehiscent.

* *Inflorescence and often also the other parts more or less scaly, especially while young.*

× *Leaflets usually in 2 or 1 pair, with an odd one, nearly glabrous.*

A. CHITTAGONGA, Miq. *E.T.* Tropical forests of Chittagong and Arakan.

Leaves pinnately 3-foliolate. Panicles short and peduncled. Scales of younger parts pale-coloured.

A. ANDAMANIA, Hiern. *E.T.* Tropical forests of the Andamans and Nicobars.

Leaflets in 2 pairs with an odd one. Scales of younger parts pale-coloured. Panicle small, sessile.

A. PANICULATA, Kz. *E.T.* Pegu Range and Tenasserim.

Leaflets in 2 pairs with an odd one. Scales of younger parts rusty-brown. Panicles ample, about as long to half as long as the leaves, rather long-peduncled.

× × *Leaflets in 8-5 pairs, with an odd one, beneath silvery or coppery scaly.*

A. ARGENTEA, Bl. *E.T.* Eastern slopes of Pegu Range. The Nicobars.

Panicle ample, densely silvery or coppery lepidote. Flowers sessile.

** *Calyx, pedicels, and usually the whole inflorescence rusty puberulous or tomentose from short stellate hairs.*

× *Leaflets in 6-8 or more pairs.*

A. CRASSINERVA, Kz. *E.T.* Tenasserim.

Leaflets beneath minutely and indistinctly scaly-tomentose, glabrescent, the lateral nerves all sharply prominent beneath. Panicles, etc., rusty puberulous. Flowers pedicelled. Berries tawny velvety.

A. (EUPHORIA) EXSTIPULATA, Griff. *E.T.* Tenasserim.

A. Griffithii, Kz.

Leaflets beneath sparingly fascicled-hairy. Petiole, panicle and nerves beneath densely rusty tomentose.

× × *Leaflets in 1 or 2 pairs, with an odd one, rarely 1-foliolate.*

A. OLIGOPHYLLA, Miq. *E.T.* Tenasserim.

Meliaca Singaporeana, Wall.

Panicles slightly stellately pubescent, soon glabrous. Calyx and pedicels glabrous. Net-venation conspicuous.

Kurz adds from the Nicobars.

A. GANGGO, Miq.

Katchall and Great Nicobar.

AMOORA, Roxburgh.

Petals 3-5. Anthers twice as many or more than twice as many as petals. Ovary 3-5-celled. Capsule leathery, opening loculicidally.

* *Petals 3. Anthers 6-8.*

× *Flowers sessile, spiked, the male spikes forming large panicles.*

A. ROHTUKA, W. A. *E.T.*
Thyt-ni (Kurz).

Tropical forests of Pegu Range and
Tenasserim up to 3000 feet.

Leaflets shortly acuminate. Fertile spikes simple, many-flowered. Male flowers about 4 lines in diameter, the staminal tube entire at the apex. Wood white or reddish, heartwood darker coloured, weight 40 lbs. (*vide* Gamble), takes a good polish. Seeds yield an oil. Brandis says Thyt-ni is 80 lbs., but this must be some other wood.

× × *Flowers pedicelled, cymose or racemose-cymose and paniceled.*

° *Male panicles ample, as long to half as long as the leaves.*

A. SPECTABILIS, Miq.

Rangoon (*vide* Hiern.).

Leaflets shortly acuminate, thin coriaceous, the nerves prominent on both sides, the veins and net-venation distinct.

A. CUCULLATA, Roxb. *E.T.*

Southern Pegu and Tenasserim.

Thyt-ni (Kurz).

Leaflets blunt, smaller, coriaceous, the nerves above hardly visible and impressed, the veins and net-venation obsolete. Fertile spikes few-flowered. Flowers about 2 lines in diameter, the staminal tube slightly 3-toothed.

° ° *Panicles slender, shorter than or as long as the petiole.*

A. LACTESCENS, Kz. *E.T.*

Tropical forests Hills East of Toung-ngoo.

Leaflets green, conspicuously nerved and net-veined on both sides. Flowers long pedicelled. Panicle very lax, densely lepidote.

** *Petals 5. Stamens 10.*

A. DYSOXYLOIDES, Kz. *E.T.*

Martaban, Yunzalin.

Panicles shorter than the petiole, like the petiole densely lepidote. Leaves sparingly lepidote beneath.

† † *Anthers exerted or the filaments upwards free.*

WALSURA, Roxburgh.

Petals 5. Berry indehiscent or follicular-dehiscing along the suture. Seeds arillate.
Sub-genus EU-WALSURA.

Berries indehiscent or only very slowly and incompletely dehiscing along the sutures, usually velvety or tomentose.

* *Panicles densely pubescent. Young shoots and petioles of young leaves puberulous.*

W. TRICHOSTEMON, Miq.

Ava. Pegu and Tenasserim.

W. villosa, W.A.

Jyō-bō (Gyo-bo, Kz.).

Petals pubescent. Filaments flat, at the very broad base somewhat coherent.
Heartwood dark brownish-red, hard and close-grained, 61 lbs. weight.

** *Panicles minutely puberulous. Leaves and petioles glabrous.*

° *Leaves coriaceous or firmly chartaceous.*

W. ROBUSTA, Roxb. *E.T.* Tropical forests of Tenasserim; rare in Pegu Range.

Jyō-bō.

Leaves beneath usually white-arcuate within the net-venation. Filaments broadly lanceolate, sprinkled with minute hairs.

W. HYPOLEUCA, Kz. *E.T.*

Tropical forests of the Andamans.

Leaflets uniformly glaucous beneath. Filaments linear, densely pubescent. Flowers larger.

°° *Leaves thin chartaceous or almost membranous, the net-venation inconspicuous.*

W. OXYCARPA, Kz. *E.T.*

Tropical forests of the Andamans.

Leaves acuminate, glaucous beneath. Young fruits acuminate, greyish velvety.

W. piscidia, Roxb., apud MacClelland, is included by Mason, but not by Kurz, and it is probably therefore one of the above-mentioned species from Tenasserim. Roxburgh's species is so named from the bark being used to stupify fish. The timber of *Walsura* is strong and excellent, being termed 'male jyo,' jyo being that very strong and admirable wood, *Schleichera trijuga*.

Sub-genus HEYNEA, Roxb.

Berries dehiscing along the sutures, usually glabrous.

W. TRIJUGA, Roxb.

var. *a* Upper Tenasserim. var. *β* rare in the tropical

W. quinquejuga, Roxb.

forests of the Pegu Yomah, and in the Martaban Hills, up to 2000 feet elevation.

Glabrous or pubescent. Leaflets in 3-6 pairs. Panicles long-peduncled.

var. *a genuina*. All parts (also the panicle) quite glabrous, or only the young shoots slightly pubescent. Leaflets in 3-6 pairs.

var. *β pubescens*. All softer parts, inflorescence, and under surface of leaves, softly pubescent. Leaflets usually in 4 pairs.

B. Ovary-cells 3- to many-ovuled. Seeds usually winged.

SWIETENIÆ.

Stamens united into a tube. Albumen present or not. Leaves pinnate.

CARAPA, Aublet.

Petals 4 or 5. *Ovary-cells* with 6-3 ovules. *Capsule* large, thick coriaceous, opening loculicidally. Seeds very large, with corky testa, without arillus.

C. MOLUCCENSIS, Lamk. *E.T.*

Shores of the Andamans. Katchall.

Granatum littoreum, Rumph.

Xylocarpus granatum, Koen.

Pyn-leh-ōng.

Leaflets more or less ovate. Flowers 5-merous, about 2 lines across.

C. OBOVATA, Bl. *E.T.*

Littoral and tidal forests from Chittagong to Tenasserim and the Andamans.

Guarua oblongifolia, Griff.

Wood reddish-brown, not very close-grained, strong. The fruits are used for tanning, and the tree produces a gum (Kurz). This is an excellent wood, much used for house building. It is easy to work, and looks like a pale and coarse mahogany. Weight 14 lbs.

SOYMIDA, *A. Jussieu*.

Petals 5. *Staminal-tube* cup-shaped, 10-lobed, the lobes 2-toothed. *Disk* rather broad. *Seeds* winged at both ends. *Albumen* none.

S. (SWIETENIA) FEBRIFUGA, Roxb. *T.*

Prome (?).

CHICKRASSIA, *A. Jussieu*.

Petals 4 or 5. *Staminal-tube* cylindrical, 10-crenate. *Disk* none. *Seeds* winged below. *Albumen* none.

C. TABULARIS, A. JUSS.

var. *a* rare in the tropical forests of Chittagong, Pegu, Tenasserim, and the Andamans. var. *β* frequent in the dry forests of Prome and Pegu.

Yi-mā or Yeng-mā (Kurz).

var. *a genuina*. Leaves and panicles glabrous. Capsules greyish, wrinkled.
var. *β retutina*, Roem. All softer parts, as well as the panicle, softly pubescent.
Capsules black, almost smooth.

Kurz describes the wood as light-coloured, and weighing 24 lbs. only! It would seem in this and other cases he only follows Brandis, who is certainly wrong as to weight. Yimmah is a somewhat coarse brown wood weighing 53 lbs., and is an excellent wood for common purposes.

CEDRELIEÆ.

Filaments free, inserted outside of the disk. Valves of capsule separating from the axis. Seeds many. Leaves pinnate.

CEDRELA, Linnæus.

Petals erect. Stamens 4-6. Disk raised or thin. Ovary 5-celled. Capsule opening septically. Seeds winged.

* *Seeds winged at both ends. Leaflets entire.*

C. TOONA, Roxb. *T.* Chittagong, Arakan, and rare in Pegu Range.
C. febrifuga, Bl.
C. Teysmanni, Miq.

Calyx minute, the sepals rounded, hardly $\frac{1}{3}$ line long. Leaflets usually on long slender petioles.

Thyt-kadō (scented wood). The 'Toon' of India.

Wood reddish, weight 34 lbs., Kurz gives 28, but this is too low. It is an excellent wood for furniture, but given to creaking during changes in the weather and at night.

C. MULIUGA, Kz. *E.T.* Rare in Pegu Range West of Toung-ngoo.
Toung-ta-mā.

Calyx large, the sepals $1\frac{1}{2}$ line long, acute. Leaflets usually shortly petioled.

** *Seeds winged only below.*

C. SERRATA, Royle. *T.* Ava.
C. longifolia, Wall.

Leaflets serrate or serrulate. Calyx minuto.

Many species of this Order yield bitter and tonic principles which are useful as febrifuges, and some are emetic, purgative, or anthelmintic. The main value however of trees of this Order lies in the excellent timber they supply. Foremost among these stands Mahogany, *Swietenia Mahagoni*, which may be regarded as displaying the type of excellence for a furniture wood, but which some Burmese woods but little known or regarded closely approach. Another famous tree held in high esteem for the sanative properties of its oil and leaves is the Nim (of India), *Melia azadirachta*, which also yields a fine wood. Other excellent timbers are yielded in Burma by various species of *Carapa*, *Anoora*, *Walsura* and *Cedrela*, not to mention others of less value.

Order BURSERACEÆ.

Flowers hermaphrodite, or polygamous, regular. *Calyx* gamosepalous, or the sepals distinct, imbricate or valvate. *Petals* 3-5, usually free, deciduous, valvate, or imbricate. *Stamens* twice as numerous as petals, or more (rarely 3-5), equal or unequal, free. *Anthers* usually versatile. *Disk* usually conspicuous, annular or cup-shaped. *Ovary* free, 2-5 celled, with 2 (rarely a solitary) usually pendulous ovules in each cell. *Style* usually short, with an entire or 2-5-lobed stigma. *Drupe* indehiscent, containing 2-5 nuts, or a longer chartaceous stone, the fruit rarely capsular, inclosing 2-5 bony nuts. *Seeds* pendulous. *Albumen* none. Trees or shrubs, with pinnate, or rarely 3-1-foliolate leaves, the lower pair of leaflets usually stipule-like. *Flowers* small in racemes or panicles.

GARUGA, Roxburgh.

Torus broadly filling the urceolate calyx-tube. *Calyx* 5-cleft.

G. PINNATA, Roxb. *T.* From Chittagong to Tenasserim and the Andamans.
Chyu-y-ök.

var. *a genuina*. More glabrescent; drupes glabrous.

var. *β mollis*, Turcz. More pubescent, the drupes densely villous or pubescent.

Kurz says the bark is used for tanning, and describes the wood as greyish or yellowish, and 52 lbs. weight. The seasoned wood however is only 45 lbs. and reddish. It is coarse in grain and little used.

BURSERA, Linnæus.

Calyx 4-6-parted. *Stamens* 8-12, inserted at the base of the annular disk.

B. SERRATA, Wall. *E.T.* Pegu Range and Martaban.

Limonia pentagyna, Roxb.

Thadi (Kurz).

CANARIUM, Linnæus.

Calyx 3- (rarely 2-5)cleft, valvate. *Petals* 3-5. *Stamens* 6-10. *Drupes* ovoid, more or less 3-angular, with a bony or hard putamen.

* *Stipules* subulate, entire, very deciduous.

C. EUPHYLLUM, Kz. *E.T.* Tropical forests of South Andaman.

Leaflets serrulate. Disk-glands smooth, 6, free, cohering by pairs.

C. BENGALENSE, Roxb. *E.T.* Rare in the Pegu Range.

Leaflets entire. Disk-lobes 3, hairy, united into a cup. Wood rather light pale brown, polishes well. Tree exudes a brittle amber-coloured resin, like Copal (Kurz).

* * *Stipules* 2-cleft and pectinately cut, persistent.

C. COCCINEO-BRACTEATUM, Kz. *E.T.* Tropical forests of South Andaman.

Young buds covered by the crimson velvety bracts; leaflets entire and serrate.

The Order *Burseraceæ* is chiefly remarkable for the balsamic products of many trees belonging to it. For example, Myrrh is produced by *Balsamodendron Myrrha*, an Arabian tree. Balm of Mecca or Gilead, an odoriferous balsam, is produced by two other Arabian species of *Balsamodendron*, and Kafal, an odoriferous wood and gum, by *B. opobalsamum* and *B. kafal*. Hence, no doubt, the allusion of Virgil, "India mittit ebur, molles sua thura Sabæi," and the epithet *molles* 'effeminate' may have been applied to them from the poet's being aware of their having been ruled over by a Queen who visited the Court of Solomon. The Indian Olibanum is produced by *Boswellia thurifera*; Ceylon Elemi by *Canarium commune*; the Elemi of Java by *Bursera gummifera*; and that of Mexico by *Elaphrium elemiferum*. Bdellium by *Balsamodendron Africanum*; the Guggur resin of Seind, by *B. mukul*; and the Gagal of Bengal, by *B. Roxburghii*. But various other trees of this Order yield similar resins, which possess identical properties with the above. The Ceylon *Canarium Zeylanicum* yields a resinous oil used for torches; *C. commune* an edible oil from its seeds, and a terebinthaceous oil possessing the properties of Copaivi; while *C. strictum* is the black-dammar tree of Malabar, though the resin is really amber-coloured.

Order OCHNACEÆ.

Flowers hermaphrodite. *Sepals* 4-5, free, usually scarious, imbricate. *Petals* 5 (rarely 4-10), free, deciduous, almost sessile or clawed, imbricate or convolute. *Torus* never annular or glandular, enlarged under the fruit. *Stamens* 4-10 or many, equal, or unequal, 1-sided or declinate. *Filaments* persistent. *Anthers* linear, basifixed, dehiscing longitudinally, or by terminal pores. *Ovary* central, or excentric,

1-10-celled, terete or lobed, with 1 or 2 (rarely more) ovules in each cell. *Style* simple, or rarely 2-10-cleft at summit. *Fruit* either 3-10 one-seeded drupes, seated on the enlarged torus, or 2-4-lobed, 1-4-seeded, indehiscent, berry-like, or septiciadally capsular, coriaceous or woody. Trees or shrubs, with simple, usually serrulate leaves. *Stipules* present. *Flowers* showy, often bright yellow, in panicles or fascicles, rarely solitary.

OCINIEÆ.

Ovary 2-10-celled, with a solitary ovule in each cell. *Albumen* none.

OCHNA, Schreber.

Stamens indefinite. *Drupes* 3 to 10, on the enlarged torus. *Corymbs* lateral.

* *Styles* free at the summit for nearly a line in length.

O. ANDAMANICA, Kz. T. The Andamans and Nicobars.

Fruiting sepals erect-conniving. Filaments as long as or longer than the anthers.

** *Styles* united to the apex.

× *Filaments* as long as or longer than the anthers.

O. WALLICHI, Planch. T. Pegu Range and Tenasserim.

O. obtusa, Wall.

O. lucida, Griff.

Yō-da-yā (Kurz).

Petals usually 5. Fruiting sepals reflexed.

O. FRUTICULOSA, Kz. E.S. Pegu and Martaban.

Petals 5. Fruiting sepals erect-connivent.

× × *Filaments* almost 4 times shorter than the anthers.

O. SQUAREOSA, Roxb. T.

O. lucida, Lamk.

Hsen-weh.

Petals usually 7-8. Fruiting sepals erect-conniving.

GOMPHIA, Schreber.

Stamens 10. *Drupes* 3-5, seated on the enlarged torus. *Panicles* terminal.

G. SUMATRANA, Jack. E.T. Mergui.

Ochna crocea, Griff.

TETRAMERISTA.

Flowers 4-merous. *Stamens* 4. *Fruit* a coriaceous 4-seeded berry.

Mr. Bennet has a *Tetramerista glabra*, var. *sagittata*, based upon *Ancistrocladus? sagittatus*, Wall. Cat. 1055, a plant which I have not seen, and which, on account of its sagittate-based leaves, cannot be a *Tetramerista*. He gives Tenasserim as one of the localities for it (Kurz).

Order SIMARUBEÆ.

Flowers regular, dioecious or polygamous, rarely hermaphrodite. *Calyx* gamosepalous, or 3-5-sepalled. *Petals* 3-5, hypogynous or slightly perigynous, imbricate or valvate, rarely wanting. *Stamens* as many or twice as many. *Anthers* versatile, the cells opening by longitudinal slits. *Disk* under or round the ovary, various, rarely wanting. *Ovary* of 3-5 (rarely more or fewer) carpels, either quite distinct or more or less united into a lobed or rarely entire ovary, with a solitary (rarely two) ovule in each cell. *Styles* as many as carpels, free or united at the base with their stigmas only. Trees or shrubs, with pinnate or simple leaves, seldom gland-dotted. All the species are intensely bitter.

SIMARUBEÆ.

Ovary deeply lobed or the carpels distinct.

* Stamens twice as many as petals.

° Leaves simple.

SAMADERA, Gaertner.

Calyx 3-5-parted. *Disk* large. *Stamens* 8-10. *Drupe* variously winged.

S. INDICA, Gaertn. *E.T.*

Upper Tenasserim.

Kathai (Kurz).

Kurz says this tree yields the 'niepa bark' of commerce. It is presumably the same tree as Mason records as follows, though the habitat differs: "The low grounds near the sea coast are ornamented with a handsome shrub which is a species of samadera, and bears a rather curious flower. Like the quassia of the same tribe, its leaves are most intensely bitter, and may perhaps possess the virtues of quassia. Wight says it is cultivated in the gardens about Batavia; but I have never seen it out of its native jungles on this coast."

°° Leaves pinnate.

AILANTHUS, Desfontaines.

Calyx 5-cleft. *Disk* 10-lobed. *Stamens* 10. *Fruit* of 1 to 5 samaras.

** Stamens as many as petals. *Leaves* pinnate. *Carpels* drupaceous.

° *Styles* free or cohering at the base only.

A. MALABARICUS, DC. *T.*

Rare along the Khaboung choung,
Eastern Slopes of Pegu Range.

Leaves unpaired-pinnate, 1-2½ feet long, glabrous.

BRUCEA, Miller.

Disk 4-lobed. *Stamens* glabrous. *Flowers* cymose-racemose.

B. SUMATRANA, Roxb. *E.S.*

Mergui.

Leaflets coarsely crenate-toothed. *Drupe*s about 2 lines long.

B. MOLLIS, Wall. *S.*

Upper Tenasserim 3000 to 4000 feet.

Leaflets quite entire. *Drupe*s about 3-4 lines long.

°° *Styles* connate. *Flowers* in panicles.

PICRAMMA, Blume.

Disk thick. *Stamens* pilose.

P. JAVANICA, Bl. *E.T.*

Rare on Pegu Range; common in Tenasserim
and the Andamans.

P. Andamanica, Kz.

Leaves unpaired-pinnate, 8-9 inches long. Leaflets in 3 pairs, with an odd one.

EURYCOMA, Jackson.

Disk none. *Stamens* glabrous.

E. LONGIFOLIA, Jack. *E.S.*

Tenasserim and the Andamans.

E. Merguensis, Planch.

Leaves unpaired-pinnate, 2-2½ feet long, glabrous.

PICRAMNIEÆ.

Ovary entire, 2-5-celled.

HARRISONIA, R. Brown.

Calyx 4-5-cleft. *Stamens* 4 or 10. *Ovary* 4-5-celled. *Leaves* pinnate, or pinnately 1-3-fideliolate.

H. BENNETI, Bth. *T.* Prome and the Yunzaleen at 2000 feet.
Lasiolipsis paucijuga, Benn.

Tapu-ben (Kurz).

Leaves unpaired-pinnate, the puberulous rachis winged.

BALANITES, *Delile*.

Sepals 5. *Stamens* 10. *Ovary* 5-celled. *Leaves* bifoliolate.

B. ROXBURGHII, Planch. *T.* or *S.* Ava. var. β in Prome.

Ximenia Aegyptiaca, Roxb.

var. β *gracilis*. Branchlets slender and glabrous or nearly so. Inflorescence more glabrous than in the normal form and only puberulous, the peduncles and pedicels all very slender.

Order RUTACEÆ.

Flowers regular, usually hermaphrodite. *Calyx* various, gamosepalous, or the sepals free. *Petals* as many as sepals, or twice as many, or rarely more, free or rarely cohering, imbricate or valvate. *Stamens* definite or rarely numerous. *Anthers* usually versatile, the cells opening lengthwise. *Torus* inside the stamens, usually more or less thickened into a disk. Trees or shrubs, very rarely herbs, all herbaceous parts pellucid-gland-dotted. *Stipules* none. *Leaves* opposite or alternate, simple or compressed.

Many members of this Order possess aromatic, pungent, and therapeutic properties. The bark of some species of *Toddalia* is used as a febrifuge. The limes and citrons abound in a volatile fragrant oil and salts of potash, rendering them of great therapeutic value in many diseases. The Bael is esteemed for sherbet, and several species yield good wood.

A. Fruit separating into 2-5 distinct 2-valved carpels.

ZANTHOXYLIEÆ.

Flowers usually polygamous. *Disk* free, or rarely wanting. *Styles* basilar or ventral, free. *Fruit-carpels* coriaceous, the endocarp persistent or separating elastically.

× *Leaves* opposite or nearly so, rarely intermixed with nearly alternate ones. *Unarmed*.

EVODIA, *Forster*.

Stamens 4-5. *Leaves* often compound, rarely 1-foliolate.

E. VITICINA, Wall. *E.S.* Tavoy.

× *Panicles* small, contracted, usually much shorter than the petioles.

Branchlets 4-cornered and marked with 4 prominent longitudinal lines. *Leaves* 1-3-foliolate, the leaflets sessile. *Stamens* shorter than the petals.

E. TRIPHYLLA, DC. *S.* Tenasserim between 3000 and 5000 feet.

E. gracilis, Kz.

Branchlets terete. *Leaves* 8-foliolate, the leaflets short petioluled, green.

× × *Panicles* corymbose, spreading, as long or longer than the petiole.

E. ROXBURGHIANA, Bth. *E.T.* Tropical forests of Tenasserim, the Andamans, and Kamorta.

Xanthoxylon triphyllum, Wight.

Branchlets terete, thick. *Leaflets* shortly petioluled, dark bluish-green.

MELICOPE, *Forster*.

Stamens 8. *Leaves* often 1- rarely 3-foliolate.

M. HELFERI, Hf. Tenasserim (Helfer).

Quite glabrous. *Bark* wrinkled. *Disk* 8-lobed.

× × *Leaves all alternate. Often armed.*

ZANTHOXYLON, *Linnaeus.*

Petals 3-5, rarely none. Stamens as many. Leaves often pinnate.

* *Cymes axillary, or axillary and terminal. Branches alternate. Leaves pinnate.*

× *Rachis of leaves winged. Flowers apetalous.*

Z. ACANTHOPIDIUM, DC. *T.* Hills East of Bhamo.

Leaflets 2-3 inches long, glandular-crenulate. Cymes dense, $\frac{1}{2}$ -1 inch long.
Fruit-carpels usually by 4-2.

Z. ANDAMANICUM, Kz. *E.S.* Tropical forests of Termokli Island.

Leaflets coarsely crenate, $\frac{1}{2}$ -1 inch long. Flowers and fruit unknown.

× × *Rachis of leaves not winged. Flowers 4-5-petalous.*

Z. HAMILTONIANUM, Wall. *E.S.* Burma (*vide* Hefner).

Leaflets in 2-3 pairs, glossy on both sides. Cymes axillary.

** *Cymes terminal. Branches opposite.*

Z. BUDRUNGA, DC. *E.T.* Tropical forests from Chittagong to Tenasserim.

MaYa-nen (Kurz). Ka-thit-hsu (Mason).

Leaflets glandular-crenate, in 7-10 pairs. Wood heavy, white, close-grained (Kurz).

B. Fruit a drupe or berry, rarely a capsule.

TODDALIEÆ.

Flowers usually polygamous. Disk free. Style single. Albumen usually present.

ACRONYCHIA, *Forster.*

Petals 4. Stamens 8. Drupe or capsule 4-celled. Erect unarmed trees, with 1-3-foliolate leaves.

A. LAURIFOLIA, Bl. *T.* Chittagong, Pegu, the Andamans, and Kamorta.

A. cyminosma, F. Muell.

Cyminosma pedunculata, DC.

All parts glabrous. Leaves 1-foliolate, rather shortly petioled.

TODDALIA, *Jussieu.*

Petals 2-5. Stamens as many. Berry 4-7-celled. Climbers, often armed, with usually 3-foliolate leaves.

T. ASIATICA, L. *S.S.*

Ava and Pegu up to 3000 feet.

T. aculeata, Pers.

Scopolia aculeata, Roxb.

Kyāu-zā.

var. *a aculeata*, Pers. Petioles and often also the midrib beneath hooked-prickly. Panicles usually smaller and less branched.

var. β *floribunda*, Wall. Petioles and midrib of leaves unarmed. Panicles often more compound.

AURANTIEÆ.

Flowers hermaphrodite. Petals and stamens free or connate. Style simple. Ovules 1, 2 or more in each cell. Berry often pulpy, with a coriaceous rind. Albumen none.

× *Ovary-cells with 1 or 2 ovules only.*

+ *Style persistent, not jointed at the base.*

GLYCOSMIS, *Correa da Serra.*

Calyx 5-parted or toothed. Stamens 10, free. Ovules solitary. Leaves pinnately 5-1, or rarely 7-foliolate.

+ + *Style jointed at the base, deciduous.*

† *Leaves pinnate or 3-foliolate.*

* *Ovules 2 in each cell.*

◦ *Leaves pinnate or pinnately 3-foliolate.*

‡ *Cotyledons plano-convex, fleshy. Petals imbricate.*

** *Anthers blunt, not gland-tipped.*

◦ *Berries obovate-oblong to oblong, leaden blue.*

G. CYANOCARPA, Spreng. *E.S.*

Pegu Range.

Tor-shouk.

Petals longer, persistent. Filaments flat, from a narrower base gradually broader towards the triangular apex. Bark pale-coloured.

var. *α genuina*. Flowers in peduncled terminal and axillary panicles.

var. *β cymosa* (*G. tetraphylla*, Wall., and *G. oxyphylla*, Wall.). Flowers in short peduncled or almost sessile, quite glabrous, or rarely rusty tomentose, cymes axillary, or axillary and terminal, rarely transformed into panicles.

◦ ◦ *Berries more or less globular, from watery flesh-coloured to crimson.*

G. TRIFOLIATA, Spreng. *E.S.*

Chittagong to Tenasserim, the Andamans and Katchall.

Petals very deciduous. Filaments from a broader base attenuated upwards. Nerves of leaflets prominent above. Bark pale-coloured. Wood heavy, close-grained, yellowish-white, darkening with exposure (Kurz).

G. (LIMONIA) ARBOREA, Roxb. *E.T.*

Andamans and Nicobars.

Petals very deciduous, lanceolate, about 3 inches long. Filaments elongate, filiform. Bark brown.

*** *Anthers gland-tipped.*

G. (LIMONIA) PENTAPHYLLA, Retz. *E.S.* All over Burma.

Petals longer, persistent, about 1½ line long. Anthers cordate. Filaments flat, from a narrower base gradually broader towards the triangular apex. Bark white.

MURRAYA, *Linnaeus*.

Stamens 10, free. *Ovary* 2-5-celled. 1 or 2 ovules in each. *Filaments* linear-subulate. Unarmed, the flowers in terminal cymes.

M. EXOTICA, L. *E.T.*

Tropical forests of Pegu, Tenasserim, and the Andamans.

Chalcas paniculata, Roem.

Leaflets 3 to 8. Petals nearly ½ inch long.

“Burmese Boxwood,” white, heavy, and close-grained (Kurz).

M. KOENIGII, Spreng. *E.T.*

Chittagong. Pegu Range.

Leaves 4-6-foliolate.

◦ ◦ ◦ *Leaves digitately 3-foliolate.*

LUVUNGA, *Hamilton*.

Calyx cup-shaped. *Stamens* 8 or 10. Armed or not.

** *Ovules solitary in each cell.*

L. (LIMONIA) SCANDENS, Roxb.

Chittagong. Ava (?).

Filaments glabrous, more or less connate.

L. FLEUTHERANDRA, Dalz.

Tavoy.

L. Tavoyana, Wall.

TRIPHASIA, *Loureiro*.

Calyx 3-lobed. *Stamens* 6, spiny. *Leaves* digitately 3-foliolate. *Flowers* almost solitary.

* *T. TRIFOLIATA*, DC. *E.S.* Tenasserim (wild?). Nankowry and Katchall. This shrub yields the Lilliputian oranges, often seen in Chinese preserves.

LIMONIA, *Linnaeus*.

Calyx 4- or 5-lobed or parted. *Stamens* 8-10, armed. *Leaves* pinnate.

L. ACIDISSIMA, L. *T.* Ava, Taong-doung, and Promé Hills.

L. crenulata, Roxb.

Thi-paya-zā (Kuruz).

Leaflets opposite. Inflorescence puberulous. Berries globose, sessile.

var. β *pubescens*. Prickles on the branches short, the wings of the petiole narrow, leaflets bluntish, the terminal one long but bluntish acuminate, the petioles and nerves beneath softly puberulous.

L. ALTERNANS, Wall. *S.* Arakan, Pegu and Tenasserim.

Unarmed shrub. Leaflets alternate. Inflorescence glabrous. Berries ovoid.

†† *Leaves* 1-foliolate or simple.

PARAMIGNYA, *Wight*.

Anthems linear-oblong. *Disk* elongate. *Calyx* usually cup-shaped. Climbers, armed. *Berries* without pulp.

* *Petals* about 8 lines long. *Calyx* largish, cupular, broadly lobed.

P. MONOPHYLLA, Wight. *E.S.* Near Maulmain at 5000 feet.

Style elongate. *Calyx* and pedicels tomentose, the latter as long as or a little longer than the calyx.

P. GRANDIFLORA, Oliv. *T.* Tavoy.

Style short. *Calyx* and pedicels glabrous, the latter 1 inch or thereabouts long.

** *Petals* 2-4 lines long. *Calyx* small, with acute lobes.

Berries terete.

P. GRIFFITHII, H. f. *E.S.S.* Ava, Serpentine mines of the Hookam Valley. Pegu (*vide* Helfer).

Young shoots more or less puberulous. Style short, hirsute or villous.

P. (LIMONIA) CITRIFOLIA, Roxb. *S.S.* Tropical forests of Chittagong, the Andamans and Nicobars.

P. micrantha, Kz.

Glabrous. Style very short, like the ovary glabrous.

Berries 3-4-angular.

P. ANGULATA, Willd. *T.* Tidal forests of Pegu and Tenasserim.

Limnollus angulosus, Rumph.

Limonia angulosa, W. A.

P. longispina, H. f.

Gonocitrus angulatus, Kz.

Erect tree, the spines 1-1½ inch long, straight. *Calyx* glabrous.

This species has got quite an array of synonyms. I attempted to establish a new genus upon it on account of the angular fruits and absence of pulp, but on examining the fruits of several other *Paramignyas*, I find that they also seem to be

pulpless (*P. littoralis*, Miq.), when dried. *Atalantia missionis*, Oliv., has curiously enough retained its place in *Atalantia*, although habit and generic characters place it beyond any doubt in *Paramignya*, and in habit it approaches very much the above species (Kurz).

C. KOENIGII, Spreng. Tropical forests of Chittagong and the Pegu Range, along streams.
Murraya fetidissima, T. et B.

Leaflets 10 to 20. Petals about 2 lines long.

CLAUSENA, *Burmam.*

Filaments dilated at the base. Unarmed, the flowers in panicles or racemes.

* *Panicle terminal.*

◦ *Ovary glabrous.*

C. MACROPHYLLA, H. f. Bank of the Salween at Trokla.

Softly villous. Leaves pinnately 5-foliolate. Flowers 4-merous.

C. (AMYGDALUS) HEPTAPHYLLA, Roxb. S. Chittagong. Tenasserim (*vide* Helfer).
 Pyin-dor-thein (Kurz).

Inflorescence and leaves glabrous. Petiole and rachis terete or nearly so. Leaflets usually 7 (5-9), not, or hardly oblique. Flowers usually 4- rarely 5-merous.

C. WALLICHI, Oliv. S. Pegu Range and Tenasserim.

Inflorescence and leaves glabrous. Rachis more or less winged. Leaflets 13-17, oblique. Flowers 5-merous.

◦◦ *Ovary more or less hirsute or pubescent.*

C. EXCAVATA, Burm. E.S. All over Burma.

Leaflets 15-30, oblique. Flowers 5-merous.

* C. WAMPI, Blanco. E.T. Chittagong (in gardens).

Inflorescence and the tubercled petioles densely and shortly tawny tomentose. Leaflets 5-9. Young berries densely fascicled-tomentose. Flowers 5-merous.

** *Panicles or racemes axillary.*

C. (AMYRIA) SUFFRUTICOSA, Roxb. S. Chittagong and Prome.

All parts shortly pilose. Leaflets 5 to 17. Ovary and the long red berries glabrous. Flowers 4-merous.

‡‡ *Cotyledons crumpled, leafy. Petals valvate.*

MICROMELUM, *Blume.*

Filaments linear-subulate. Unarmed, the flowers in terminal corymbs.

M. PUBESCENS, Bl. E.T. All over Burma and the Andamans.

Berbera integerrima, Roxb.

Ta-nyeng-lipo (Kurz).

Petals 2½ lines long. Ovary slightly appressed-pubescent. Young berries stalked glabrous. Wood heavy, close-grained, yellowish.

M. HIRSUTUM, Oliv. S. All over Burma.

M. Zeylanicum, Wight.

Meagre shrub up to 4 feet high. Petals 2 lines long. Ovary densely tawny hirsute. Young berries sessile or nearly so, puberulous.

ATALANTIA, *Correa da Serra.*

Anthers ovate or cordate. *Disk* cup-shaped. *Calyx* often irregular. Trees or shrubs, often armed. *Berries* with vesicular pulp.

× *Calyx irregularly lobed, split to the base on one side.*

A. MONOPHYLLA, L. *E.S.* Ava, Segain. The Nicobars.

A. floribunda, Wight.

A. puberula, Miq.

Chilocalyx ellipticus, Turcz.

Berries the size of a large pea or small cherry. Wood heavy, hard, and close-grained, white, or yellowish, resembling 'boxwood,' suitable for turning (Kurz).

A. MACROPHYLLA, L. *E.T.*

Coasts of Andamans and Tenasserim.

A. monophylla, var. *macrophylla*, Oliv.

Berries the size of a wood-apple.

× × *Calyx regularly 4-lobed.*

A. CAUDATA, H. f.

Along streams in the Pegu Range.

The Burmese plant is a middling-sized tree of elegant appearance, but spiny. I have not met either with flowers or fruits, and therefore the identification must remain doubtful (Kurz).

× × *Ovary-cells with numerous ovules.*

† *Rind of berry leathery. Leaves 1-foliolate.*

CITRUS, *Linnaeus.*

× *Young shoots and nerves of leaves beneath pubescent or puberulous. Flowers and fruits large.*

Stamens 20-60, often connate. Trees, usually spiny.

* CITRUS DECUMANA, L.

Cultivated.

Shouk-tong-ō.

× × *All parts glabrous.*

° *Style very short.*

* C. HYSTRIX, DC.

Tropical forests of Martaban, the Nicobars, and Siam.

Shouk-pōk.

Flowers small. Stamens free. Petioles leafy, and almost as long and as broad as the blade itself.

° *Style as long as the ovary or much longer.*

† *Petals 8 to 10 lines long.*

* C. AURANTIUM, L. *E.T.*

Occasionally cultivated.

Leaves acuminate or acute, the petiole often winged. Berries globular, without a knob. Filaments cohering by 3-4.

* C. MEDICA, L. *E.S.*

Shouk-ta-khwā.

Leaves blunt or nearly so, the petiole not winged. Berries oblong to globose, with a knob, the skin usually thick. Filaments free or polyadelphous.

var. *α genuina*.

var. *β limonum*, Brand.

var. *γ acida*, Roxb.

var. *γ* apparently wild in the Khaboung forests of the Pegu Yomah, west of Young-ngoo (Brandis); the other varieties only cultivated.

†† *Petals 3-4 lines long.*

* C. NOBILIS, Lour. *E.T.*

Cultivated all over Burma and Ava.

Aurantium Sinense, Rumph.

Wild on Kamorta and Katchall.

C. medica, var. *limetta*, Brandis.

Calyx small. Berries globular, sweet or acid, the skin usually thin.

The fruits of this genus are the most wholesome and refreshing which we know, their therapeutic value depending on the presence of salts of potash, and contain bitter and aromatic principles, chiefly lodged in the rind. The juice of several varieties of lime is of immense value both as preventing and curing that formidable disease, scurvy, which is by no means (as some suppose) confined to the sea-faring classes, and is accompanied by a deficiency of potash salts in the blood. Lime-juice is also used by the Burmese for the cure of bilious diarrhœa, and in some cases of dysentery (probably complicated by a scorbutic taint) lime juice is of service. In rheumatism and rheumatic gout, and the sickness of pregnancy, lime-juice is of great value; and the rind of both sweet and bitter oranges forms a most wholesome preserve, and yields an infusion which is a valuable adjunct to other tonics.

Orange-flower water is distilled from the flowers of the Seville orange (*C. communis*), which by the same process yield the volatile oil called "Essence of Neroli," and the rind gives the peculiar flavour to Curaçoa. Bergamot is an essence expressed from the rind of a species of lemon.

† † *Rind of berry woody. Leaves compound. Trees.*

FURONIA, *Correa da Serra.*

Ovary 5-6-celled. *Leaves* pinnate.

F. ELEPHANTUM, COFF.

Prome.

'Thi' (though Kurz gives 'Mahan'). Yields a gum.

ÆGLE, *Correa da Serra.*

Ovary 8- to many-celled. *Leaves* trifoliolate.

* Æ. (CRATEVA) MARMELOS, L.

Ok-shyt or Ö-shyt. Bael of Hindustan.

Much cultivated, especially in the Prome district, and said to occur wild in the forests also: I found the tree in those of the Toukyeghat, east of Toung-ngoo (Kurz).

The ripe fruit is very fragrant, and forms a mucilaginous 'sherbet,' much esteemed for its mildly astringent properties; it is however of small medicinal value.

Order GERANIACEÆ.

Flowers hermaphrodite, regular or irregular. *Sepals* 5, rarely 4 or 2, free or connate to the middle, imbricate or rarely valvate. *Petals* as many or fewer, rarely none, hypogynous or almost perigynous, variously imbricate. *Torus* scarcely expanded into a disk, with glands, alternating with the petals, or without glands, raised in the centre into a beak, rarely flat. *Stamens* as many as the sepals, or 2 or 3 times as many; rarely fewer. *Filaments* free, or connate in a ring. *Anthers* 2-celled, the cells opening lengthwise. *Fruit* a capsule, dry, and the valves separating from the axis; or fleshy and elastically dehiscent; rarely a drupe or berry. Herbs or shrubs, rarely trees. *Flowers* various, often thorny.

OXALIDIEÆ.

Flowers regular. *Sepals* imbricate. *Glands* none. *Stigmus* capitate. *Ovary-cells* with 2 or more orules.

* *Capsule* dry or nearly so, dehiscent. Herbs.

OXALIS, *Linnaeus.*

Stamens 10. *Capsule* dehiscent loculicidally, the valves cohering with the axis. *Leaves* usually digitately compound.

- O. CORNICULATA*, L. In rubbishy places all over Burma.
O. pusilla, Salisb.

BIOPHYTUM, *De Candolle*.

Stamens 10. *Capsule* dehiscent loculicidally, the valves usually separating from the axis to the base. *Leaves* pinnate.

- * *B. (OXALIS) SENSITIVUM*, L. In rubbishy places all over Burma.
B. Candolleanum, Wight.

Leaflets nearly straight, in 10-11 pairs. Flowers larger. Capsule usually much shorter than the calyx. Seeds obliquely transverse-furrowed.

- B. ADIANTOIDES*, Wight. Mergui.

Leaflets very unequal at base, in 12-25 pairs. Peduncles with a clubbed mass of bracts at apex.

- B. REINWARDTII*, Walp. On poor soils all over Burma.

Leaflets equal, in 10-20 pairs. Flowers smaller. Capsule almost as long as or a little longer than the sepals, small. Slender herb.

** *Berry fleshy, indurcent. Shrubs or trees.*

AYERIKHOA, *Linnaeus*.

Stamens 10, of which 5 are often reduced to staminodes. *Styles* distinct. *Ovary-cells* many-ovuled. *Seeds* arillate or without arillus. Trees with pinnate leaves.

- * *A. CARAMBOLA*, L. *E.T.* Cultivated.

Soung-yah ('*Kamranga*' of India).

Fruits sharply angled. Seed arillate.

- * *A. BILIMBI*, L. *E.T.* Occasionally cultivated.

Fruit bluntish angular. Seed without arillus.

The differences between *A. carambola* and *A. bilimbi* appear to me to be of generic value (Kurz). These trees produce very sour fruits, which are eaten in stews and tarts; especially the *Kamranga*.

BALSAMINIEÆ.

Flowers regular. *Sepals* coloured, the posticous spurred. *Anthers* almost connate.

IMPATIENS, *Linnaeus*.

* *Leaves* all opposite or occasionally tornately-whorled.

- I. CHINENSIS*, L. Tenasserim.

I. fasciculata, Lam.

I. heterophylla, Wall.

I. setacea, Coleb.

Leaves almost sessile. Flowers rather large, wings obtuse, the spur long and slender, inflexed.

- I. RETICULATA*, Wall. Common all over Burma.

Exactly as the preceding, but the spur short and inflexed.

Hardly more than a form of the preceding. *I. tomentosa*, Heyne, is stated by H. f. and Thoms. to grow in Pegu, but the habitat is omitted in III. Fl. Ind. It seems to be the above species, at any rate the Wallichian specimens cited belong here (Kurz).

- I. CIRCEOIDES*, Wall. Moist forests of Pegu and Tenasserim.

Leaves on long petioles. Flowers rather small, the wings acuminate, the spur short, incurved.

** *Leaves all alternate.*

° *Flowers shortly racemose, umbellate or corymbose at the ends of the long peduncles.*

I. TAVOYANA, Bth. Tenasserim.

Leaves petioled. Flowers small, with a long, straight or curved spur.

°° *Peduncles 1- or rarely 2- or 3-flowered, shorter than the leaves.*

× *Spur usually much shorter than the corolla.*

† *Flowers 1-2 inches long.*

* I. BALSAMINA, L. Cultivated and in rubbishy places
I. *Malayensis*, Griff. near villages.

Stem succulent, the thickness of a goose-quill. Leaves narrow, pubescent or glabrescent, shortly petioled. Spur often very long and slender.

I. PARSILL, H. f. On limestone rocks near Maulmain.

Stem the thickness of the finger, short. Leaves elliptic or ovate, glabrous, long-petioled.

†† *Flowers small.*

I. CAPILLIPES, H. f. and Th. On limestone rocks near Maulmain.

Glabrous, slender. Leaves long-petioled, narrow.

× × *Spur longer than the corolla.*

I. VIOLEFLORA, H. f. Maulmain.

Very slender, glabrous. Capsule puberulous. Flowers rather large.

I. ARGUTA, H. f.

HYDROCERA, *Blume.*

All petals free. *Drapes* sappy, indehiscent.

H. (IMPATIENS) NATANS, Willd. Ditches and water-courses in Pegu.

H. *triflora*, W. A.

Order MALPIGHIACEÆ.

Flowers hermaphrodite, regular or irregular. *Calyx* usually 5-partite, imbricate, or valvate, one or more of the 5 segments furnished with a large gland, rarely absent. *Petals* 5-clawed, or sessile, imbricate. *Disk* obsolete. *Stamens* 10 or more, hypogynous or nearly so. *Filaments* free, or more or less basally connate. *Anthers* 2-celled. *Fruit* a 1-3-winged samara, or capsule, or drupe. *Albumen* none. Trees or shrubs with opposite simple leaves. *Stipules* minute or none. *Flowers* in axillary or terminal inflorescences.

MALPIGHIEÆ.

Carpels never winged, free or united into a fleshy or drupaceous 1- to 3-celled fruit. Usually erect shrubs, with opposite leaves and connate stipules.

MALPIGHIA, *Linnaeus.*

Calyx 6-10-glandular. *Filaments* at base glabrous. *Ovary* entire, 2-4-celled, styles terminal and free. *Drapes* containing 3 or fewer crested nuts.

* M. COCCIGERA, L. S. Chittagong (wild and cultivated as
M. *heteranthera*, Wight. an ornamental shrub).

HIRIETÆ.

Samaras 1-3, obliquely accumbent to a short pyramidal torus, or the carpels united

into a winged indehiscent capsule. Woody climbers or rarely erect shrubs or trees, the stipules minute or wanting.

* Stamens definite, usually 10, all perfect.

° Style 1, rarely 2.

HIPTAGE, Gaertner.

Calyx with a single large gland adnate to the pedicel. *Carpels* 3-winged. Trees or woody climbers.

M. BENGALENSIS, L. S.S.

Pegu and Tenasserim.

Gaertnera racemosa, Roxb.

Scandent diffuse shrub, branched almost from the base. Leaves larger, more acute and greyish-green. Bark grey.

H. OBTUSIFOLIA, DC. C.

Pegu Range and Khakyen Hills.

A lofty climber, the stem simple, cable-like, up to 100 feet long. Leaves smaller, broader, often bluish apiculate, glabrous and glossy, dark-green. Bark dark-brown.

H. CANDICANS, H. f. T.

Dry forests of Prome.

H. arborea, Kz.

Toung-htsu-khâ-pân (Kurz).

A small tree. Flowers often pale pink with the usual yellow basal blotch. Capsule not ridged on top, the wings shorter and broader, obliquely truncate. Bark thick and corky, dark-brown. Growth erect, not scandent.

H. SUMATRANA, Miq.

Nankowry.

Identical, Kurz thinks, with *H. Javanica*.

°° Styles 3. *Calyx* without glands.

ASPIDOPTERYS, A. Jussieu.

Petals not clawed. *Stigmas* capitellate. *Samaras* broadly winged all round. Woody climbers.

* *Gynobase* persistent after the fall of the samaras, conical, acute, exerted, surrounded by 3 smooth acute disk-lobes.

A. (HIREA) NUTANS, Roxb. W.C.

Chittagong. Bhamo.

A. lanuginosa, A. Juss.

Leaves tomentose beneath, acuminate. Ovary hirsute. Nucleus of samara with or without a crest.

A. (HIREA) TOMENTOSA, Bl. W.C. Khakyen Hills and Hills East of Toung-ngoo.

Leaves tomentose beneath, more or less glabrescent, apiculate. Ovary quite glabrous. Nucleus of samara with a crest.

** *Gynobase* absent after the fall of the samaras or minute and shorter than the disk lobes, the thick 3-lobed often cup-shaped disk usually wrinkled.

× *Samara* nearly as broad as long, with a vertical crest between the wings.

A. CONCAVA, A. Juss. W.C.

Tenasserim.

All parts, also the ovary, quite glabrous. Disk in fruit about 1 line broad.

A. HELFERIANA, Kz.

Tenasserim.

Leaves puberulous along the nerves beneath. Disk smaller, hardly wrinkled.

×× *Samara* more than twice as long as broad, not crested.

A. (TRIOPTERIS) INDICA, Willd.

Ava. Salween Valley.

A. Roxburghiana, A. Juss.

All parts glabrous. Ovary hirsute.

A. (*HIREA*) *HIRUTA*, Wall. Ava. Taong-doung. Prome.
All parts hirsute. Ovary glabrous.

** *Stamens numerous. Styles 3, consolidated. Calyx minute, without glands.*

PLAGIOPTERON, Griffith.

Capsules indehiscent, 3-4-winged as in Hiptage. Petals reflexed.

P. *SCAVEOLENS*, Griff. W.C. Mergui.

Order ZYGOPHYLLÆ.

Flowers hermaphrodite, white, red or yellow, rarely blue. *Petals* 5-4 (rarely none), hypogynous, free. *Disk* hypogynous, rarely annular. *Stamens* usually double the number of petals, 2-seriate. *Seed* usually solitary, rarely 2 or more, pendulous. *Albumen* cartilaginous, rarely none.

TRIBULUS, Linnaeus.

Stamens 10. *Fruits* dry, composed of 5-12 cocci, usually winged or spiny. Herbs with pinnate leaves.

T. *CISTOIDES*, L.

Flowers 1-2 inches in diameter, the peduncles as long as or longer than the leaves.

T. *LANTIGINOSUS*, L.

Flowers $\frac{1}{2}$ - $\frac{3}{4}$ inch in diameter, the peduncles shorter than the leaves.

Order CORIARIEÆ.

Flowers regular. *Petals* 5, small, fleshy. *Stamens* 10. *Ovary* 5-lobed, of 5 one-ovuled carpels. *Styles* 5. *Fruit* apocarpous. *Albumen* scanty or none. Shrubs. *Leaves* simple, opposite, exstipulate.

CORIARIA, Linnaeus.

Perianth 5-6-sepalled, imbricate. *Staminodes* 5-6, sepal-like. *Stamens* 10-12, exserted. *Filaments* filiform. *Anthers* large, 2-celled. *Ovary* consisting of 5-6 carpels adnate to a central torus, with a solitary pendulous ovule in each.

C. *NEPALENSIS*, Wall.

Khakyen Hills.

Branches 4-cornered, all parts glabrous. Leaves opposite, 3-nerved at the base, thin, coriaceous.

The affinities of this genus are obscure. Endlicher makes it the type of an Order, whilst Kurz ranges it in *Phytolaccaceæ*, from which it differs in the *petals*, pendulous *ovules*, fleshy *albumen*, and straight thick *embryo*. The leaves and fruits of species of this genus contain a poisonous crystallizable narcotic principle, *Coriariine*, which is dangerous, as the leaves are sometimes used (it is said) to adulterate Senna. The seeds of *C. sarmentosa* of New Zealand and *C. Nepalensis* are very poisonous, but the juicy fruit is edible. *C. myrtifolia* and the Chinese *C. ruscifolia* are rich in tannin, and yield a black dye, much used by shoemakers.

Order LINEÆ.

Flowers regular, hermaphrodite. *Sepals* 5, rarely 4, free, or basally connate, imbricate. *Petals* as many, often fugaceous, often twisted imbricate. *Stamens* 4-5, alternating with as many staminodes. *Hypogynous glands* 5, usually adnate to the staminal ring or obsolete. *Fruit* usually a capsule, rarely a drupe. Herbs or shrubs, rarely trees.

EULINIEÆ.

Petals twisted. *Perfect stamens* as many as *petals*. *Capsule* opening septically. *Herbs* or small shrubs.

REINWARDTIA, Dum.

Calyx glabrous. *Styles* 3 or 4. *Capsule* 3-4-celled.

R. INDICA, Dum.

Chittagong. "Karen country" (Karen-ni?).

R. trigyna, Planch.

Linum repens, Don.

ERYTHROXYLIEÆ.

Petals usually imbricate, rarely twisted, with a basal scale inside. *Perfect stamens* twice as many as *petals*. *Fruit* a drupe. *Shrubs* or *trees*.

ERYTHROXYLON, Linnaeus.

§ *Styles* free from the base (*Erythroxylon*).

E. KUNTHIANUM, Wall.

Martaban Hills up to 7000 feet.

Leaves lanceolate, shortly acuminate-glaucous beneath. *Pedicels* $\frac{1}{2}$ inch long.

§ *Styles* united for about $\frac{1}{2}$ of their length (*Sathia*).

E. (SETHIA) INDICUM, DC.

Pegu (fide Mason).

E. monogynum, Roxb.

Leaves obovate or oblong, blunt. *Pedicels* usually 3 lines long, rarely longer.

E. CUNEATUM, Miq.

Tenasserim.

E. Burmanicum, Griff.

Leaves broadly obovate or oblong, retuse. *Pedicels* short.

Series III. THALAMIPLORÆ.

Sepals usually distinct and separate, free from the ovary.¹ *Petals* 1-, 2-, or many-seriate, hypogynous. *Stamens* hypogynous, rarely inserted on a short or long torus, or on a disk. *Ovary* superior.

MALVALES.

Flowers rather irregular. *Sepals* 5, rarely 2 or 4, free or connate, valvate or imbricate. *Petals* as many, or more. *Stamens* usually many and monadelphous. *Ovary* 3- to many-celled, rarely of one carpel. *Ovules* on the inner angles of the cells. *Shrubs*, rarely *trees*. *Leaves* alternate, usually stipulate, simple or compound.

Order TILIACEÆ.

Flowers regular, hermaphrodite or unisexual. *Sepals* 3-5, free or united, valvate. *Stamens* numerous, rarely few and definite, usually arising from a prolonged or dilated torus, free, or rarely quinque-adelphous. *Anthers* 2-celled. *Ovary* free, 2-10-celled, each cell with few, often pendulous, or numerous ovules often placed in 2 or more series. *Trees*, *shrubs*, or *herbs*, with alternate, rarely opposite, simple or lobed leaves. *Flowers* usually cymose.

A. Anthers opening by slits.

BROWNLOWIÆ.

Sepals united into a bell-shaped 3-5-cleft calyx. *Anthers* short, usually globular or didymous, the cells ultimately confluent at the top.

¹ Exceptions: *Connate sepals* occur in a few orders. The calyx is adnate to the ovary, or to a fleshy torus embracing the ovary, in *Pæonia*, *Calycanthaceæ*, and in some *Annonaceæ*, *Nymphaeaceæ*, *Portulacæ*, *Capparidæ*, *Boraginæ*, *Polygalæ*, *Camelotaceæ*, *Voehysiaceæ*, *Tiliacæ*, and *Dipterocarpaceæ*. *Petaloid sepals* occur in apetalous *Ranunculaceæ*, in *Berberidæ*, *Tiliaceæ*, and others. The *stamens* are manifestly perigynous in a few *Dilleniaceæ*, *Papaveraceæ*, *Capparidæ*, *Monogylæ*, *Resedaceæ*, *Violaceæ*, *Caryophyllæ*, *Portulacæ*, *Melastacæ*, and *Sterculiaceæ*.

* *The 5 inner stamens reduced to staminodes.*

BROWNLOWIA, Roxburgh.

Carpels distinct, globular, 2-valved, 1-seeded. Albumen none. Trees with stellate or scaly pubescence and simple leaves.

* *Leaves deeply peltate.*

B. PELTATA, Bth. S.T. Tenasserim.
Leaves oblong or rotundate. Calyx velvety.

** *Leaves not peltate.*

B. ELATA, Roxb. Chittagong to Tenasserim.
Leaves cordate-oblong. Calyx velvety.
B. LANCEOLATA, Bth. Tidal forests of Arakan and Tenasserim.
Leaves lanceolate. Calyx scaly.

PENTACE, Hasskarl.

Fruits 3-5-winged, indehiscent, by abortion 1-seeded.

P. BERMANICA, Kz. E.T. Tropical forests of Pegu Range and Martaban.

Kurz gives Thyt-kā or Kathyt-kā as the name of this tree, and describes the wood as heavy. Now 'Thyk'-kā weighs 37 lbs. only to the cubic foot, and is not a heavy wood, whilst 'Kathyt' (= ? *kathit-kā*) is one of the lightest woods known, being 23 lbs. only.

BERRYA, Roxburgh.

** *Anthers all anther-bearing.*

Capsule 3-4-valved, with twice as many wings. *Styles* 1-4, filiform.

B. AMONILLA, Roxb. Mixed forests of Pegu and Martaban.
var. *mollis*, Wall.

Hpet-wun.

The wood is reddish-brown, and something like a rather coarse-grained mahogany. It weighs 56 lbs., and is excellent for all purposes, and planes and dresses well.

GREWIEÆ.

Sepals distinct. *Petals* with a basal seale more or less adnate, inserted round the base of a more or less raised torus bearing at the top the stamens. *Anthers* short, the cells parallel and distinct.

* *Fruit* dry, winged.

COLUMBIA, Persoon.

Fruit 3-5-celled, separating into as many 2-winged cocci. Trees or shrubs, with simple often oblique leaves. Flowers small, clustered in terminal panicles.

C. (GREWIA) FLORIBUNDA, Wall. S. Ava, Taong-doung. Toukyagat, East of Young-ngoo.

Leaves cordate-oblong. Fruits $\frac{3}{4}$ -1 inch across.

C. MERGUIENSIS, Planch. Mergui.

Leaves lanceolate. Fruits $1\frac{1}{2}$ inch across.

** *Fruit* more or less drupaceous, not winged.

o *Fruit* unarmed, tomentose to glabrous.

GREWIA, Linnæus.

*Drupe*s more or less lobed or globular. Trees or shrubs with simple 1-9-nerved leaves. *Flowers* rather small, axillary and few, in cymes, or in terminal panicles.

Sub-genus *MICROCOS*.

Stigma shortly-toothed. *Flowers* forming terminal panicles, involucred in bud.

* *Endocarp of drupes fibrous-woody.*

G. CALOPHYLLA, Kz. *E.T.* Tropical forests of South Andamans. Kamorta.
Leaves entire, sub-coriaceous, glabrous. Ovary and torus velvety-tomentose.

** *Endocarp of drupes crustaceous or bony.*

G. MICROCOS, L. From Chittagong to Tenasserim.
G. ulmifolia, Roxb.

Myat-ya.

Leaves thin chartaceous, glabrous or beneath puberulous, not sinuate. Ovary and torus glabrous. Wood 51 lbs. (Kurz). This is probably the wood known to me as *mī-ai-ā*, 45 lbs. (well-seasoned), a very pale dirty-reddish colour, a second-class wood for common uses. The name, however, probably applies to several species.

G. SINUATA, Wall. *S.* Swamp forests of Pegu and Tenasserim.

Like the last, but flowers and leaves much smaller, and the latter sinuate-lobed, probably only a marshy race of the last.

Sub-genus *GREWIA*.

Stigmas dilated and fringed, radiating. *Flowers* in axillary or leaf-opposed cymes or clusters.

○ *Cymes or clusters axillary.*

× *Leaves at base 3-nerved, rarely with an additional lateral one.*

† *Drupes deeply 2-4-lobed from the top, by abortion sometimes 1-lobed.*

G. SCABRIDA, Wall. *E.S.* Tenasserim.

Cymes and sepals shortly rusty-tomentose. Leaves on both surfaces very scabrous from minute stellate hairs. Drupes deeply 4-lobed.

G. LEVIGATA, Vhl. *E.T.* var. *α* Mixed forests of Pegu and Tenasserim. var. *β* in Arakan.
G. didyma, Roxb.

Cymes sprinkled with stiff hairs, glabrescent. Sepals greyish or tawny-velvety. Leaves glabrous, or sprinkled with simple short hairs, rarely puberulous beneath. Drupes didymous.

var. *α glabra*. Leaves glabrous, or tufted-hairy in the nerve-axils beneath.

var. *β pubescens*. Leaves beneath minutely puberulous or densely downy.

†† *Drupes entire or only slightly and obtusely lobed at the top.*

G. EXCELSA, Vhl. *S.* Chittagong (*vide* Masters).
G. salvifolia, Roxb.

Leaves beneath and young parts greyish velvety. Drupes globular, grey-pubescent.

G. HIRSUTA, Vhl. Mixed forests all over Burma.
G. pilosa, Roxb.

Kyct-ta-yaw (Kurz).

Leaves at base 3- or 4-nerved. Cymes rather long-peduncled. Drupes obsoletely 4-lobed, red, sparingly hirsute.

var. *α genuina*. Leaves green, 3-nerved, sprinkled with short stiff hairs.

var. *β viminea*, Wall. Leaves longer and narrower, very long acuminate.

var. *γ heterifolia*, Wall. Leaves acuminate, at base 3- or almost 4-nerved, thinly hirsute or tomentose above, beneath clothed with a whitish velvety tomentum.

G. HUMILIS, Wall. *S.* Streams of Pegu and Ava. var. *a* Ava, Segain Hills ;
var. *β* in savannahs, especially along the borders
of swamp forests of the Irrawaddy.

More tomentose. Drupes obsolete 2-lobed, red, sparingly hirsute.

var. *a* *Wallichii*. Tomentum more villous, leaves acute.

var. *β* *retusifolia*, Kurz. Tomentum velvety. Leaves deeply retuse and broader.

The drupes are normally 4-lobed, but by abortion usually 2- rarely 1- or 3-lobed.
The species is hardly more than an extreme form of *G. hirsuta*, Vhl.

G. MICROSTEMMA, Wall. *S.* Ava and Prome Hills.

Leaves at base 3- or 4-nerved, scabrous. Flowers in short dense sessile clusters.
Stamens 16.

× × *Leaves usually broad, at base 5-7-nerved, the upper ones often only 3-nerved
or 3- and 5-nerved ones mixed.*

† *Peduncles slender, much longer than the petioles.*

G. ELASTICA, Royle. *T.* Mixed forests of Chittagong, Pegu,
G. vestita, Wall. and Martaban.

Pyn-ta-yer (Kurz).

Leaves obliquely lanceolate, while young, greyish or whitish tomentose beneath.

G. TILLEFOLIA, Vhl. *T.* Ava.

G. ASIATICA, L. *T.* Ava (stunted variety).

Leaves broadly obovate or almost rotundate, on both sides sprinkled with stellate
hairs, or pubescent beneath, often scabrous.

†† *Peduncles very short or almost reduced, and the flowers appearing clustered.*

G. ABUTILIFOLIA, Juss. *S.* var. *a* Pegu. var. *β* not rare in the mixed forests
Hsen-mēh-no-pyin (Kurz). forests of the Pegu Yomā. var. *γ* frequent in
the low and Eng forests of Pegu, and Martaban.

Leaves very variable in shape, tomentose to pubescent. Drupes from the top
deeply 4- or only by abortion fewer-lobed.

var. *γ* *sclerophylloides*. A low shrub, 3-4 feet high, more or less branched,
the younger parts densely rusty-coloured villous. Leaves very variable in shape on
the same branch, the lower ones usually ovate-oblong, up to nearly one foot long, the
upper and uppermost ones gradually smaller and narrower, from ovate to lanceolate,
doubly and sometimes bristly serrate, acuminate, scabrous or thinly pubescent above,
beneath more or less stellate-pubescent or almost tomentose. Bracteoles linear-
lanceolate, acuminate, pubescent externally, longer or as long as the flower-buds.
Petals a line long, the lamina acuminate, pubescent outside. Drupes deeply 4-lobed,
often remaining sparingly hirsute during ripeness. A laterite form.

A very variable plant, of which I entertained some hope of being able to separate
var. *γ* (which is also a common Assam plant) specifically. It resembles in size of
flowers *G. sclerophylla*, but the deeply 4-lobed drupes at once separate it (Kurz).

G. SCLEROPHYLLA, Wall. Ava and Chittagong (*vide* Masters).
G. scabrophylla, Roxb.

Leaves very scabrous and harsh. Drupes the size of a cherry, almost globular.

The fruits of several species of *Grewia* are pleasant, and make a favourite sherbet,
especially the cultivated *G. Asiatica*. The leaves also yield fodder for cattle, as
G. Asiatica, *G. elastica* and *G. oppositifolia*, and some an ordinary timber.

◦ ◦ *Fruits prickly.*

TRIUMFETTA, *Linnaeus*.

Drupe usually small, globular, indehiscent or separating into cocci.

Capsules indehiscent, globular, echinate, the cells usually 1-seeded (Lappula).

T. ROTUNDIFOLIA, Lamk.

Ava.

Leaves rotundate, not lobed, blunt, beneath greyish-tomentose like the sepals.

T. RHOMBOIDEA, Jacq.

A common weed in cultivated lands and leaf-shedding forests all over Burma. Kamorta.

T. angulata, Lamk.

T. Bartramia, Roxb.

T. cana, Bl.

Chittagong (*vide* Masters).

Leaves rotundate, acuminate, often lobed. The sepals stellate-hairy.

Capsules when ripe separating into 3-4 cocci, densely covered by long bristles, the cells usually 2-seeded (Bartramia).

T. ANNUA, L.

Mixed forests of Ava and Pegu.

Leaves slightly hirsute. Capsules and bristles glabrous.

T. PILOSA, Roth.

var. β common all over Burma, in the mixed forests and clearings.

var. β *oblonga*, Wall. ; *T. tomentosa*, Mast. ; *T. octandra*, Griff. The bristles of the carpels somewhat shorter and straight or nearly so.

Masters identifies var. β of this species with *T. tomentosa*, Boj. The Mauritian plant, which for a long time was cultivated in H.B.C., but is now apparently lost, has a velvety tomentum and small globular fruits not larger than those of *T. rhomboidea*, while Masters describes them as being as large as a cherry.

DICLIDOCARPUS, *Asa Gray.*

D. (TRICHOSPERMUM) JAVANICUM, Blume.

Tropical forests of Kamorta.

Bicagrowia Nicobarica, Kz.

TILIEÆ.

Sepals distinct. Petals without a scale at base, inserted directly round the stamens.

* *Capsule opening loculicidally, almost pod-like or globular, many-seeded.*

CORCHORUS, Linnaeus.

Stamens all anther-bearing. *Capsules* pod-like or globular, striate or muricate.

§ *Capsules globular or nearly so, more or less muricate.*

* *C. CAPSULARIS*, L.

Cultivated for its fibre all over Burma.

Lower pairs of serratures of leaves produced into five bristles. Capsules 10-sulcate, truncate. The fibre is the 'Jute' of commerce.

§ *Capsules more or less elongate or linear, cylindrical or angular, but not winged.*

* *Capsules 1 to 2 inches long or longer. Stamens very numerous.*

Lower pair of serratures of leaves produced into long bristles.

* *C. OLITORIUS*, L.

Wild and cultivated for its fibre in Ava and Pegu.

C. decemangularis, Roxb.

Capsules 2 inches long, 5-celled and 5-ribbed, longitudinally pitted, the partitions within very distinct.

Leaves without basal bristles, usually small and blunt.

C. TRILOCULARIS, L.

Burma (*vide* Mason).

Capsules 2 inches long, sparingly and minutely tubercled, glabrous, beaked.

C. URTICIFOLIUS, W.A.

Ava.

As preceding, but capsules only about 1 inch long, thinly pilose.

C. TRIDENS, L.

Prome.

C. trilocularis, Burm.

Capsules 1-1½ inch long, almost terete, not wrinkled, 3-4-celled, 3-4-toothed at apex, without partitions inside.

* * Capsules about ½ inch long. Stamens 5 to 10.

C. FASCICULARIS, Lamk. Plains between the IHein and Irrawaddy.
Capsules almost terete, tomentose, 3-celled, without partitions inside.

§ Capsules elongate, thick, truncate, 6-angled, the alternate angles winged.

C. ACUTANGULUS, Lamk. Deciduous forests up to 3000 feet.
C. fuscus, Roxb.

Stamens 15 to 20. Leaves without bristles. Capsules ¾-1 inch long, terminating in 3 simple or 2-cleft spreading points.

All the species of *Corchorus* yield a useful fibre, collectively known in the market as 'jute,' and in great demand for the manufacture of the coarse sacking known as 'Gamy,' or 'Tât.' The leaves boiled afford a common vegetable. The plant grows wild in Burma, and might be probably cultivated with profit for its fibre, for which the demand is very great, and the selling price about 4 rupees a maund.

B. Anthers opening by apical pores.

SLOANIEÆ.

Anthers linear. Staminal disk flat or cushion-like, the sepals and petals inserted directly round the stamens.

ECHINOCARPUS, Blume.

Sepals 4, imbricate, in 2 series. Petals 4, gashed, almost imbricate. Disk thick and broad. Capsule woody, 4-valved, echinate, setose, or velvety.

E. SIGUN, Bl. T. Tenasserim Hills (Thoung-yeen).
E. murex, Bth.

Leaves entire, tufted-hairy in the nerve-axils beneath. Prickles of fruit strong, usually thickened at base.

E. STERCULIACEUS, Bth. T. Upper Tenasserim between 3000 and 5000 feet.

Leaves crenate-serrate or toothed, at least when young puberulous beneath, the prickles longer, all thin and subulate.

ELEOCARPIÆ.

Anthers linear. Petals inserted round the base of a raised torus from the top of which the stamens spring.

ELEOCARPUS, Linnaeus.

Sepals 4-5. Petals induplicate-valvate, laciniate or rarely entire. Drupes fleshy. Sub-genus MONOCERAS.

Anthers aristate. Flowers large, the petals fringed or rarely entire.

* Petals entire, with a few short teeth at apex or simply fringed, not cut or cleft. Petioles continuous, not geniculate-incrassate.

◦ Inflorescence and sepals outside almost glabrous.

E. PETIOLATUS, Jack. E.T. Tenasserim.
E. integra, Wall.
E. ovalis, Miq.

All parts glabrous.

◦ ◦ Inflorescence and sepals outside silky-pubescent.

E. (MONOCERAS) TRICANTHERA, Griff. Mergui.
E. Griffithi, Kz. E.T.

Glabrous. Petals entire, acuminate. Pedicels ¾-¾ inch long.

E. VARUNA, Ham. *E.T.* Chittagong.

Glabrous. Petals deeply but simply fringed. Pedicels 3-4 lines long. Differs from *E. prunifolius*, Wall., by the silvery silk-hairy inflorescence and larger flowers.

* * *Petals 2-3-cleft, the lobes jagged or fringed. Anthers glabrous or puberulous.*

° *Petiole geniculate-thickened at apex.*

† *Inflorescence with long-persistent leafy bracts.*

E. BRACTEATUS, Kz. *E.T.* Tropical forests of Tenasserim.

All parts, also sepals and inflorescence, glabrous.

†† *Bracts of inflorescence small, very deciduous.*

× *Racemes and sepals glabrous or nearly so.*

E. SIMPLEX, Kz. (MS.). Tenasserim.

Evidently nearly allied to *E. aristatus*, Roxb., but differing in the shape of the leaves and the glabrous racemes. The flowers conform to those of the preceding species. Griffith's specimens from E. Bengal differ only by a puberulous inflorescence, and may also belong here.

× × *Racemes and sepals more or less tomentoso or pubescent.*

E. GRANDIFOLIUS, Kz. Tropical forests of Pegu and Tenasserim.

Leaves 1-1½ foot long, cuneate-acuminate at base, acute. Anthers shorter than the bristle. Drupes puberulous, the putamen slightly compressed.

E. RUGOSUS, Roxb. *E.T.* Tropical forests of Pegu and Martaban.

Leaves ½-1 foot long, rounded at the narrowed base. Leaves glabrous or nearly so. Putamen terete.

° ° *Petiole continuous, not geniculate-thickened at apex.*

E. (MONOCERAS) GRANDIFLORUS, Hook. Toukyagat district.

Monoceras lanceolatum, Hassk.

Glabrous. Putamen long recurved-aculeate.

E. LITTORALIS, T. and B. Tenasserim.

Putamen lacunose-tubercled. Leaves blunt, very thick coriaceous, glabrous.

What I have from the Botanical Gardens, Buitenzorg, under the name of *Monoceras obtusum*, Hassk., belongs to *E. rugosus*. The Tenasserim plant (with which Griffith's No. 700 is identical) has very thick and obtuse leaves, and is, in my opinion, a distinct species. I have, therefore, retained the MS. name of Teysm. and Binnend. for the plant.

Sub-genus *ELEOCARPUS*.

Anthers blunt, or one valve sharply produced. Flowers small. Petals glabrous.

† *Putamen slightly rimose, or obsolete wrinkled. Calyx and pedicels glabrous.*

E. FLORIBUNDUS, Bl. *E.T.* Tropical forests from Chittagong to Tenasserim. Kamorta.

E. serratus, Roxb.

Leaves glabrous, blistered-speckled and opaque. Petioles long, thickened at the summit. Anthers bearded. The species is easily recognized in a dried state by its peculiar blistered opaque leaves.

E. LANCEFOLIUS, Roxb. Tenasserim (*vide* Masters).

Leaves glabrous, opaque, acuminate. Petiole not geniculate-thickened.

E. HYGROPHILUS, Kz. Swamp forests of Pegu and Tenasserim.

Leaves glabrous, blunt or rounded at apex. Petioles short but slender, not thickened. Anthers naked. Drupes unknown.

I looked for some time upon this species as a variety of *E. photiniaefolius*, but the habitat as well as the structure of the leaves are inconsistent with such a view. It is nearest to *E. lanceafolius*, Roxb., but differs by obtuse or rounded leaves and beardless anthers (Kurz).

†† *Putamen wrinkled or tubercled. Calyx and pedicels puberulous.*
 × *Petioles not geniculate-thickened at apex.*

E. GANITRUS, Roxb. Chittagong.
Ganitrus sphericus, Gaertn.
E. cyanocarpus, Mart.

Leaves and petioles glabrous. Style long, exserted. The longer anther-cell acute. Drupes globular.

E. LACUNOSUS, Wall. *E.T.* Tropical forests of Pegu and Tenasserim.
 Bu-ta-let (Kurz).

Leaves beneath along the nerves and the short petioles densely puberulous. Style short. Anther-cells equal, blunt. Drupes oblong.

× × *Petioles thickened at summit.*

E. WALLICHII, H. f. *E.T.* Ava, Pegu Range, and Tenasserim.
E. longifolius, Wall.

Leaves beneath and the rather short petioles densely puberulous.

E. ROBUSTUS, Roxb. *E.T.* Chittagong (Masters), Tenasserim, and the Andamans.
E. Helferi, Kurz.

Leaves and the long petioles glabrous. Drupes oblong.

E. STIPULARIS, Bl. Tropical forests of Pegu and Tenasserim.
 All parts densely and shortly pubescent. Drupe globular.

E. cuneatus, Wight, is noted by Masters as growing in Chittagong, Burma, and Tenasserim. I do not know the species. Possibly the Burmese localities refer to *E. lacunosus*, Wall. (Kurz).

E. LEPTOSTACHYA, Wall. Tenasserim (Helf. teste Mast.).

Masters states that the species is very like *E. robustus*, but that the anthers are bearded, while in *E. robustus* itself he tells us that the anthers are both bearded and beardless.

E. LUCIDUS, Mast non Roxb. Chittagong (Griff. teste Mast.).

Masters identifies his specimens with Roxburgh's plant, which the late Dr. Anderson had already recognized as *Euphorbiaceous*, and which is *Cleidion Javanicum*, Bl. I doubt the correctness of the habitat given, for the reason that Griffith had never visited Chittagong.

I have not seen *E. oblongus*, Gaertn., from Maulmain (Kurz).

The ripe berries of several species of *Elaeocarpus* are edible, and those which possess a coarsely wrinkled stone (*E. ganitrus*) furnish the so-called Brahmini beads worn by Hindu religious mendicants. The wood of some species is said to be good; but little definite seems known of the timber yielded by the different species. According to Mason, the name of the Salween River (as it is called by Europeans), or Than-lwen, is derived from the name of a species of *Elaeocarpus* (*E. Wallichii*), which grows abundantly on its banks. Other species are called Tör-ma-ji, and Wā-hsō-ben, and Kurz adds Bu-ta-let.

Order MALVACEÆ.

Flowers regular, hermaphrodite or unisexual. *Bracteoles* 3 or more, free or combined, often forming a kind of calyx. *Sepals* 5, valvate, free or connate. *Petals* 5-twisted, imbricate. *Stamens* numerous, rarely definite, adnate to the base of the

petals. *Filaments* united into a tube or a column. *Anthers* oblong or reniform, ultimately 1-celled, the cells sinuous or twisted, bursting longitudinally. *Ovary* 2- or many-celled, with 1 or more ovules in each cell, attached to the inner angle, entire or lobed, or of 2-5 or more carpels, whorled round a central axis. Herbs or shrubs, rarely trees. *Flowers* axillary or terminal, variously arranged.

A. Carpels whorled in a single row, not united into a capsule.

MALVIEÆ.

Staminal column bearing the filaments at the summit. *Style-branches* as many as cells to the ovary. *Mature carpels* separating more or less from the axis.

* *Ovules* solitary, ascending.

× *Stigmas* linear.

ALTHÆA, Linnæus.

Bracteoles 6-9, united at base. *Fruit-axis* not longer than the carpels.

* *A. ROSEA*, Cav.

Prome. Khakyen Hills in gardens.

A. Coromandeliana, Cav.

A. flexuosa, Sims.

Holli-hock.

The word 'holli-hock' is a curious instance of how the names of plants get transmogrified. HOCK is from the root of *Aleca* (the mallow), thus *Ale-ae-kauc* = Hanc or Hock. HOLLI is a corruption of *Cauli*, from *Caulis*, a stalk (whence cauliflower), and signifies *the mallow on a tall stalk!* (Prior, *Popular Names of British Plants*).

MALVA, Linnæus.

Bracteoles 3, distinct. *Carpels* not beaked.

M. VERTICILLATA, L.

Khakyen Hills.

M. Neilgherrensis, Wight.

The mallows and holli-hocks possess demulcent and laxative properties, and marsh-mallow lozenges are still an esteemed remedy for bronchial irritation. They were regarded as very wholesome herbs by the Romans :

“Aut herba lapathi prata amantis, et gravi
Malvæ salubres corpori.”

Horace, *Epod.* ii. line 57.

× × *Stigmas* capitate or clavate.

MALVASTRUM, A. Gray.

Bracteoles 1 to 3, distinct, or none. *Carpels* usually beaked.

M. RUBERALE, Miq.

Rubbishy spots at Chittagong and Rangoon.

M. tricuspidatum, A. Gray.

** *Ovules* solitary suspended.

SIDA, Linnæus.

Carpels converging with their points or beaked. *Bracteoles* none, or very rarely 1 or 2 and bristle-like. Pycn-dor-gna-len (generic).

* *Leaves* from lanceolate to oblong or obovate-oblong, on short 2 to 4 lines long petioles.

S. CARPINIFOLIA, L.

Rubbishy spots all over Burma. The Nicobars.

S. acuta, Bur.

Recently introduced into the Andamans.

S. lanceolata, Roxb.

Carpels usually 5, leaves more or less green on both sides. *Peduncles* short, not or at the very base jointed.

S. RHOMBIFOLIA, L. Common in leaf-shedding forests and in cultivation all over Burma. var. δ Tenasserim.

Carpels usually 10, seldom fewer, leaves minutely greyish tomentose beneath. Peduncles usually elongate, jointed at about their middle.

var. α *Linneana*.

var. β *Canariensis*, Griseb.; *rhomboidea*, Roxb.; *rhombifolia*, Mast.

var. γ *retusa*, Griseb.

var. ϵ *acuta*. Erect, branched. Leaves oblong-lanceolate, acuminate, toothed.

Carpels 6-7, stellate pubescent, with 4 long awns.

var. ϵ *alnifolia*, *Chinensis*, *microphylla*, Roxb.; *Philippica*, DC.

This plant would yield an excellent flaxy fibre, and is well deserving cultivation. It has yellow flowers, grows in the rains, and when planted for fibre, the seeds should be very thickly sown on good soil.

** *Leaves cordate or nearly so, on 6 to 15 lines long, usually slender, petioles.*

° *Carpels terminating in 2 long awns.*

S. CORYLIFOLIA, Wall. Ava. Segain.

Erect, glabrous or nearly so.

S. CORDIFOLIA, L. Deciduous forests in Arakan and Pegu.

S. decagyna, Schum. and Thw.

Erect, densely tomentose.

°° *Carpels blunt or shortly 2-lobed.*

S. GLUTINOSA, Roxb. Khakyen Hills, Pegu and Tenasserim.

S. Mysurensis, W. A.

Erect. Hairs glandular or viscid. Flowers solitary or several, on short and rather thick glandular peduncles.

S. HUMILIS, Willd. Rubbishy spots in Ava and Pegu.

Spreading or almost erect, weak. Hairs spreading, not glandular. Flowers solitary, on long filiform jointed simply hairy peduncles.

*** *Ovules 2 or more, ascending or pendulous, or both.*

ABUTILON, Gaertner.

Bracteoles none. Carpels 5-20, without spurious partitions.

Carpels more than 10, usually about 20.

A. INDICUM, L. Along roads and round villages in Ava and Pegu.

Sida populifolia, Roxb.

Sida Asiatica, L.

Tha-ma-jök.

Tomentum close and dense, without spreading hairs. Capsule truncate, the carpel points very short.

A. GRAVEOLENS, Roxb. Uncultivated spots in Pegu.

Tomentum dense, intermixed with long spreading hairs. Capsule at the top contracted and angular, the carpels not pointed.

** *Carpels fewer than 10, usually 5 or 7.*

A. POLYANDRUM, Roxb. Pegu.

Tomentum of short glandular hairs, mixed with long, simple, spreading ones.

"The Burmese plant differs chiefly in the more glandular pubescence and in having the carpels constantly by 7, not by 5" (Kurz).

The different species of *Abutilon* yield by maceration a good fibre, fit both for ropes and probably also paper. A decoction of the plant is emollient, and possessed of the same properties as the marsh-mallows of Europe.

URENIEÆ.

Staminal column truncate or 5-toothed at apex, bearing the anthers or filaments on the outside. Style-branches twice as many as ovary-cells. Carpels 1-seeded.

URENA, *Linnaeus*.

Bracteoles 5, connate at base. Carpels opposite the petals, mucronate.

* *Capsules longer than the sepals, glochidiolate and bristly tomentose.*

U. *LOBATA*, L.

Common, in uncultivated places, and in leaf-shedding forests from Chittagong and Ava down to Tenasserim up to 3000 ft. elevation. The Nicobars.

Kat-sae-nai or Wet-kyae-pa-nai (generic).

** *Carpels included in the calyx, smooth or net-veined.*

† *Petals 1½ to nearly 2 inches long, forming a large funnel-shaped corolla.*

U. *RIGIDA*, Wall.

Open forests of Pegu, Martaban, and Tenasserim.

Leaves almost rotundate, very scabrous on both surfaces. Flowers forming dense leafy terminal heads.

U. *SPECIOSA*, Wall.

Mixed forests of Ava and Pegu.

Leaves underneath softly tomentose, scabrous above, the lower ones usually lobed. Flowers in loose spreading terminal racemes.

°° *Petals 4 lines long, forming a rotate corolla. Involucre longer than the calyx.*

PAVONIA, *Cavanilles*.

Bracteoles 5 or more, usually free, herbaceous or bristle-like. Carpels opposite the sepals, variously armed or smooth.

B. Fruit a capsule, dehiscent or rarely indehiscent.

* *Bracteoles 5-6. Carpels indehiscent.*

P. (*LEBRETONIA*) *PROCUMBENS*, Wall.

Ava.

P. glechonifolia, A. Rich.

Flowers yellow. Carpels mucronate.

* *Bracteoles 10 or more. Carpels dehiscent.*

P. *ZEYLANICA*, Willd.

Banks of the Irrawaddy near Ava.

Flowers pink. Carpels unarmed, the margins slightly but sharply produced.

"All the Burmese specimens seen by me (including *P. rosea*, Wall., Cat. 1887, with hairy carpels) belong to the above species, none to *P. odorata*, Willd., for which Masters gives Burma as a habitat" (Kurz).

HIBISCIEÆ.

Staminal column truncate or 5-toothed at summit, bearing the anthers or filaments outside or also on the summit itself. Style-branches or stigmas as many as ovary-cells.

† *Style branched at the summit, the branches spreading or radiating. Seeds reniform.*

KYDIA, *Rochburgh*.

Flowers polygamous. *Bracteoles 3-4*, leafy, connate at base, enlarging and spreading under the fruit. *Sepals 5*, connate below the midrib. *Petals as many*,

adnate to the staminal tube. *Staminal-tube* divided about the middle into 5 divisions, each bearing 3 reniform anthers, imperfect in female flowers. *Ovary* 2-3-celled, with 2 ascending ovules in each cell. *Styles* 3, cleft with as many peltate stigmas, imperfect in male flowers. Trees with palmatinerved leaves. *Flowers* paniced. *Bracteoles* 4-6, enlarging in fruit. *Capsules* 2- or 3-valved.

K. CALYCINA, Roxb.

Mixed forests of Ava and Pegu.

K. *fraterna*, Roxb.

Dwā-bōk.

"There really may be two different species in India, the one with smaller smooth seeds, the other with larger furrowed seeds. The indument of the Burmese plants is much more floccose, the involucre-leaflets broader. Seeds, unripe, appear smooth and smaller." Wood white, straight-grained, good for house-building (Kurz).

DECASCHISTIA, *Wight and Arnott.*

Bracteoles 10. *Ovary* 10-celled, with a solitary ovule in each.

D. PARVIFLORA, Kz. Siamese Province of Kanburi and probably Tenasserim.

Leaves beneath shortly but densely whitish tomentose. Involucre much shorter than the calyx, puberulous. Petals about $\frac{1}{2}$ inch long.

D. CRASSIUSCULA, Kurz.

Prome.

All parts thickly tomentose. Involucre nearly as long as the calyx, densely tomentose. Petals nearly 2 inches long.

"Very near *D. crotonifolia*, but differs in its sessile flowers, broader and decurrent leaves, and very short petioles" (Kurz, J.A.S.B. ii. 1873, p. 227).

Masters describes but does not name another large-flowered (flowers pink, 4 inches in diameter) species from Rangoon (Kurz).

HIBISCUS, *Linnaeus.*

Flowers hermaphrodite. *Bracteoles* free or more or less connate, several, rarely reduced to 5 or fewer. *Calyx* 5-lobed, or toothed or spathaceous. *Petals* 5, connate at base with the staminal tube. *Staminal tube* truncate, or 5-toothed at the summit. *Filaments* many. *Anthers* 1-celled. *Ovary* 5-celled, with 3 or more ovules in each cell. *Styles* 5, connate at base. *Capsule* loculicidally 5 or rarely spuriously 10-celled, velvety, dehiscent. Herbs, shrubs or trees with more or less palmate lobes or entire leaves. *Flowers* often showy, in axillary inflorescences.

A. Leaflets of involucre free, sometimes adnate to the calyx, but not connate with one another, or altogether wanting.

Sub genus SOLANDRA.

Involucre wanting. Herbs with small flowers.

H SOLANDRA, L'Her.

Ava. Taong-doung. Segain.

Flowers white, on long slender pedicels, usually forming terminal racemes.

Sub-genus HIBISCUS.

Calyx regular, not spathaceous, 5-cleft, more or less persistent, surrounded by a more or less persistent involucre, the leaflets of which are either quite free or sometimes adnate to the calyx.

* *Capsule rounded, obtuse or truncate.*

† *Capsules truncate, winged.*

H. VITIFOLIUS, L.

Rubbishy spots from Chittagong and Ava to Pegu.

H. *truncatus*, Roxb.

Velvety-pubescent. Calyx and involucre tomentose. Flowers large, yellow with a dark-purple eye.

*** *Capsules rounded or obtuse, not winged.*

H. MICRANTHUS, L. Ava. Paghān-myo.
H. rigidus, L.

Capsules glabrous. Flowers white, hardly an inch in diameter, the petals reflexed. Scabrous herb.

* H. MUTABILIS, L. Cultivated in gardens.

Capsules hirsute. All parts, also calyx and involucre, densely scurvy tomentose. Involucre-leaflets 10. Flowers large, white, then rose-coloured. A large shrub.

H. VENESTUS, Bl. Upper Tenasserim.

As preceding, but all parts softly tomentose. Involucre and calyx densely pubescent. Involucre-leaflets in Burm. spec. 7, linear (in Malayan 5, ovate-lanceolate).

** *Capsules acuminate or acute, not winged.*

× *Calyx lobes 1-3-nerred, without thickened margins.*

† *Leaves densely and softly tomentose.*

H. PANDURIFORMIS, Burm. Ava. Prome.
H. tubulosus, Cav.

All parts, also calyx and involucre, densely tomentose. Pedicels shorter than the peduncles. Seeds pubescent.

†† *Leaves glabrous or roughish puberulous.*

Δ *Annual herbs. Flowers yellow with dark-purple eye.*

H. PROCERUS, Wall. Ava.

Seeds tubercled. Leaves glabrous. Stem and petioles prickly.

H. DIVERSIFOLIUS, Jacq. Ava.

Seeds smooth. All parts and more especially the calyx and involucre very tubercled-hispid.

H. LUNARIFOLIUS, Willd. Ava. Segain and Taong-doung.
H. pruriens, Roxb.
H. racemosus, Lindl.

Seeds smooth. Young parts densely and shortly hispid. Involucre-leaflets puberulous or almost glabrous.

Δ Δ *Shrubs. Flowers from purple to rose-coloured and white. Leaves glabrous, longer than the petioles.*

* H. SYRIACUS, L. Cultivated by Karens in Martaban.
H. Stoeckii, Seem.

Pedicels shorter than the petioles.

H. ROSA-SINENSIS, L. Much cultivated in native gardens.

The Shoe flower. Pedicels elongate, longer than the petioles. The Chinese use the flowers to dye leather black.

× × *Calyx lobes with a prominent midrib and (especially when in fruit) with thickened, usually indurated borders.*

○ *Involucre-leaflets bearing on the back an oblong or linear appendage.*

Δ *Appendage of involucre-leaflets leafy, oblong. Flowers pale sulphur with crimson eye.*

H. FURCATUS, Roxb. Ava and Banks of the Koladyne in
H. aculeatus, Roxb. (*vide* Masters). Arakan.

Không-yān.

Flowers about 2 lines in diameter, shortly peduncled. Stipules lanceolate. Stems stiff-hairy and usually prickly.

H. SURRATTENSIS, L.

H. heterophyllus, Griff.

All over Burma, in the leaf-shedding forests, and deserted toungyas, etc.

Flowers about an inch in diameter, on long slender peduncles. Stipules large, leafy, semilunar. Stems prickly.

H. aculeatus, Roxb., differs chiefly by the much smaller stipules, which, however, pass into those of *H. Surrattensis*.

△△ *Appendage of involucre-leaflets linear, rarely wanting.*

* *H. RADIATUS*, Cav.

Much cultivated all over Burma from Chittagong and Ava down to Tenasserim, and often like wild in deserted toungyas.

var. *a.* Corolla white or pale-sulphur with a purple eye.

var. *β* *Lindleyi* (*H. Lindleyi*, Wall.).

Flowers white or pale-sulphur with a purple eye, or purple, the calyx-lobes without a gland on the midrib.

○○ *Involucre-leaflets entire, without any appendage.*

* *H. CANNABINUS*, L.

Cultivated in Pegu and Martaban.

Calyx dry, horny in fruit, the lobes prickly ciliate, with a large gland on the midrib. Seeds glabrous.

* *H. SABDARIFFA*, L.

Much cultivated all over Burma from Chittagong and Ava down to Pegu, sometimes as wild in deserted toungyas.

Them-bān-khyen-boung. Roselle.

Calyx fleshy, red, the lobes without prickles, usually a little hairy, but soon glabrescent. Seeds shortly hispid. This species is cultivated for its red fleshy acid calices, which are admirable if chewed raw for quenching thirst, or stewed with sugar. The jelly prepared from the calices is not inferior to the best red currant, and the best substitute for it.

Sub-genus ABELMOSCHUS.

Calyx spathaceous, 5- rarely 3-toothed, deciduous, surrounded by a 5-20-leaved free, often very deciduous involucre. *Seeds* glabrous.

× *Involucre-leaflets* short and small, deciduous already before opening of the flowers.

* *H. FICULNEUS*, L.

Cultivated rarely in Pegu in native gardens.

H. prostratus, Roxb.

H. strictus, Roxb.

Flowers rather small, uniform white.

×× *Involucre-leaflets* narrow linear, often numerous and long. *Flowers* large, yellow with purple eye.

○ *Capsules* short, 5-angled.

† *Involucre-leaflets* about 10-12.

H. SAGITTFOLIUS, Kz.

Ava. Pegu.

Capsules glabrous. Flowers white, hardly an inch in diameter, the petals reflexed. Scabrous herb.

H. ABELMOSCHUS, L.

Arakan, Pegu, Ava and Tenasserim, Kamorta.

Abelmoschus moschatus, Moench.

Ba-lu-wā-gyi.

All parts spreadingly setose. Peduncles as long as or shorter than the capsule, strong. Flowers 2-3 inches in diameter.

The specific name of *moschatus* was bestowed on this plant from the musky aromatic odour of its brown seeds, which are named by the Arabs 'Hub-ul-Mashk,' and are used to perfume powders and unguents. The species abounds in mueilage, which is used to clarify sugar.

†† *Involucre-leaflets* 15-20.

H. CANCELLATUS, L. Dry forests of Ava and Promo.

Abelmoschus crinitus, Wall.

Stems hirsute. Leaves lobed, tomentose and sprinkled with stiff hairs. Involucre-leaflets persistent.

°° *Capsule elongate-conical, 7-angular.*

* *H. ESCULENTUS*, L. Cultivated in Burma (*vide* Mason).

H. longifolius, Willd.

Ba-lu-wā.

Involucre-leaflets 13. All parts slightly hairy.

This species is cultivated for its pods, which are boiled and eaten as a vegetable. The young pods are adapted for pickling, and the fully ripe seeds, when roasted, are an excellent substitute for coffee, and can be added in lieu of barley to soup.

××× *Involucre-leaflets broad and leafy, usually large, 4-6. Flowers yellow with purple eye. Stems setose.*

° *Involucre-leaflets* 4.

* *H. MANIHOT*, L. Rarely cultivated in Pegu.

H. pentaphyllus, Roxb.

Leaves almost glabrous. Involucre-leaflets glabrous, tomentose bordered.

H. HOSTILIS, Wall. Mixed forests of Ava and the Pegu Range.

Leaves beneath sprinkled with 3-forked short hairs. Involucre-leaflets appressed pubescent and setose-ciliate.

°° *Involucre-leaflets* 6.

H. PUNGENS, Roxb. Northern parts of Pegu Range from 1200 to 2000 feet.

Leaves hirsute. Involucre-leaflets with long stiff hairs.

B. Leaflets of the involucre united up to the middle or at least at the base, sometimes forming a cup-shaped involucre.

* *Trees or erect shrubs. Seeds glabrous. Flowers large, yellow with purple eye.*

* *H. HASTATUS*, L. Rarely cultivated in gardens.

Leaves deeply 3-lobed.

H. TILIACEUS, L. Common within the tidal area from Chittagong to

H. tortuosus, Roxb. Tenasserim, the Andamans and Nicobars.

Then-ben or Thim-bān.

Leaves not divided, entire or crenulate.

** *Seeds woolly or pubescent.*

† *Woody climbers.*

H. SCANDENS, Roxb. *W. C.* Tropical forests of Martaban.

Velvety tomentose, leaves glabrescent above. Involucre-leaflets 4-7, velvety.

|† *Trees.*

H. MACROPHYLLUS, Roxb. *E T.* Chittagong to Tenasserim.

H. vulpinus, Rwdt.

H. spathaceus, Bl.

H. setosus, Roxb.

Yē-wun.

Tawny setose. Leaves entire, tawny tomentose. Involucre-leaflets 10, hirsute.

This is an extremely useful genus of plants. The calices, pods, and leaves of many species are edible and wholesome, and almost all species yield a long and strong fibre, excellent for ropes or for making paper. When grown for fibre, the plants should be cut in flower and at once steeped; but this process should be more carefully carried out than is usually done, as steeping vegetable fibre in a tropical climate greatly impairs its strength and causes discoloration. The mucilaginous juice of many species is used in refining sugar, by Asiatics who object to the use of blood for that purpose. The flowers of *H. Rosa-sinensis* yield a juice which dyes leather black.

THESPIA, *Correa da Serra.*

Bracteoles 5-8 or fewer, rarely wanting, deciduous. *Calyx* truncate, minutely 5-toothed or parted. *Corolla* convolute. *Staminal tube* 5-toothed at apex. *Ovary* 5-4-celled, with few ovules in each cell. *Style* furrowed, club-shaped, entire, or 5-toothed. Trees or shrubs, with entire or shortly-lobed leaves. *Flowers* large, yellow.

T. (HIBISCUS) POPULNEA, T. Common in the beach and tidal forests from
Hibiscus populneoides, Roxb. Chittagong to Tenasserim and the Andamans.
T. macrophylla, Bl. Ava, Bhamo and Sabado. The Nicobars.

All younger parts and unripe capsules covered with rusty-coloured scales. Leaves glabrous. The occurrence of this salt-loving tree in Ava is unique, and requires explanation. Brine springs are numerous in Prome and Ava, and may possibly account for such an exceptional re-appearance of a shore-plant in the interior of Burma. Wood brown, strong, durable (Kurz).

T. LAMPAS, Dalz. Mixed forests all over Burma.
H. tetralocularis, Roxb.
Azauza Zollingeri, Alef.

All younger parts, and usually the leaves beneath, shortly stellate tomentose. Unripe capsules densely hirsute. A meagre shrub.

GOSYPIUM, *Linnaeus.*

Bracteoles 3, leafy, cordate. *Calyx* truncate, or shortly 5-cleft. *Staminal column* bearing numerous filaments outside. *Ovary* 5-celled, with several ovules in each cell. *Style* club-shaped, furrowed, with decurrent stigmas. *Seeds* woolly or glabrous. Herbs, shrubs, or small trees, with lobed, rarely entire, leaves. *Flowers* large, yellow or purple. *Calyx* and *capsule* usually black-dotted.

* G. HERBACEUM, L. var. α and β much cultivated all over Burma, and often
Wā. seen as wild in deserted toungyas and neglected lands.

Annual. Seeds free, clothed with firmly adhering silky down.

var. α *herbaceum*, L.; *G. hirsutum*, Roxb.; *G. Barbadosense*, Wight. Lobes of leaves acuminate.

var. β *hirsutum*, L.; *G. obtusifolium*, Roxb.; *G. herbaceum*, Wight. Leaves with usually blunt lobes, the upper ones often undivided, with or without a gland on the midrib beneath. Involucre-leaflets entire or serrate. Capsules when ripe green. Cotton white.

Dr. Mason writes of the cotton grown in Burma: "By far the finest-looking native cotton I have seen in India is that cultivated by the Red Karens. The plants grow more than twice the height of those seen in Toung-ngoo, close by. It may be attributed to two causes. Much less rain falls on the table-land inhabited by the Red Karens, than in Toung-ngoo, and it is entirely a limestone soil, which Mr. Piddington said was the next best soil for the plant.

"Mr. Blundell introduced the plant which produces the Pernambuco, Peruvian, Bahia or South Sea Island cotton, and Major Macfarquhar raised such a fine article at Tavoy from it, that the Committee of the Agricultural and Horticultural Society of Calcutta were unwilling to believe it the production of that species. They reported:

'The sample sent by Major Macfarquhar appears to be of a quality resembling the *Sea Island*, but finer and more silky, and the fibre not so strong, its value is not so easy to determine, but the Committee are of opinion that it would sell for a high price. The Pernambuco cotton, which it is believed is the same as the *South Sea Island* cotton, is an inferior staple to that of the N. American *Sea Island*, and they have a sample of cotton submitted which in point of *fineness* surpasses the genuine *Sea Island* cotton of N. America.

" 'This improvement on the general staple of Pernambuco cotton might be reconciled had it been produced *at a distance from the Sea*, since it has been ascertained, that this description of cotton deteriorates by proximity to the sea; whence your Committee are disposed to think that Major Macfarquhar has been led into error in calling it *South Sea Island* instead of *Sea Island*.'

" Admitting that Major Macfarquhar was in error, which it is believed he was not, the report proves that an article, 'finer and more silky' than the best American cotton has been raised in these Provinces. The principal difficulty to the introduction of this species into general cultivation was, as Mr. Blundell told me, that the trees did not produce abundantly.

" *Sea Island* cotton has been raised in the Tenasserim Provinces by amateur cultivators, but I have never seen any report on the article obtained. 'Bourbon cotton of Indian growth,' says Wight, 'has sold in the London markets for the highest prices going;' and, as the Bourbon plant is the original *Sea Island* acclimatized to the East, the cultivator would have a stronger probability of success by obtaining his seed from Bourbon, than from America.' Much attention should also be given to the selection of a proper soil. Analysis has shown that all the lands on which cotton is grown in India differ widely in their constituent parts from the best cotton lands of America. The subject is still in its infancy, more extensive analysis being required; 'but it seems *at present*,' observes Mr. Piddington, 'that the abundance and fineness of good cottons depend on the quantity of carbon in the soil, and the solubility of that carbon.' If therefore you can obtain a soil approaching the American soils, that is, containing peaty matter, lignite, and colouring cold water, this will no doubt be the best; because it contains carbon, and probably hydrogen combined with it, suitable for the food of the plant. And the next best soil is one containing carbonate of lime."

* G. BARBADENSE, L.

Rare in gardens in Pegu.

Nu-wā.

Shrubby perennial. Seeds black, free or cohering, devoid of adhering pubescence.

BOMBACIÆ.

Staminal column divided at summit, or rarely to the base, into numerous filaments or 5 to 8 staminal bundles, very rarely entire nearly to the summit. *Anthers* free or variously cohering. *Stigmas* free or connate.

* *Leaves* digitate. *Bracteoles* distinct or none.

BOMBAX, *Linnaeus*.

Calyx cup-shaped, truncate or irregularly 3-5-lobed. *Staminal column* divided into numerous filaments. *Ovary* 5-celled, with several ovules in each cell. *Style* club-shaped or shortly 5-lobed at top. *Capsule* woody or coriaceous, loculicidally 5-valved, the cells copiously downy inside. *Seeds* obovoid or globose, enveloped in the silky down. *Albumen* thin. Leaf-shedding trees, with digitate leaves. *Flowers* large scarlet or white fleshy.

B. MALABARICUM, DC.

From Chittagong to Tenasserim, up to 3000 feet.

Let-pān or Di-du.

Leaflets on a 10 to 12 lines long petiole. *Staminal bundles* consisting of 15 to 20 strong and thick filaments. Young trees have the bark armed with numerous conical thorns of a sharp and formidable character.

B. INSIGNE, Wall.

Ava. Pegu Range. Andamans.

Leaflets decurrent on the short 2 to 3 lines long petiolule. Staminal bundles consisting of 50 or more long filiform filaments.

Kurz applies the terms *Let-pan* and *Di-du* to one tree. The Burmese, if I mistake not, regard them as male and female. The 'cotton trees' are noble trees, with grandly buttressed stems, but the wood is soft and worthless. When a man dies, one of these trees, if handy, is felled, a log is cut out of the length, which is speedily converted into a solid coffin, the softness of the wood lending itself to that end. The fleshy calices of the flowers are cooked and eaten, and the silky down of the seed-capsules is collected to stuff pillows with. As the fibre is smooth, it will not felt or even twist into yarn like cotton; so that its utility is limited to stuffing pillows. The trees attain their largest size in river plains, where one of these giant trees, 80 to 100 feet high, with its brightly-coloured flowers, enlivened by the presence and motions of numerous birds, seeking for nectar and insects in the calices, forms a striking and interesting object.

ERIODENDRON, *De Candolle*.

Calyx and *ovary* as in *Bombax*. *Staminal bundles* 5, inserted at base, each bearing 2-3 linear anthers.

E. (BOMBAX) PENTANDRUM, L.

Rare (one tree only seen) in the coast forests of South Andaman. Here and there cultivated in Pegu and Tenasserim.

E. anfractuosum, DC.

One of those trees that are stated to be very frequent in the Indian jungles, but I myself have never succeeded in seeing it in a truly wild state, although the loftiness of the tree and the decussate termination of its branches would render it recognizable from a long distance (Kurz).

* *Leaves* simple, pinninerved, beneath more or less lepidote. *Fruits* muricate.

DURIO, *Linnaeus*.

Calyx bell-shaped. *Petals* 5. *Branches* of the staminal bundles bearing several linear anthers with sinuous anther-cells.

* D. ZIBETHINUS, L. *E.T.*

Wild in Tenasserim, south of 14° N.L.

Du-yin. The Durian.

"The Burmese specimens in Dr. Brandis' herbarium, although destitute of corolla, do not differ from the Malayan durian, and the calyx is the same in size as well as in shape" (Kurz).

The 'durian' is perhaps more passionately esteemed by those who are in the habit of consuming it than any fruit in the world. When the hard prickly coat begins to gape at the seams, the fruit is in perfection, and the nuts within are seen enveloped in a rich mellow paste, somewhat comparable to a mixture of equal parts of almond paste, clotted cream, and mashed garlic, the odour being rapidly intensified as the fruit ripens more and more. The nuts are also edible when roasted like chestnuts. The specific name *zibethinus* is said to have been given it from the fondness of the civet-cat for it, or perhaps from the abominable odour of the over-ripe fruit. An unexplained circumstance regarding the 'Durian' is that this name occurs among the fruits mentioned as found at Delhi by either Purchas or one of the early English travellers. What is this 'Durian'? Was it a mistake of the traveller, or was the name in Jehangir's time applied to some Indian fruit? It is absurd to suppose the Durian was ever introduced or fruited in Northern India.

"Helfer writes in his second report on the resources of Tenasserim: 'This tree does not grow so far north as Maulmain, some few trees excepted, which are grown as a rarity on the island of Beloo. It sphere begins at Tavoy; large plantations occur to the E. of Mount Burney, and very fine specimens in the valley of Taunbiaun. Lower down on the Tenasserim, the trees begin to grow almost spontaneously, and in lat. 14° it forms large forests.'

The Order *Malvaceæ* is a highly useful one to man. It yields one of the most delicious fruits known, but which is unfortunately very restricted in its geographical range (*Durian*). The *Hibiscus sabdariffa* (indigenous to tropical Africa) is, on the other hand, a very widely diffused plant, yielding a delicious table vegetable, whilst nearly every species of the genus yield a long and fairly strong fibre adapted for the manufacture of rope or sacking; and the cotton plant, whereon one of the main industries of England depends, is another member of this Order.

Order STERCULIACEÆ.

Flowers regular, hermaphrodite or unisexual. *Sepals* 5, more or less (rarely wholly) connate. *Petals* 5 or none. *Stamens* usually united into a ring, cup, or tube, many, or rarely few, and free. *Anthers* 2-celled in heads, or in a single ring at the apex, or dispersed on the outside of the staminal column, with or without intervening staminodes. Herbs, shrubs, or trees, with alternate simple or palmately-lobed, or digitate leaves. *Stipules* present.

STERCULIÆÆ.

Flowers unisexual or polygamous. *Petals* none. *Anthers* 5-15, sessile, surrounding the stalked ovary or in males the top of a shorter or longer column, or shortly polyadelphous. *Mature carpels* distinct, sessile or stalked.

* *Anthers* irregularly clustered, numerous. *Fruit* dehiscent.

STERCULIA, Linnæus.

Orules 2 or more in each cell. *Carpels* follicular.

† *Seeds* without wings, 2 or more along the suture of the coriaceous carpels, never inserted at the base.

* *Leaves* digitate.

S. FETIDA, L. T.

Mixed forests of Pegu Range.

Lek-khok or Lek-khō.

Leaves glabrous. Calyx rather large, the lobes spreading.

This is probably the species which so unpleasantly obtrudes itself on the traveller's notice, who incautiously halts near one in flower. The odour exhaled by the tree in question resembles the sickening smell of the mucus secreted by the bowels in acute dysentery, and once recognized, can never be forgotten. This identity of odour between a normal vegetable secretion and an abnormal animal one, the result of disease, is not a little curious.

S. VERSICOLOR, Wall.

Ava on limestone hills near Segain.

Shor-hpyu (Kurz).

Leaves emescent tomentose beneath. Calyx small, the lobes conniving, short.

** *Leaves* palmately lobed or cut. *Leaf-shedding* trees.

S. FRENZ, Roxb.

Pegu and Tenasserim.

Carpels densely covered with stiff fragile hairs. Flowers small.

S. VILLOSA, Roxb.

Pegu. Tenasserim and Andamans.

Shor-ni.

Carpels shortly tomentose from stellate hairs.

S. ORNATA, Wall.

Pegu Range. Tenasserim.

Shor-wā.

Carpels densely covered with stiff short hairs, glabrescent. Flowers nearly $\frac{3}{4}$ inch in diameter.

*** *Leaves all entire. Small evergreen trees or meagre shrubs.*

° *Leaves quite glabrous.*

× *Calyx-lobes not spreading, almost erect or more usually conniving with their tips.*

S. LONGIFOLIA, Vent. *E.T.* Tenasserim (?).

S. striatiflora, Mast.

Calyx shortly tubular, striate, the lobes the length of the tube.

× × *Calyx almost rotate.*

S. COCCINEA, Roxb. *E.S.* Pegu Range. Tenasserim.

Calyx-lobes from a broader base, linear, very long, and somewhat twisted.

° ° *Leaves more or less tomentose or puberulous, at least beneath.*

× *Flowers more than ½ inch long, in simple brown tomentose racemes.*

S. ROXBURGHII, Wall. *E.T.* Chittagong.

All parts glabrous.

S. RUBIGINOSA, Vent. *E.S.* Burma (*vide* Masters).

Leaves beneath and petioles softly rusty pubescent.

× × *Flowers in panicles.*

S. ANGUSTIFOLIA, Roxb. Tenasserim.

S. mollis, Wall. Andamans and Nicobars.

Leaves tomentose. Calyx-lobes free and spreading. Flowers long-pedicelled.

var. *a angustifolia*. Leaves on petioles 8-10 lines long, lanceolate.

var. *β mollis*. Leaves obovate-oblong, on petioles 4-5 lines long, shortly acuminate, rounded at the narrowed base. Tomentum almost velvety.

S. PARVIFLORA, Roxb. *E.T.* Ava and Syliet.

Leaves beneath minutely stellate-puberulous. Calyx-lobes short and connivent. Flowers shortly pedicelled. (See Kurz, J.A.S.B., 1876, part ii., p. 120.)

† † *Calyx tubular. Seeds without wings. Carpel: chartaceous and expanded leaf-like, bearing 1 or 2 seeds along the marginal sutures at about ½ of their length.*

S. COLORATA, Roxb. *T.* From Chittagong to Tenasserim and the Andamans.

Wet-shor. Hog's slide.

Leaves more or less lobed, occasionally almost entire, glabrous or puberulous beneath. Calyx about 8-9 lines long.

S. FULGENS, Wall. *T.* Ava. Taong-doung. Tenasserim.

Leaves very large, much lobed, pubescent beneath. Calyx about 1-1½ inch long.

† † † *Calyx more or less campanulate. Seeds without wings, solitary, laterally adnate to the base of the boat-shaped chartaceous or membranous follicles. Scaphium (including Pterocymbium and Carpophyllum).*

* *Follicles produced below at about the middle into an additional bluntish sac-like lobe.*

S. CAMPANULATA, Wall. *T.* Tropical forests of Pegu Range, Martaban, and the Nicobars.

Leaves more or less tomentose or puberulous beneath. Calyx campanulate, green.

** *Follicles not produced into an additional lobe.*

S. SCAPHIGERA, Wall. *T.* Tropical forests of Pegu and Tenasserim.

Scaphium Wallichii, Schott and Endl.

Carpophyllum macropodum, Miq.

Leaves coriaceous, glabrous, glossy. Calyx almost rotate, yellowish.

†††† *Seeds numerous, winged along their upper end, inclosed in a woody large follicle (Pterygota).*

S. ALATA, Roxb. T. From Chittagong to Tenasserim and the Andamans.
'Booth's cocoa-nut' (Mason).

Leaves entire, glabrous, 5-nerved at base. Follicles as large as the fist.

The genus *Stereulia* is not a particularly useful one. Several species produce a gum, having some of the appearance of tragacanth, and the seeds are edible, and much relished, when roasted, by the Burmese. The bark of some species yields a good fibre, but the timber is worthless. In addition to the above, Kurz records two other species, which he appears not to have seen.

S. LINGUIFOLIA, Mart. Tavoy (Parish).
S. ENSIFOLIA, Mart. Mergui (Griffith).
And S. HYPOSTICIA, Miq., from Kamorta.

** *Anthers 5, in a ring. Carpels indehiscent.*

HERITIERA, Aiton.

Flowers unisexual. Calyx 4-7- (usually 5-)cleft. Petals none. Staminal column slender, bearing a ring of 5 anthers. Anther-cells parallel. Ovary-carpels usually 5, nearly distinct, with a single ovule in each. Style short, with 5 rather thick stigmas. Fruit-carpels woody, indehiscent, keeled, or almost winged on the back. Albumen none. Trees, with simple leaves, silvery-sealy beneath. Flowers small on axillary panicles.

* *Carpels glossy or at least smooth, brown. Leaves shortly petioled.*

H. LITTORALIS, Dry. E.T. Tidal forests and sea shores from Chittagong to
Balanopteris tohila, Gaertn. Tenasserim, the Andamans, and Nicobars.
Pyn-leh-ka-nā-zo.

Leaves usually coriolate or rounded at base. Carpels strong-crustaceous, obliquely ovoid, with a sharp keel pointed at the summit.

H. MINOR, Lam. E.T. Same distribution as the last.
H. fuses, Buch.

Pyn-leh-ka-nā-zo.

Leaves narrowed at base. Carpels fibrous-woody under the thin bladderly epicarp, obliquely and broadly depressed, the keel at the summit broad and almost wing-like.

Wood dark reddish-brown, strong, tough, and durable, 66 lbs. to the cubic foot. Kurz gives the breaking weight of this wood at 1132 lbs., the mean of Teak being given by Kurz at 240 lbs. only. It is one of the toughest and strongest woods known, and yet but little employed save for firewood. In Calcutta, however, it is used for carriage shafts from its great toughness and strength.

** *Carpels sea-green or grey, rough and corky-tubercled. Leaves long-petioled. Carpels obliquely ovoid, keel indistinct, at the extremity produced into a thick narrow wing-like appendage.*

H. MACROPHYLLA, Wall. E.T. Upper Tenasserim, near Trokla.

HELICTERIEÆ.

Flowers hermaphrodite. Petals deciduous. Anthers 5-15, sessile or on short filaments, situated on the margin of the cup-like dilated summit of the column and usually alternating with staminodes.

HELICTERES, Linnaeus.

Anther-cells divaricate or confluent into one. Fruit a capsule, sometimes twisted. Seeds not winged.

† Carpels spirally twisted. Leaves unequally serrate (*Spirocarpæ*).

H. ISORA, L. S. Burma (*vide* Mason).
 Thu-ng-ch-chē (Kurz).
 Calyx about $\frac{1}{2}$ inch long, or longer.

†† Carpels straight or nearly so (*Oudemansia*, Miq.).

* Calyx about $\frac{1}{2}$ inch long or longer. Leaves unequally serrate or toothed (*Orthocarpæ*).
 H. VISCIDA, Bl. S. Ava. Taong-donng.
 Calyx laxly stellate-woolly and viscid.
 H. (OUDEMANSIA) HIRSUTA, Miq. S. Tenasserim.
 Calyx shortly scurvy tomentose.

** Calyx only 2 or 3 lines long.

° Carpels firmly cohering, forming a densely villous-echinate apiculate or obtuse capsule. Leaves entire or obtusely serrate, shortly whitish-tomentose beneath.

H. OBTUSA, Wall. S. Tenasserim. Kamorta.
 Stems tawny tomentose. Leaves sprinkled above with stellate hairs, blunt or acute.

°° Carpels loosely cohering, with the points all free, shortly hairy echinate. Leaves never whitish pubescent beneath, serrate.

H. GLABRUSCULA, Wall. S. Mixed forests of Arakan, Pegu and
H. plebeia, Kz. Martaban.
 Flowers in short axillary racemes.

H. ELONGATA, Wall. S. Ava.
 Flowers in elongated slender racemes, much longer than the pubescent leaves.

PTEROSPERMUM, Schreber.

Anther-cells parallel. Capsule woody, terete or 5-angular. Seeds winged.

* Capsules distinctly 5-cornered. Leaves large and broad.

° Stipules and bracteoles pinnatifid.

P. ACERIFOLIUM, Willd. E.T. From Chittagong to Tenasserim and
 Toung-hpet-wun. the Andamans.
 Calyx-lobes 3-4 inches long. Style towards the base villous.

°° Stipules. Bracteoles entire.

P. ACEROIDES, Wall. E.T. Tropical forests in Tenasserim and
 Calyx-lobes $1\frac{1}{2}$ -2 inches long. Style glabrous. the Andamans.

“*Pt. diversifolium*, Bl., appears to be an intermediate form between *Pt. acerifolium* and *Pt. aceroides*, having the flowers and styles of the former but smaller, and the bracteoles of the latter.” The wood of both this and the last species is brown, heavy, and takes a good polish (Kurz).

** Capsules terete or nearly so.

° Leaves semi-sagittate at base. Stipules pinnatifid.

P. SEMISAGITTATUM, Roxb. T. From Chittagong and Ava down to Tenasserim.
 Nak-yay-pen or Naj-y-ay (Kurz).
 Flowers 3 inches long or longer. Bracteoles large, divided into several many-cleft and jagged lobes, forming an involucre.

°° *Leaves never semi-sagittate, usually small, entire or shortly lobed. Stipules small, entire or 2-3-cleft. Flowers not above 2 inches long.*

† *Pediceles much longer than the petioles.*

P. LANCEFOLIUM, Roxb. *E.T.* Chittagong. Tavoy (?).

Leaves greyish or whitish tomentose beneath, acuminate. Stipules and bracteoles 2-3- rarely 5-cleft. Capsules greyish velvety. Wood strong, close-grained.

†† *Pediceles short, about the length of the petioles, or rarely a little long-r.*

P. CINNAMOMEUM, Kz. *E.T.* Martaban and Tenasserim.

Leaves entire, acuminate, beneath rusty-coloured (rarely greyish), tomentose. Stipules and bracteoles linear subulate, with a cucullate basal appendage. Capsules brown, scurvy-tomentose, glabrescent. Wood brown, close-grained, perishable (Kurz).

P. JAVANICUM, Jungh. *E.T.* Tenasserim.

P. Blumeanum, Korth.

Leaves usually small. Stipules and bracteoles entire, lanceolate. Some trees of this genus yield a hard and good timber, but of no great importance.

ERIOLENIÆ.

Flowers hermaphrodite. Petals deciduous. Anthers numerous on the outside of the tubular or conical column from the middle to the top. Staminodes none.

ERIOLENA, De Candolle.

Calyx 5-cleft, valvate. Petals 5, deciduous, with dilated tomentose claws. Staminal column short, bearing on the outside numerous linear-oblong anthers, the anther-cells parallel. Capsule woody, 5-valved. Seeds winged above. Albumen thin. Trees with simple, often lobed leaves. Flowers usually yellow and showy, solitary, or on axillary panicles.

E. CANDOLLEI, Wall. Ava. Pegu. Martaban.

Dwā-ni.

Heartwood red, tough and elastic, 44 lbs. to the cubic foot.

DOMBEYIÆ.

Flowers hermaphrodite. Petals persistent, flat. Anthers 10 to 20, rarely 5, united into a short cup at or near the top of the column, the cells parallel. Staminodes 5 or none.

× *Anthers 15, rarely 10.*

PENTAPETES, Linnaeus.

Bracteoles caducous. Sepals herbaceous. Ovary-cells with several ovules. Style simple.

P. PUNICEA, L. Along rice fields in Ava and Pegu.

Eriorhaphe punicea, Miq.

× × *Anthers 5.*

MELHANIA, Forskahl.

Bracteoles 3, persistent. Stamens united into a cup, with 5 elongate staminodes.

HERMANNIÆ.

Flowers hermaphrodite. Petals marcescent, flat. Stamens 5, shortly united or rarely tubular at base only. Staminodes usually none.

× *Ovary 5-celled.*

MELOCHIA, Linnaeus.

Capsules almost globular. Seeds wingless. Herbs or under shrubs.

M. CORCHORIFOLIA, L.

In forests and cultivation all over Burma.

VISENIA, *Houttuyn.*

Capsules deeply 5-lobed. *Seeds* winged at their extremities. Trees.

V. INDICA, Houtt.

Tropical forests of Pegu and Tenasserim (rare).

V. umbellata, Bl.

Kamorta and Nankowry.

Riedleria velutina, DC.

× × *Ovary* 1-celled.

WALTHERIA, *Linnaeus.*

Calyx campanulate. *Staminodes* none.

W. AMERICANA, L.

Ava. Segain. Prome.

W. Indica, L.

BUETTNERIEE.

Flowers hermaphrodite. *Petals* concave at base, usually appendaged at top. *Anthers* 5-15, rarely numerous, introrse, the filaments united into a shorter or longer tube, solitary or in groups alternating with the staminodes.

° *Anthers* by 2-4 alternating with a staminode.

GUAZUMA, *Plumier.*

Petals clawed, with a linear 2-cleft blade. *Fruit* globular, woody tubercled.

* G. TOMENTOSA, H. B.

An American tree, sometimes seen planted as an avenue-tree.

LEPTONYCHIA, *Turczaninow.*

Petals concave, not clawed. *Filaments* long, only at base connate, alternating by 2 with short staminodes, a series of subulate staminodes at the back.

L. GLABRA, Turcz. *E.S.*

Tenasserim.

Outer staminodes 15, the inner staminodes ciliate. *Capsule* 1-celled, rugose.

L. (GREWIA) HETEROCLITA, Roxb. *E.S.* Tropical forests of South Andamans.

Binnendykia trichostylis, Kz.

L. moacurroides and *Grewia acuminata*, Bedd.

Outer staminodes 10, the inner not ciliate. *Ovary* and *capsule* 3-5-celled and lobed, the latter minutely tubercled.

°° *Anthers* singly alternating with the staminodes.

BUETTNERIA, *Linnaeus.*

Petals cucullate at the clawed base. *Staminodes* short and blunt. *Capsules* woody, variously armed.

× *Leaves* cordate-oblong, entire.

B. ASPERA, Colebr. *S.S.*

Pegu. Tenasserim. Andamans.

Capsules large, greyish velvety, covered with strong woody prickles.

B. FENINATA, Wall.

Pegu.

Leaves elliptical ovate.

× × *Leaves* more or less lobed or angular. *Capsules* the size of a cherry.

B. PILOSA, Roxb. *S.S.*

Tropical forests all over Burma.

Tat-tayāk-nweh.

More or less roughish stellate-tomentose. *Capsules* densely covered with brown setose flexible bristles.

B. ANDAMANENSIS, Kz. *S.S.*

Upper Tenasserim and South Andamans.

Glabrous or almost so. Capsules covered with long stiff smooth bristles.

B. CRENULATA, MacClelland. Pegu. Tenasserim.

ABROMA, *Linnaeus*.

A. ANGUSTA, L. Nankowry.

The Order of *Sterculiaceæ* is notable for the abundance of mucilage which most of its members contain, and the fibre of most is strong and good for cordage. The wood is usually valueless, but *Heritiera* and *Pterospermum* are exceptions, the former affording one of the toughest woods in the East. The Cacao bean, from which Chocolate is made, belongs to this Order.

GUTTIFERALES.

Flowers regular. *Sepals* and *Petals* each usually 4 or 5, imbricate in bud. *Stamens* usually many. *Ovary* 3- or many-celled, rarely 2-celled or of 1 carpel. *Placentas* on the inner angles of the cells.

Order DIPTEROCARPEÆ.

Flowers hermaphrodite, regular. *Calyx-tube* free from the ovary or adnate, bell-shaped and enlarging or small and unchanged, the limb 5-parted or cleft, imbricate (rarely almost valvate), all or a few of the lobes enlarged and wing-like, rarely unaltered under the fruit. *Petals* 5, twisted, imbricate, free or basally connate. *Stamens* numerous, rarely definite, hypogynous or perigynous. *Anthers* 2-celled, the connective often produced, bristly or blunt. *Ovary* usually superior, 3-celled (rarely 2- or 1-celled), with usually paired anatropous ovules in each cell. *Fruit* a usually 1- or rarely 2-seeded nut, inclosed or supported by the calyx or rarely inferior, the calyx-wings some or all enlarged, wing-like. *Albumen* none, or rarely fleshy and ruminant. Trees or shrubs, with alternate simple leaves. *Flowers* usually in racemes or panicles. All the species abound in balsamic products, as camphor and wood oil.

Sub-order ANCISTROCLADEÆ.

Ovary 2-celled, with a single erect ovule. *Fruit* adnate to the enlarged calyx.

ANCISTROCLADUS, *Wallich*.

All the 5 calyx-lobes more or less enlarged. Scandent shrubs.

A. GRIFFITHII, Planch. Swamps and muddy river banks
Pan-ben-nwach (Kurz) from Pegu to Tenasserim.

All the 5 lobes of the fruiting calyx equally enlarged, short and coriaceous, stellately spreading, leaves chartaceous.

A. WALLICHI, Planch. Tropical forests of Chittagong,
A. extensus and *A. stelligerus*, Wall. Pegu, Tenasserim, Andamans.

Lobes of fruiting calyx unequal, chartaceous, 1-1½ inch long. Leaves thicker.

Sub-order DIPTEROCARPEÆ.

Ovary 3- rarely 1-celled, with 2 pendulous ovules in each cell. Trees, rarely erect shrubs.

* *Ovary* inferior or nearly so, or with a broad base adnate to the calyx-tube. Nuts therefore for ½ to ¾ of their length adnate to the enlarged calyx-tube.

ANISOPTERA, *Korthal*.

Connective terminating in bristle or acute gland, 2 of the 5 calyx-lobes enlarging into long wings.

Sub-genus SYNAPTEA.

Stamens only 15-18, the connective terminated in an acute gland. *Style* filiform. *Nuts* only to about $\frac{1}{2}$ of their length adnate to the calyx-tube.

A. ODORATA, Griff. T. Tenasserim.

Vatica grandiflora, Dyer.

Young shoots covered by a mealy or scurvy tomentum.

Sub-genus ANISOPTERA.

Stamens numerous, the connective produced into a bristle, style thick and ovoid. *Nuts* inferior or nearly so.

A. GLABRA, Kz. E.T. Pegu Range and hills East of Tonng-ngoo.

Thyt-kadō (Kurz).

Apparently quite glabrous.

A. OBLONGA, Dyer. Mergui.

Differs from the preceding in the unequally prominent nerves of the calyx-wings.

A. SCAPHULA, Roxb. T. Chittagong.

Connective terminated by a short point, mucronate. Leaves oblong, blunt.

** *Ovary* free, superior. *Nuts* free, either inclosed in the enlarged calyx-tube or exposed and the calyx-tube hardly enlarged.

° *Calyx-tube* in fruit very enlarged, completely inclosing the nut.

DIPTEROCARPUS, Gaertner.

Calyx 5-lobed, with a turbinate or urceolate free tube. *Petals* somewhat cohering at base, spreading. *Stamens* numerous, free or nearly so, the connective produced into a cuspidate point. *Ovary* free, 3-celled. *Style* filiform. *Nut* woolly, 1- rarely 2-seeded, free, and inclosed in the enlarged calyx-tube. The *calyx-lobes* enlarged, 3 of them remaining short, the 2 others growing out into long wings. *Leaves* entire, or coarsely repand-crenate. Lofty trees.

* *Calyx-tube* in fruit more or less globular, ovoid or turbinate, without any ribs or longitudinal wings on its belly.

° *Calyx-tube* in fruit towards the top produced into 5 compressed knobs, each situated between 2 lobes.

D. TUBERCULATUS, Roxb. Chittagong to Tenasserim.

Eng.

Leaves glabrous or puberulous beneath. Stipules puberulous.

Tree often with a clean stem 50 feet high and 10 feet in girth. The tree yields no wood oil, but a clear yellow resin. Wood brown, 55 lbs. to the cubic foot, works well and is lasting for indoor work where protected from the sun and rain.

Dr. Mason writes: "This is a tree of the wood oil tree tribe, remarkably characteristic of a sandy soil. It abounds on the sandy plains near the sea shore at Mong-magon, and is equally common on a similar soil in the interior. It produces a valuable timber which is sawn and sold extensively in Toung-ngoo. The Burmese call it *en*." Mason adds that Wallich referred the "*en*" to *D. grandiflora*, MacClelland to *alatus*, and Kurz now identifies it with *tuberculatus*. The deduction seems to me to be that the Burmese word *En* or *Eng* is applied indifferently to more species than one, and hence probably the difference of opinion touching the value of *Eng* timber, one writer having in view one tree of the name, and other writers quite a different tree.

°° *Calyx-tube* in fruit perfectly terete.

× *Leaves* glabrous and glossy.

D. LEVIS, Ham.

Arakan. Pegu. Tenasserim.

D. turbinatus, Roxb.

D. grandiflora, Griff.

Kanyin-ni.

Stipules velvety. Fruiting calyx smooth and more or less pruinous.

A magnificent tree with often a clear stem of 120 feet and a girth up to 25 feet. Yields a large quantity of superior wood oil and some brown resin. Wood very inferior, decaying in a little more than a year if exposed to the weather, but lasting longer indoors.

D. HASSELTII, Bl.

Andamans and Tenasserim.

Stipules glabrous. Fruiting calyx sprinkled with minute stellate hairs.

× × *Leaves beneath or on both surfaces variously hairy.*

G. TURBINATUS, Gaertn.

From Chittagong to Tenasserim.

Leaves acuminate, beneath along with the petioles pubescent. A magnificent tree fully as tall as *D. laris*, but with a slightly less girth. Yields a wood oil. Wood pale brown, 55 lbs. to the cubic foot, quality similar to *D. tuberculatus*.

D. OBTUSIFOLIUS, Teysm.

Prome and Martaban.

All softer parts greyish pubescent, the leaves blunt. Size of *D. tuberculatus* and quality of wood similar.

D. PILOSES, Roxb. *E.T.*

Tropical forests of Arakan, Martaban, and Tenasserim.

Leaves acuminate, often large. Petioles, young branchlets and stipules strigose from short tawny brush-like fascicled hairs.

* * *Calyx-tube in fruit longitudinally marked by 5 ribs or as many wings.*

† *Wings of fruiting calyx-tube broad (about half as broad as the belly or broader).*

D. ALATUS, Roxb.

Kanyin-hpyu.

Calyx greyish-tomentose, when in fruit sparingly stellate-puberulous. Petioles long. Leaves greyish pubescent. A magnificent tree with a clear stem of 100 feet, and 15 feet in girth.

D. GRIFFITHII, Miq.

Tropical forests of the Andamans and Tenasserim.

Calyx pruinous, quite glabrous. Petioles only 2-2½ inches long.

A deciduous tree, the same size as the last. Wood yellowish-grey.

† † *Wings of the fruiting calyx-tube narrow or reduced to ribs.*

° *Leaves blunt.*

D. INCANUS, Roxb.

Chittagong.

All softer parts greyish-villous. A doubtful species, very near to *D. alatus*.

° ° *Leaves acuminate.*

D. COSTATUS, Gaertn.

Chittagong, Martaban, Tenasserim.

D. gonopterus, Turcz.

Branchlets tomentose, the belly of the calyx narrowly 5-winged and sparingly hairy.

D. VESTITUS, Wall.

Tavoy.

If not identical with *D. turbinatus*, apparently differing by the calyx-lobes all short broadly deltoid (not 2 elongate).

D. SCABER, Ham.

Southern Tipperah.

D. ANGUSTIFOLIUS, W.A.

Chittagong.

D. costatus, Roxb. (non Gaertn.).

Yields wood oil abundantly (Voigt).

This genus yields resin, wood oil and timber. The oil (known as 'Garjun' oil in India) is nearly equal to Copaiba in the treatment of disease, for which it is a

cheap substitute. Dose. M x-xv thrice daily. Some utterly preposterous Custom rules did once (if they do not still) stand in the way of the importation of these oils into England. The timber of these trees is of varying excellence, some being poor, whilst others yield a fairly good wood for indoor work, but they are unsuited to bear exposure to the elements. Speaking of the 'Kanyin,' *D. laevis* and *grandiflora*, Dr. Mason says: "The common wood oil tree produces a very useful timber, which is sawn into boards at Tavoy and Mergui, and used in house building. Where not exposed to the wet, they answer as well as teak, and are sold at half the price; but they are not impervious to white ants. The best charcoal is made from this tree and the next. The Burmese distinguish two species, *ni* and *phyu*, or red and white. The most common species from which the torches are made is called red in the Tenasserim Provinces, and Martaban."

PARASPOREA, Kurz.

Calyx-tube very short, not enlarging. *Stamens* 12-15, the connective mucronulate. *Ovary* free, 3-celled. *Style* filiform. *Calyx-tube* in fruit not enlarged, the 5 lobes valvate, and almost equally wing-like. *Nut* 1-seeded, free and not in the least inclosed by the spreading calyx-lobes. *Lofty trees*, with shining leaves. *Flowers* small, whitish, racemose, in dense panicles. The generic character lies in the *astivation of the calyx and entirely exposed nut*.

P. STELLATA, Dyer. E.T. Tropical forests of Pegu Range and Martaban.
Koung-hmu (Kurz).

SHOREA, Roxburgh.

Calyx-tube very short. *Stamens* 35-100, the cells unequal, and often a little pilose at the tips, the connective terminating in a bristle or penicellate sharp point. *Ovary* free, 3-celled. *Fruiting calyx* not enlarged, the wing-like 5 lobes erect, very imbricate, and with their broad twisted bases closely embracing the nut. *Trees* with entire leaves. *Flowers* small, racemose, in panicles.

* *Inflorescence tomentose or velvety-pubescent.*

× *Leaves chartaceous, when full-grown glabrous or nearly so.*

S. OBTUSA, Wall. From Ava to Tenasserim.
Thit-yā.

Shorter calyx-lobes in fruit acuminate. *Stamens* 20-25.

The wood of the Thit-yā (or Thiyah) is strong and valuable, though coarse and somewhat hard to work. It precisely resembles its near ally the 'Sāl' of India (*S. robusta*, Roxb.), and weighs 67 lbs. to the cubic foot. Kurz (following Brandis) says 57; but this is far too low for a good specimen, and Balfour (Timber Trees, p. 247) says 75, which is far too high for a seasoned sample. The tree also furnishes a white resin.

S. ROBUSTA, Roxb. Ava.

Shorter calyx-lobes in fruit blunt. *Stamens* about 50.

S. HELPFI, Dyer. Tenasserim.

Incompletely known. Leaves apparently persistent.

×× *Leaves very coriaceous, appressed silvery beneath.*

** *Inflorescence quite glabrous.*

S. (HOPEA) FLOKIBUNDA, Wall. Tenasserim.

Calyx quite glabrous.

PENTACME, De Candolle.

Calyx imbricate, the tube very short. *Petals* inflexed from their middle and closely twisted round the sexual organs, forming a closed hemispherical corolla, perforated only at the top. *Stamens* 15. *Anthers* 1-celled, the cells almost equal,

saccate at base, tapering into subulate points, the connective also terminated by a rigid bristle. *Ovary* free. *Style* filiform. *Nut* inclosed in the imbricate bases of the calyx-lobes. Large trees, with entire leaves. *Fruit* as in *Shorea*.

P. SIAMENSIS, Miq.

Ava. Prome and Tenasserim.

Enjin. Enjin.

Kurz says this tree furnishes a red resin, and describes the wood as "dark brown," tough and durable, and weighing 55 lbs. This is an error, as the seasoned wood is a very pale brown, hard, strong, tough and durable, but not easy to work, and weighs 61 lbs. to the cubic foot. It is one of the best woods in the country, but not very plentiful—and one consequently which should be planted.

Dr. Mason, under the head of *Shorea robusta*, says, "The Burmese books say that Gaudama died in a grove of Engyen-trees, and the Pali name is *thāla* or *sāla*, the Sanscrit *sāl*, the name of the *Shorea robusta*. Much of the petrified wood found in the Irrawaddy, the natives say, belongs to this tree, and the Burmese books state that Gaudama was born under one of them, though others say he was born under the *Jonesia*." Dr. Mason, however, discriminated the points wherein the Burmese tree differs from the true *robusta*, as he adds: "The tree, though not very abundant, is found in both the Tenasserim Provinces and Pegu, but the inflorescence differs from Roxburgh's description of *Shorea robusta*." The Enjin is a sacred tree with Buddhists, and not used in consequence by Burmans, save perhaps in sacred buildings. Dr. Mason also mentions a tree which does not seem to have been identified by Kurz: "Lard Shorea. On the mountains in the interior is a species of shorea which produces an oil of the consistence of lard, and has been hence named by the Karens 'the hog's lard tree.'" Can this be a species of *Bassia*? I see no reason why the valuable *Bassia latifolia* should not flourish, if introduced, in Upper Pegu, and it is an experiment worth a trial, in localities where the *Phyllanthus emblica* (Shah-hpyu) flourishes, as it would prove a valuable addition to the food supply of the people.

HOREA, Roxburgh.

Calyx-tube very short, the lobes imbricate. *Stamens* 15. *Anther-valves* nearly equal, the connective terminating in a short point, or prolonged into a long bristle. *Ovary* free, 3-celled. *Calyx-tube* in fruit not enlarged, 2 of the 5 lobes wing-like, enlarged, the 3 outer ones remaining very short. *Nut* embraced by the calyx-lobes. Trees, with entire leaves and racemose flowers, forming axillary peduncles.

* *Connective terminated by a short point.*

H. ODORATA, Roxb. E.T.

Chittagong to Tenasserim.

Thyn-gān.

Calyx greyish-tomentose. Bluntish leaves acuminate.

Wood brown, "heavy," and close-grained, 64 lbs. to the cubic foot according to Balfour. Kurz (following Brandis?) gives 46 lbs., but this could hardly be called "heavy," and three specimens of Thyn-gān in my possession give respectively 48, 49, and 60 lbs.

** *Connective terminated by a bristle longer than the anther-cells.*

H. GRATISSIMA, Wall.

Tenasserim.

Calyx greyish-tomentose. Flowers somewhat larger.

H. OBLONGIFOLIA, Dyer.

Southern Tenasserim.

All parts glabrous. Calyx-lobes ovate, acute, glabrescent. Anthers orbicular, with an appendage 4 times their length.

H. GRIFFITHII, Kz.

Tenasserim.

Calyx almost glabrous. Flowers very small.

The 'Horeas' or Thyn-gāns all yield excellent timber, and the Burmese discriminate several species. I have specimens of Thyn-gān net shwē do 60 lbs., Thyn-gān net

(*H. odorata*) 49 lbs., Thyn-gān-wā 48 lbs., and Thyn-gān-hypn. They are tough, strong, and durable woods, but the unseasoned timber I have noticed to be liable to be "wormed" or attacked by Coleopterous insects, and the trees would therefore benefit by being water seasoned for a time. For canoes they stand first of any timbers in Burma.

VATICA, *Linnaeus*.

Calyx-tube very short, adnate to the torus, the lobes imbricate. *Stamens* 15, the connective produced in a sharp point, shorter than the unequal anther-cells. *Ovary* inserted with a broad base, free, 3-celled. *Style* linear. *Capsules* free, coriaceous, irregularly deliscent, or dehiscing from the apex by 6 valves, 1-seeded. Glabrous trees, with entire leaves. *Flowers* fragrant, racemose, in panicles.

V. LANCEIFOLIA, Bl.

Chittagong. Burma.

Younger parts mealy-puberulous, soon glabrescent. Capsule the size of a pigeon's egg supported by five, sub-equal, enlarged, calyx-lobes, shorter than the calyx.

V. TRIGYNA, Griff.

On top of Pator Hill near Mergui at 6000 feet.

Kurz says: "Griffith's description is a very complete and good one, but still I cannot guess the plant. The ovary-like style would indicate *Anisoptera*, but the ovary itself is stated to be superior and free."

Order TERNSTRÆMIACEÆ.

Flowers usually hermaphrodite. *Sepals* 5, rarely 4-7, free or slightly connate, imbricate. *Petals* 5, rarely more, free, or basally connate, imbricate or twisted. *Stamens* usually numerous, free, often adnate to the base of the petals. *Anthers* basifixed or versatile. *Fruit* a berry or capsule. *Albumen* none, or scanty, rarely copious. *Stipules* none.

TERNSTRÆMIACEÆ.

Anthers basifixed. *Fruit* indehiscent. *Seeds* usually few. *Albumen* fleshy, usually scanty. *Embryo* curved, the cotyledons shorter than the radicle and nearly as broad.

ANNESIA, *Wallich*.

Ovary half-immersed in the torus. *Fruit* inferior.

A. FRAGRANS, Wall. *E.T.*

The Eng forests of Prome, Martaban and Tenasserim up to 2000 feet.

Leaves rather coriaceous, bluntnish, the nerves distinct. Peduncles slender.

A. MONTICOLA, Kz. *E.T.*

Hill forests of Martaban from 5000 to 7000 feet; also the Khakyen Hills.

Leaves thick coriaceous, acute, nerves obsolete. Possibly a dwarf race of the last.

TERNSTREMA, *Linnaeus*.

Flowers hermaphrodite or diœcious. *Sepals* and *Petals* 5, the latter basally connate. *Stamens* many. *Anthers* glabrous. *Ovary* 2-3-celled, with 2 or rarely more pendulous ovules in each cell. *Style* simple or none. *Stigma* lobed or almost entire. *Seeds* few, arillate. *Flowers* usually 2-bracted at base, axillary. Evergreen trees, with entire or crenate-serrate leaves.

T. JAPONICA, Thbg.

Martaban and Tenasserim from 3000 to 7200 feet.

Cleyera gymnanthera, W. A.

Anthers apiculate. Calyx smooth. Berries $\frac{1}{2}$ inch thick.

T. PENANGIANA, Chois.

Tropical forests of Tenasserim, the Andamans, and Kamorta.

Erythrochiton Wallichianum, Griff.

Anthers blunt. Calyx wrinkled. Berry 1-1 $\frac{1}{2}$ inch thick.

SLADENIA, *Kwz.*

Sepals persistent, scarious, imbricate. *Petals* 5 (rarely 6), coriaceous. *Stamens* 10 or thereabouts. *Filaments* short, dilated. *Anthers* bifid at summit, emarginate at base, minutely hispid on the edges and at the base of back, the cells opening by an apical pore. *Ovary* 3-celled, with 2 pendulous ovules in each. *Flowers* small, in dichotomous cymes.

S. CELASTRIFOLIA, Kz.

Hills East of Blamo.

ADINANDRA, *Jack.*

Sepals and *Petals* 5 each, much imbricate, the latter basally connate. *Stamens* many, often 1-4-adelphous. *Anthers* pilose. *Ovary* 3-5-celled, containing numerous ovules in each cell. *Style* simple or shortly 3-5-cleft. *Berries* indurcescent, with many small seeds.

A. VILLOSA, Choisi. *E.T.*

Open forests in Pegu and Tenasserim.

Leaves glabrous above, pubescent below.

EURYA, *Thunbergh.*

Flowers dioecious. *Petals* united at base. *Anthers* glabrous. *Ovules* many. *Fruit* superior.

* *Leaves serrulate.*

× *Leaf-buds quite glabrous.*

E. JAPONICA, Thbg. *E.T.*

Martaban and Tenasserim, between

E. Wightiana, Wight, non Wall.

4000 and 7000 feet.

E. glabra, virens, and obovata, Bl.

Toung-let-let.

Branchlets marked by decurrent prominent lines.

× × *Leaf-buds pubescent or hirsute. Branchlets terete.*

E. ACUMINATA, DC. *E.T.*

Martaban between 6000 and 7200 feet.

Slender pine-like tree. Leaves puberulous beneath, acuminate. Styles united.

E. SERRATA, Bl. *E.T.*

Tropical forests of Martaban up to 2000 feet.

E. lucida, Wall.

Khakyen Hills. Rangoon.

Toung-let-let.

A bushy round-headed tree. Leaves membranous, glabrous, bluntly caudate. Styles free. Wood heavy, red-brown, brittle.

** *Leaves entire or serrulate at apex only.*

E. SYMPLICINA, *E.S.*

Martaban Hills at 7000 feet.

Young shoots appressed, pilose. Styles united.

SAURAUJIEÆ.

Anthers versatile. Fruits usually pulpy, rarely almost dehiscent. Seeds numerous, small. Albumen copious. Embryo straight, the radicle longer than the cotyledons.

SAURAUJA, *Willdenow.*

Flowers 5-merous, usually hermaphrodite. *Styles* 3-5.

* *Calyx densely setose or hispid. Ovary glabrous.*

S. ARMATA, Kz. *E.T.*

Khakyen Hills and ? Martaban (J.A.S.B.

S. cerea, Griff., apud Dyer.

ii, 1873, p. 59).

Flowers large, on short thick pedicels, clustered. Leaves spiny-serrate.

** *Calyx smooth. Ovary glabrous.*

S. PUNDUANA, Wall. *E.T.* Martaban Hills between 2000 and 3000 feet. Khakyen Hills.

Leaves pale or tawny mealy-puberulous beneath. Peduncles long and slender, scaly. Styles 5.

S. ROXBURGHII, Wall. *E.T.* Chittagong and Hills East of Toung-
Ternstroemia serrata, Roxb. ngoo, between 2000 and 6000 feet.

Adult leaves glabrous, except the puberulous midrib. Peduncles short, scaly puberulous. Stamens about 50. Flowers lazuli-blue.

S. TRISTYLA, DC. *S.* Tenasserim.
Ternstroemia bilocularis, Roxb.

As preceding, but leaves finely setose-serrate. Stamens about 20. Flowers said to be white. Included on the authority of Dyer. Specimens thus named in HBC. hardly differ from the preceding (Kurz).

S. MACROTRICHA, Kz. Khakyen Hills.

All parts except upper side of leaves covered with long tawny or brown spreading hairs. Peduncles short but slender, rusty-hirsute.

GORDONIE.E.

Anthers versatile. Fruit indehiscent or loculicidal. Albumen scanty or none, rarely copious. Embryo curved or straight, the cotyledons large, the radicle short.

× *Fruit a dehiscent capsule.*

SCHEMA, Rwdt.

Sepals 5, somewhat unequal. Petals 5, much imbricate. Stamens numerous, adnate to the petal base. Capsule woody, usually round, opening loculicidally in 4-6 valves, leaving a free central axis. Seeds flat, winged. Radicle inflexed, inferior. Albumen thin. Trees or shrubs, with entire or crenate leaves, and showy white flowers.

× *Peduncles usually very short and stout, usually not longer than the petioles.*

S. WALLICHI, DC. *T.* Chittagong. Khakyen Hills.
Gordonia integrifolia, Roxb.

Peduncles short and straight (rarely long in Wall. Cat. 1455 fr. Nepal), usually lenticellate, rather strong, the nerves beneath prominent, the reticulation distinct. Leaves glabrous or slightly pubescent beneath. Wood compact, brown (Kurz).

S. MOLLIS, Dyer. *T.* Ava Hills.

Peduncles 1 inch long, lenticellate. Leaves pubescent beneath. The nerves and net-venation prominent and distinct. A pubescent variety perhaps of the last (Kurz).

S. MONTICOLA, Kz. Nāt-toung, Martaban over 6000 feet.

Peduncles thick, lenticellate. Leaves very coriaceous, glossy above, crenate, on both sides green, the net-venation indistinct, immersed.

Perhaps a stunted variety of *S. Noronha*, the leaves like those of *Pygeum lucidum* (Kurz).

S. NORONHE, Rwdt. *E.T.* Martaban and Tenasserim between
Gordonia integrifolia, Roxb. 1500 and 4000 feet.
G. floribunda, Wall.

Pān-mā.

Peduncles short and straight, smooth. Flowers larger than in *S. crenata*. Leaves glaucescent beneath, often entire, the lateral nerves prominent, the net-venation obsolete. Wood light brown.

×× *Peduncles elongate, and often slender, much longer than the petioles, smooth.*

S. CRENATA, Korth. *E.T.* Pegu. Tenasserim.
S. oblata, Roxb.

Peduncles slender, usually more or less curved. Leaves glaucous beneath, usually crenate-serrate, the nerves and net-venation beneath distinct.

Wood brown, easy to plane and work, 42 lbs. to the cubic foot (Theobald).

S. BANCANA, Miq. Martaban and Tenasserim up to 3000 feet.

Peduncles strong, but still slender, 1-1½ inch long. Leaves very coriaceous, on both sides impressed-reticulate and almost rugulose, entire or crenate, the lateral nerves entirely or nearly impressed. Capsules smaller.

CAMELLIA, *Linnaeus.*

Sepals very unequal. Outer stamens monadelphous. *Seeds* few, large, not winged. *Radicle* superior.

* *Stamens free, twice as many as the petals.*

C. CAUDATA, Wall. Along streams in the Martaban Hills at about 3500 feet.

Young parts and midrib of the membranous leaves pilose. Flowers nodding on a line-long scaly peduncle. Filaments villous.

* C. CHINENSIS, L. Cultivated.
C. thea, Lk.

All parts glabrous. Leaves coriaceous. Peduncles not scaly. Filaments glabrous.

C. DRUPIFERA, Lour. Tenasserim.
C. kissi, Wall.
C. simplicifolia, Griff.

Glabrous. Leaves coriaceous. Flowers almost sessile, erect. Filaments glabrous.

×× *Fruit an indehiscent drupe.*

PYRENARIA, *Blume.*

Sepals unequal. *Seeds* large. *Cotyledons* folded or convolute. *Radicle* inferior.

× *Bracts large, leafy, dissimilar to the sepals.*

P. DIOSPYRICARPA, Kz. *E.T.* Martaban Hills over 6000 feet.

Dry leaves yellowish, pubescent beneath.

** *Bracts small, similar to but shorter than the sepals.*

P. CAMELLEFLOKA, Kz. *E.T.* Hill forests of Martaban between 3000 and 5000 feet.

Dry leaves yellowish, glabrous. Petioles hardly 2 lines long, puberulous or glabrous. Fruits obovate, waxy yellow.

P. SERRATA, Bl. *E.T.* Tenasserim.
P. attenuata, Seem.

Leaves glabrous, in a dried state liver-coloured. Petioles glabrous, 6-8 lines long. Fruits globular or elliptical, green.

Order GUTTIFERÆ.

Flowers regular, dioecious, polygamous, or hermaphrodite. *Sepals* 2-6, imbricate. *Petals* as many, rarely more, imbricate, or almost twisted. *Male flowers*: *Stamens* usually indefinite, hypogynous. *Filaments* free, or united into bundles. *Anthers* various. *Female flowers*: *Staminodes* various. *Ovary* 1-2 or more celled, with one or more ovules in each cell. *Stigmas* as many as ovary-cells, or variously consolidated, sessile,

or on a longer or shorter style. *Fruit* usually an indehiscient berry, with a fleshy or pulpy mesocarp. *Seeds* large. *Albumen* none.

Trees or shrubs, often abounding in a yellow juice, with opposite, simple, often coriaceous leaves. *Stipules* none.

GARCINIEÆ.

Stigma sessile, or on a very short and thick style, peltate or radiately lobed. Seeds often arillate.

GARCINIA, *Linnaeus*.

Flowers dioecious or polygamous. *Sepals* 4, decussate or rarely 5-6, imbricate. *Petals* 4-5, imbricate. *Males*: *Stamens* numerous, free, or united in an entire or lobed fleshy mass, or 4-adelphous round a style-rudiment. *Anthers* 2, or rarely 4-celled. *Females* and *Hermaphrodites*: *Staminodes* various, free or connate. *Ovary* 2- or more celled, with a solitary ovule in each cell. *Stigma* sessile, or on a short style, entire, lobed or radiating. *Fruit* a 2- or several-celled berry, with a coriaceous rind. *Seeds* imbedded in the arillus-like pulp.

△ *Flowers 4-merous.*

× *Anthers oblong or ovate, opening by longitudinal slits or pores.*

* *Stamens of male flowers in 4 bundles under the rudimentary ovary. Berries 4- to 10-celled, the stigma radiating-lobed, smooth or nearly so.*

* *G. MANGOSTANA, L. E.T.*

Cultivated only in Tenasserim.

Men-gwöt. The Mangosteen.

Female flowers with staminodes round the ovary. Berries on a short peduncle. *Stigma* radiately-lobed and adnate.

G. CORNEA, L. E.T.

Tropical forests of the Southern Pegu Range, and Tenasserim. Kamorta. Nankowry.

Female flowers without staminodes. Berries sessile. *Stigma* large, peltate, slightly lobed, sessile.

G. SPECIOSA, Wall. E.T.

Tropical forests of Tenasserim and the Andamans. Katchall. Nankowry.

Flowers on rather long pedicels, nearly 2 inches in diameter. *Stigma* in male flowers large, peltate, entire.

** *Stamens in 4 polyandrous bundles in a ring round the rudimentary ovary. Stigma peltate, discoid, rough from wrinkles or radiating veins. Ovary 2-celled.*

G. ANOMALA, Pl. and Trian. E.T.

Forests of Martaban and Toung-ngoo, from 4000 to 6000.

Peduncle rather long, bearing 2 or rarely 1 leafy bracts.

G. MERGUIENSIS, Wight. E.T.

Tenasserim.

Leaves long acuminate, the lateral nerves remote, and irregular. *Staminal* mass deeply 4-lobed.

G. ROSTRATA, Bth. and H. f. E.T.

Southern Tenasserim.

Leaves blunt caudate, the lateral nerves crowded, very faint and regularly parallel. Peduncles naked. Flowers in branchiate poor cymes or small panicles.

× × *Anthers almost sessile on a column or 4-sided fleshy mass, seldom dividing into 4 somewhat distinct lobes. Stamens in female flowers in a single complete or interrupted ring. Stigmas tubercled or tubercled-wrinkled. Ovary 4-12-celled.*

° *Stigma in fruit raised on a short thick style.*

G. COWA, Roxb. E.T.

Chittagong.

G. Roxburghii, Wight.

Berry convex at top, the style not on a separate nipple.

G. KYDIA, Roxb. *E.T.* Tropical forests from Chittagong to
 Toung-tha-leh (Kurz). Tenasserim and the Andamans.
 Berry terminated by a nipple-shaped protuberance. Anthers 4-celled.

°° *Stigma in fruit quite sessile.*

† *Male and female flowers solitary to ternary.*

G. MICROSTIGMA, Kz. *S.* Tropical forests of South Andaman.
 Stigma minute, dot-like, smooth. Anthers 2-celled.

°°° *Stigma tubercled.*

G. LANCEFOLIA, Roxb. *E.T.* Chittagong Hills.

Leaves acuminate or cuspidate, leathery. Flowers sessile. Anthers 4-celled.

G. SUCCIFOLIA, Kz. *E.T.* Swampy forests near the Tsittoung and
G. loniceroides, T. And. Irrawaddy Rivers.

Leaves blunt, succulent. Flowers pedicelled. Anthers 2-celled.

G. PANICULATA, Roxb. *T.* Chittagong.

Male flowers panicle, the females in terminal spikes.

× × × *Anthers peltate, opening by a circular slit.*

G. ELLIPTICA, Wall. *E.T.* Tropical forests of Pegu, Martaban
G. heterandra, Wall. and Tenasserim up to 3000 feet.

Tha-nāt-tor.

Leaves large, coriaceous. Female flowers almost sessile, the stigma small,
 verrucose.

△△ *Flowers 5-merous.*

G. (XANTHOCHYMUS) PICTORIUS, Roxb. Tropical forests from Ava and Chit-
G. Roxburghii, Kz. tagong to Tenasserim.

Mator or Mador.

Pedicels about an inch long. Petals expanded.

G. (XANTHOCHYMUS) DULCIS, Roxb. *E.T.* Tropical forests of the Andamans.

Pedicels 3-4 lines long. Petals almost closed, half the size.

Kurz adds from the Nicobars:

G. (XANTHOCHYMUS) JELINEKII, Kz. Tillan-choung.

This Order is remarkable as producing one of the finest fruits of the tropics, the Mangosteen, though the tree will only thrive in the extreme South of Tenasserim, being indigenous to the warm and moist climate of the Malayan Peninsula. The thick and somewhat fleshy case which protects the ball of snowy delicate pulp within is very astringent, and exudes yellow globules of a gamboge. All the trees, indeed, of this genus furnish a yellow gum, but it is only one or two species which yield a gum easily soluble in water. The best gamboge is produced by *G. elliptica*, but an inferior article is produced by *G. cornea*, *G. anomala*, *G. cova*, *G. Kydia*, *G. succifolia*, *G. xanthochymus* and *G. (Hebrodendron) morella*. *Garcinia Cambogia*, Des. non Roxb., yields a pleasant fruit and a gamboge quite insoluble in water, and it is the complete solubility of the best gamboge that distinguishes it from inferior sorts, but it is probable that, when fully investigated, these insoluble gamboges will be found of service in the arts. In small doses Gamboge is a powerful hydragogue cathartic, especially valuable in dropsical affections, and it constitutes the active ingredient of Morrison's Pills.¹

¹ It was an overdose of some quack pills Mr. Edmund Jones took that cost him his life, and deprived Raugon of one of the most enterprising leaders of her mercantile community.

Several species of *Garcinia* yield edible fruits, and the seeds of *G. purpurea* (and possibly some other species) yield a vegetable butter, called in India "Kokum butter." To obtain this the seeds are dried, pounded, and then boiled in water; the oil concreting on the surface when the water cools. The oil is bland and alimentary, and well adapted for forming ointments in a country where animal fats are objected to. The timber of the *Garcinias* is inferior, but Kurz says that *G. speciosa* yields a good and durable wood.

OCHROCARPUS, *Thouars.*

Calyx closed in bud, bursting into two valves.

O. (CALYSACCION) SIAMENSIS. *E.T.* Prome Hills. Rare in Martaban.
Tar-hpi.

CALOPHYLLIÆ.

Style elongate, the stigma peltate or 4-cleft. *Seeds* without arillus.

CALOPHYLLUM, *Linnaeus.*

Flowers polygamous. *Sepals* and *petals* together 4-12, imbricate, in 2 or 3 series. *Stamens* numerous, free or nearly so. *Anthers* 2-celled. *Ovary* 1-celled, with a single erect ovule. *Style* rather long. *Stigma* peltate. *Drupe* indehiscient, crustaceous, 1-seeded. Trees with coriaceous parallel-veined leaves. *Flowers* white, fragrant, in cymes or panicles.

* *Sepals* 4, often the 2 inner ones or all, petal-like. *Petals* none.

C. SPECTABILE, Willd. *E.T.* Tropical forests of Tenasserim and the
C. tetrapetalum, Roxb. Andamans.

Pan-ta-kha or gā.

Flowers about 8 lines in diameter, in peduncled or almost sessile umbel-like cymes.

C. AMENUM, Wall. *E.T.* Tenasserim.

Flowers small, racemes short and strong, flowers few.

** *Sepals* 4. *Petals* 4 to 8.

C. POLYANTHUM, Wall. *E.T.* Martaban Hills East of Toung-ngoo
Leaves at both ends acuminate. at 3000 to 4000 feet.

C. INOPHYLLUM, L. *E.T.* Within the tideway, Pegu, Tenasserim, Andamans
C. bitangor, Roxb. and Nicobars. Is often washed by the sea.

'Pōng-nyet.'

Leaves rounded or retuse at the apex.

Kurz is decidedly wrong in describing this wood as heavy (63 lbs.). Brandis gives 39 lbs., and my highest weight for the *seasoned* wood is 42 lbs. In the opinion of Drs. Gilson and Cleghorn, the valuable 'poon' spars are produced by *C. angustifolium*, or some allied species. Kurz (in his Sketch of the Nicobar Vegetation, J.A.S.B. 1876, Part ii. p. 119) says: "Mr. Jelinek remarks that the Nicobarese build their canoes of this tree," and adds in a note, "I doubt this, for the Nicobarese cut the trees for their canoes far in the interior, while *C. inophyllum* is a shore tree. The timber of their boats more resembles that of *Artocarpus*." Now there is in Burma a fine lofty tree growing on the hills, and to judge by its wood an *Inophyllum*, in good request for canoes, for which its light tough wood well fits it. The Burmese name is 'Tar-hpi' or 'Ta-ra-phi,' and the tree that I so understand averages under 40 lbs. to the cubic foot. The name, however, probably applies to other species, as Brandis gives its weight as 57 lbs. The wood of both 'Pōng-nyet' and 'Tar-hpi' is identical in appearance, but the former is a tree of squat stunted growth, whereas the 'Tar-hpi' runs up into magnificent trees with straight stems, fitted to yield the largest spars or canoes, and its wood is moreover the lighter of the two. *C. angustifolium*, Roxb., is

not included by Kurz in his list, whence I presume that species does not occur in Tenasserim.

Another enormous tree (*Artocarpus mollis*, Wall.) is also a favourite one for canoes, and this may be the species to which Kurz alludes; but that a lofty *Inophyllum* is also used, as Jelinek asserts, I quite believe, though he may have mistaken the species.

C. WALLICHIANUM, Planch. et Trian. Tropical forests of Kamorta.

KAYEA, *Wallich*.

Ovary 1-celled, with 1 ovules. *Style* single, with a 4-cleft stigma.

K. (MESUA) NERVOSA, Planch. et Trian. *E.T.* Tenasserim.

Flowers 1-3 in the leaf-axils, and terminal.

K. FLORIBUNDA, Wall. *E.T.* Tropical forests in hills East of Young-ngoo at 2500 feet.

Flowers in terminal panicles.

MESUA, *Linnaeus*.

Flowers polygamous or hermaphrodite. *Sepals* and *petals* each 4, imbricate. *Stamens* numerous, free or connate at base. *Anthers* oblong, 2-celled, dehiscing vertically. *Ovary* 2 celled, with two erect ovules in each cell. *Style* long, with a peltate stigma. *Drupe* woody, 1 celled, 1-4-seeded. Trees with rigid coriaceous almost veinless leaves. *Flowers* large.

M. FERREA, L. *E.T.* Tropical forests from Chittagong to

M. speciosa, Choisy. Tenasserim and the Andamans.

M. pedunculata, Wight.

Gān-gor. Ceylon iron-wood. Poached-egg tree.

A handsome ornamental tree, with fragrant flowers, one of the five flowers described as tipping the Hindu Cupid's darts. It is one of the hardest, most imperishable and valuable woods, averaging over 70 lbs. to the square foot. It is red when fresh, but seasons to a reddish-brown, and is hard and tough, but cross-grained and difficult to plane and dress. It is said to grow wild in Tenasserim. A specimen before me of 'Young-gāngor,' from Tavoy, would seem, however, to belong to some other species, though Kurz only gives one species (uniting *ferrea* and *pedunculata*). It weighs 77 lbs. to the cubic foot, is a pale yellowish-brown, rather straight in the grain, very hard, and takes a beautiful polish. It is probably not *M. ferrea*, but some other species of *Mesua*, and a most valuable timber.

Order HYPERICINÆÆ.

Flowers regular, hermaphrodite. *Stamens* 5, imbricate. *Petals* 5, hypogynous, imbricate, often twisted. *Stamens* indefinite, hypogynous, free, or united into 3-5 (rarely 1) bundles. *Anthers* 2-celled, longitudinally dehiscing. *Ovary* 3-5-celled or rarely spuriously 1-celled. *Styles* free. *Stigmas* usually club-shaped or capitate. *Fruit* a septicial or loculicial capsule or an indehiscent berry. *Albumen* none. Herbs, shrubs (rarely trees), with opposite simple leaves. *Stipules* none.

HYPERICINÆÆ.

Capsules dehiscing septicially. *Seeds* not winged.

HYPERICUM, *Linnaeus*.

Flowers 5-merous.

* *Shrubs* with large flowers. *Ovary* 5-celled. *Capsule* 5-valved.

H. LESCHENAPLTH, Choisy. Nāt-toung, over 7000 feet.

H. triflorum, Bl.

H. oblongifolium, Hooker.

H. Hookerianum, W.A.

* * Herbs with small flowers. Ovary 3-celled. Capsules 3-valved.

H. ELODEOIDES, Chois.

Khakyen Hills.

Stems terete. Sepals glandular-ciliate.

* * * Herbs. Ovary 1-celled. Flowers small.

H. JAPONICUM, Thbg.

Khakyen Hills. Yunzaleen at 2500 feet, and Tenasserim.

Stems 4-angular. Sepals entire.

* H. (NORYSCA) CHINENSE, Voigt (M.).

CRATOXYLLIÆ.

Capsules dehiscing loculicidally or sometimes both and septically. Seeds winged.

CRATOXYLON, Blume.

Sepals and petals 5. Stamens triadelphous, the staminal bundles often alternating with as many hypogynous glands. Ovary 3-celled, with 4 or more ovules in each cell. Capsule 3-valved, opening loculicidally. Seeds winged at upper end.

Trees or shrubs with simple dotted leaves. Flowers in axillary cymes or terminal panicles, rarely solitary.

Sub-genus TRIDESMIS, Spach.

Petals furnished at base with a scale.

C. (TRIDESMIS) FORMOSUM, Korth. T.

Tropical forests of South Andaman.

All parts glabrous, petals white, entire.

C. PRUNIFLORA, Wall. T.

Ava. Martaban. Tenasserim.

C. prunifolium (Calami lapsu, monente auctore).

Pedicels, sepals, and beneath leaves pubescent. Petals lilac-fringed. Wood heavy, but perishable, soon "wormed" (Kurz).

Sub-genus ANCISTROLOBUS, Spach.

Petals without a basal scale.

* Flowers in axillary poor cymes or solitary.

C. POLYANTHUM, Korth. T.

Tenasserim. Andamans.

Leaves thin chartaceous, acute or blunt. Hypogynous glands present or absent. Wood heavy, brown, fibrous, close-grained (Kurz).

× × Flowers in terminal panicles.

C. NERIIFOLIUM, Kz. T.

Mixed forests from Chittagong to Tenasserim.

Bai-byā.

Leaves linear-oblong, usually almost sagittate-produced at base, chartaceous.

Wood heavy, brown, softish.

C. ARBORESCENS, Bl. E.S.

Tenasserim.

Leaves more or less obovate-oblong, coriaceous.

Dr. Mason adds:

*BRATHYS JAPONIA, Wight.

Order ELATINEÆ.

Sepals 2-5. Petals 2-5, hypogynous, imbricate. Stamens as many as or double the number of the petals, hypogynous. Ovary 3-5-celled. Ovules anatropous.

BERGIEÆ.

Ovary-cells with several ovules. Albumen none. Perianth complete. Fruit a capsule.

BERGIA, *Linnaeus*.

Sepals acute. *Flowers* 5-merous. *Capsule* sub-crustaceous, septicidal or septifragal.

B. VERTICILLATA, Willd. Ava. Pegu.

B. *aquatica*, Roxb.

Glabrous. *Flowers* white, sessile.

B. AMMANIOIDES, Roxb. Pegu and Tenasserim, common in rice fields.

Pubescent or hirsute. *Flowers* rose-coloured, shortly pedicelled.

CARYOPHYLLALES.

Flowers regular. *Sepals* 2 to 5, rarely 6. *Petals* usually as many. *Stamens* as many or twice as many, rarely more, or fewer. *Ovary* 1-celled, or imperfectly 2- to 5-celled. *Placenta* central, free, rarely parietal. *Embryo* usually curved and in a floury albumen.¹

Order PORTULACEÆ.

Flowers hermaphrodite. *Corolla* none, or petals sometimes coherent at the base, very fugacious. *Stamens* hypogynous or perigynous, equal, and alternate with the calyx-lobes, or double, triple or multiple in number. *Ovary* usually free, rarely inferior, 1-8-celled. *Fruit* indehiscent, or a pyxidium, or a loculicidal capsule. *Embryo* peripheric, arched or annular, surrounding a floury albumen.

SESUVIÆ.

Ovary half-inferior, with the petals and stamens perigynous.

P. OLERACEA, L. All Burma, on cultivated lands and waste

Mya-byit. Common Purslane. places. Kamorta and Katchall.

Fruits glabrous. *Flowers* clustered by 3-5.

P. QUADRIFIDA, L. Ava, and Pegu in waste places.

P. *meridiana*, L.

Joints pilose. *Flowers* solitary.

CALANDRINIÆ.

* PORTULACARIA AFRA, Jacq.

TALINUM, *Adanson*.

Ovary free. *Sepals* usually deciduous. *Seeds* caruncled.

T. CUNEIFOLIUM, Willd. On Pagodas at Pagan-myo.

Order TAMARISCINEÆ.

Flowers regular, usually hermaphrodite. *Sepals* 5, free, imbricate. *Petals* as many, free, or slightly connate at base. *Stamens* 4-10, free, inserted in a small annular hypogynous disk or united at base. *Anthers* 2-celled, longitudinally dehiscent. *Seeds* with a sessile or stalked tuft of hairs. *Albumen* none. Shrubs or trees with minute scale-like leaves and small flowers.

TAMARIX, *Linnaeus*.

T. DIODEA, Roxb. Ava.

Leaves appressed to the terete almost simple branchlets and branches. *Flowers* sessile, rose-coloured, in dense short spikes.

T. GALLICA, L. Tidal savannahs of Pegu.

T. *Indica*, Willd.

¹ Exception: *Petals* connate in some *Portulacæ* and *Tamariscineæ*.

Leaves somewhat spreading on the very short thin and branched branchlets. Flowers pedicelled, white, in loose slender terminal or variously lateral racemes.

The wood of the *Tamarix* makes good fuel, and *Tamarix* galls are highly astringent, and consequently used both in dyeing and medicine.

Order CARYOPHYLLEÆ.

Sepals free or united. *Petals* 4-5, hypogynous or sub-perigynous, sometimes none. *Stamens* usually twice as many as petals. Annual or perennial herbs with opposite leaves.

SILENIEÆ.

Calyx gamosepalous, 4- to 5-lobed. *Petals* and *stamens* hypogynous, often raised on a stalk-like torus. *Styles* distinct from the base. *Stipules* none.

GYPSOPHILA, *Linnaeus*.

Calyx turbinate-tubular or bell-shaped, broadly and almost wingedly 5-nerved. Capsule deeply 4-valved. *Styles* usually 2.

* G. (SAPONARIA) VACCARIA, L. South Andaman (introduced).
Saponaria perfoliata, Roxb.

ALSINIEÆ.

Sepals free. *Stamens* inserted on an annular disk, rarely perigynous. *Styles* free.

BRACHYSTEMMA, *Don*.

Petals entire. *Capsules* depressed, 1-seeded. *Styles* 2. *Stipules* none.

B. CALYGINUM, Don. Kluayen Hills.

POLYCARPIEÆ.

Sepals free. *Stamens* inserted on an annular disk. *Styles* united. *Stipules* scarious.

DRYMARIA, *Willdenow*.

Petals lobed. *Sepals* not keeled. *Style* very short.

D. CORDATA, Willd. Bhamo, Martaban at 2000 to 2500 feet.
Cerastium cordifolium, Roxb.

POLYCARPON, *Linnaeus*.

Sepals keeled. *Petals* entire. *Style* short.

P. (PHARNACEUM) DEPRESSUM, L. Chittagong. Arakan. Pegu. Tenasserim.
P. Laflingia, Bth. and H. f.
Laflingia Indica, Retz.

POLYCARPÆA, *Loureiro*.

Sepals not keeled, scarious. *Petals* entire or notched. *Style* elongate.

P. CORYMBOSA, Lank. Ava, on limestone at Segain and
P. marginata, Prsl. Paghā-myō. Prome. Maulmain.

POLYGALALES.

Sepals and *Petals* 5 each, rarely 4 or 3. *Stamens* as many, or twice as many as the petals. *Ovary* 2-celled, rarely 1- or more-celled. *Albumen* fleshy, rarely none. *Leaves* exstipulate. Herbs or shrubs.

Order POLYGALÆÆ.

Flowers irregular, hermaphrodite. *Sepals* 5, unequal, the 2 inner ones often petal-like, imbricate. *Petals* 5 or 3, distinct, unequal, the lower ones usually keel-shaped. *Stamens* 8 (rarely 4 or 5), hypogynous. *Filaments* usually united into a

sheath. *Anthems* opening by terminal pores or rarely by slits. *Ovary* free, 1-3-celled, with one or more anatropous ovules in each cell. *Fruit* usually a 2-celled capsule, rarely 1-celled and indehiscent. *Flowers* 3-bracted, in racemes, panicles or spikes.

POLYGALLEÆ.

Seeds albuminous. *Petals* more or less united into a gamo-petalous corolla.

POLYGALA, *Linnaeus*.

Stamens 8, united. The two inner sepals wing-like.

Sub-genus BLEPHARIDIUM.

The 2 inner sepals (wings) persistent, petaloid or herbaceous.

* *Wings* herbaceous or green, sepal-like, with a narrow hyaline margin or not, acute.

† *Herbs* or perennials, rarely parasites.

P. GLOMERATA, LOEF. Common in Toung-yas in Martaban up to 4000 feet.

Erect, stout, 1 to 2 feet high. Bracts fallen before flowering. Flowers small, white with purple tips. Capsule ciliate.

P. TELEPHIOIDES, Willd. Rare in the Eng forests of the Western Slopes of the Pegu Range and Kamorta.

Small, a few inches high. Flowers and bracts as in preceding. Capsule glabrous, not ciliate. Flowers whitish, but the keel and crest of a beautiful lazuli blue.

P. CHINENSIS, L. Pegu.

P. arvensis, Willd.

Small. Flowers yellow or orange-yellow, with dull orange tips. Bracts persistent during flowering.

** *Wings* petal-like and coloured, blunt and often mucronate.

† *Stems* terete.

P. ERIOPTERA, DC. Ava and Prome Hills.

Wings about a line long, puberulous. Capsules oblong, puberulous, not margined.

P. CROTALAROIDES, Ham. Dry forests in Prome.

Wings 3 lines long, puberulous. Capsules orbicular, with narrow ciliate margin.

† *Stems* sharply angular.

P. LEFTALFA, DC. Open forests of Ava, Prome, Pegu, and Kamorta.

Erect, glabrous. Leaves linear. Flowers small, in terminal and lateral racemes.

Sub-genus SEMEIOCARDIUM, Zoll.

Calyx deciduous. *Keel* not crested. *Seeds* albuminous. *Flowers* small.

P. GLAUDESCENS, Wall. Ava. Prome. Tenasserim.

P. furcata, Royle.

Capsules not nerved, almost rotundate, not winged.

P. CARDIOPHYLLA, Kz. Tenasserim.

Capsules strongly nerved, oblong, the membranous borders produced wing-like at the summit.

Sub-genus CHAMIBRYXUS, Tournef.

Calyx deciduous. *Keel* crested. *Albumen* none. *Flowers* rather large. Shrubs.

P. KARENSEUM, Kz. Martaban Hills, 1000 to 6000 feet.

Flowers pale-lilac. Keel-crest 2-lobed, the lobes many cleft. Capsules membranous. Strophiole minute.

P. ARILLATA, Ham.

Ava.

Flowers yellow. Keel-crest 2-lobed, the lobes many-cleft. Capsule coriaceous. Strophiole very large.

SALOMONIA, *Loureiro*.

Stamens 4 or 5. *Sepals* almost equal, petal-like. *Stems* leafy. Not parasitic.

× *Scandent shrubs*.° *Leaves on short petioles, cordate or ovate*.

S. CANTONIENSIS, Lour.

Pegu. Tenasserim.

Glabrous. Leaves acute. Capsules crested.

S. LONGICILIATA, Kz.

Pegu Range, between Pansuay and Myodwin.

Blunt leaves and stems along the wings fringed. Capsules crested.

°° *Leaves sessile*.

S. OBLONGIFOLIA, DC.

Tenasserim.

S. obovata, Wight.*S. angulata*, Griff.

Glabrous or nearly so, leaves oblong to oblong-lanceolate.

Sub-genus EPIRHIZANTHES, Bl. Parasitic, leafless or scaly.

S. (EPIRHIZANTHES) CYLINDRICA, Bl.

Tenasserim, on bamboo-trunks between

S. aphylla, Griff.

decayed wood.

S. parasitica, Griff.SECURIDACA, *Linnaeus*.

Stamens 8, united. *Fruit* a 1-celled indehiscient samara.

S. INAPPENDICULATA, Hassk.

Chittagong. Arakan. Tenasserim.

S. Tavoyana, Wall.*S. scandens*, Ham.*S. paniculata*, Roxb.

XANTHOPHYLLIEE.

Petals and stamens free. *Fruit* globular, indehiscient. *Albumen* none.

XANTHOPHYLLUM, *Roxburgh*.

Sepals sometimes unequal. *Petals* 5, free, declinate, the keel-petal boat-shaped. *Stamens* 8, free, or partially adnate to the petals. *Disk* hypogynous, annular. *Ovary* 1-celled, or imperfectly 2-celled, with 2 or more ovules variously attached. *Style* elongate. *Fruit* globular, with a thick rind, often 1-seeded. *Albumen* none. Trees or shrubs, with alternate simple leaves. *Flowers* in racemes or panicles.

* *Ovary sessile (i.e. the stalk not exerted from the annular disk)*.° *Panicle remotely supra-axillary (and terminal)*.X. VIRENS, Roxb. *E.T.*

Tropical forests of Chittagong and Pegu Range.

Leaves glaucous and rather opaque beneath. Panicles diffuse, glabrous. Calyx and slender pedicels glabrous. Ovary minutely pubescent, the stigma broadly 2-lobed.

°° *Panicles or racemes truly axillary (and terminal)*.× *Ovary and style villous. (Leaves glaucescent beneath.)*

X. EGLANDULOSUM, Griff.

Tenasserim.

X. Griffithii, H. f. and Th.

Panicles tawny puberulous. Pedicels thick, 1½-2 lines long, puberulous.

X. GLAUCUM, Wall. *E.T.* Swampy forests of Pegu, Martaban,
Thyt-hpyu. and Tenasserim.

Racemes slender, in lax tomentose panicles. Pedicels slender.

× × *Ovary glabrous, the style slender pubescent.*

II. FLAVESCENS, Roxb. *E.T.* Swampy forests of Chittagong and Tenasserim.
Thyt-hpyu (Kurz).

Panicle diffuse, greyish velvety. Fruit glabrous. Leaves glossy, drying yellowish like *Symplocos*. *X. flavescens*, as revised in *Hf. Ind. Fl.*, is a mixture of species, but it is impossible to clear up the synonymy so long as the numbers of distributed collections are not given. *X. angustifolium*, Wight, *Ill.* 50, t. 23, with simple or almost simple sub-axillary racemes and a villous stalked ovary, is certainly not identical with Roxburgh's plant; besides, it is a small tree or rather shrub, while the latter is a timber-tree (Kurz).

* * *Ovary shortly stalked.*

X. AFFINE, Benn. *E.T.* Tenasserim.

Leaves rather large. Racemes simple or in short robust axillary panicles, greyish velvety. Ovary glabrous, with a very thick villous style.

Order PITTOSPOREÆ.

Flowers usually hermaphrodite. *Sepals* 5, imbricate. *Petals* 5, hypogynous, imbricate. *Torus* small. *Stamens* 5, opposite the sepals. *Anthers* versatile. *Ovary* 1-celled, with 2-5 parietal placentas, or 2-5-celled by the projection of the placentas, with many parietal or axile anatropous ovules. *Style* simple. *Fruit* capsular or indehiscent, usually many-seeded. *Albumen* copious. *Stipules* none. *Flowers* terminal, or axillary. Trees or shrubs, with alternate or almost whorled simple leaves.

PITTOSPORUM, Banks.

Capsule woody, 1-celled, 2- or rarely 3-valved. *Seeds* arillate, or imbedded in pulp.

P. FERRUGINEUM, Ait. *T.* Tenasserim. Kamorta.

PARIETALES.

Stamens many or definite. *Carpels* connate into a 1-celled ovary, with parietal placentas, rarely spuriously 2- or more-celled by the prolongation of the placentas.¹

* *Embryo large, in fleshy albumen.*

Order BIXINEÆ.

Flowers regular, hermaphrodite or unisexual. *Sepals* 4-5, rarely 2-6, imbricate, free and connate, and bursting irregularly, often deciduous. *Petals* 4-5, or wanting, imbricate, or twisted in the bud, deciduous. *Stamens* usually hypogynous. *Anthers* 2-celled, discharging by pores or slits. *Ovary* 1- rarely several-celled, with parietal amphitropous or anatropous ovules. *Fruit* dry or fleshy, indehiscent, or opening by valves bearing the seeds in the middle. *Seeds* usually few, sometimes with an arillus, or the testa pulpy. *Albumen* copious, fleshy. Trees or shrubs, with alternate, usually simple, sometimes palmatifolob leaves.

BIXIEÆ.

Petals broad, twisted in bud, without a scale or basal appendage. *Anthers* opening by pores or short slits.

¹ Exceptions: *Carpels* free in a few *Papaveraceæ* and *Rosaceæ*. *Ovary* regularly 3- or more-celled in some *Sarraceniaceæ*, *Papaveraceæ*, *Cypripediaceæ*, and *Bixiaceæ*.

COCHLOSPERMUM, *Kuntz.*

Capsule 3-valved. *Seeds* cochleate, pilose or woolly. *Leaves* palmately-lobed.

C. (BOMBAX) GOSSYPIUM, L. *T.* Deciduous forests of Prome.

Wood worthless. Tree yields a clear white gum.

BIXA, *Linnaeus.*

Capsule 2-valved. *Seeds* straight, glabrous, with a pulpy testa. *Leaves* simple.

* B. ORELLANA, L. *E.T.* Cultivated all over Burma. Like
Thi-dyn. wild in Katchall and Kamorta.

Sapwood red, heartwood pale-coloured. The orange-red pulpy testa of the seeds furnish the *arnotto* dye or 'terra orellana.' The seeds are steeped in water and well stirred at intervals till the coloured paste enveloping them is dissolved. The thick fluid which results is then strained and boiled, during which process the colouring matter rises to the top, is skimmed off, and boiled down in another vessel till of a sufficient consistency to be made into balls of two or three pounds weight. It is chiefly used to colour cheese and chocolate.

FLACOURTIEÆ.

Petals none, or if present only small, imbricate in bud, without scales. *Anthers* opening by valves.

* *Petals* present.

SCOLOPIA, *Schröber.*

Flowers hermaphrodite. *Petals* 4-6. *Stamens* indefinite. *Seeds* funicled, testa hard.

S. ROXBURGHII, Clos. *E.T.*

Tenasserim.

Ludia spinosa, Roxb.

Drupe almost globular, the size of a small pea. Leaves opaque above. The older branches armed with long, strong, straight and compound spines.

S. LUCIDA, Wall. *E.T.*

Tenasserim.

Drupe obovoid, the size of a small cherry. Leaves shining on both sides.

× × *Petals* none.

FLACOURTIA, *Commerson.*

Flowers diœcious. *Sepals* 4-5, scale-like, imbricate in males. *Stamens* numerous. *Ovary* 2-5-celled. *Styles* 2-5, free, connate at base. *Berry* containing 2 to many hard pyrenes. Trees or shrubs, often spiny, with simple leaves and small racemose flowers.

* *Stigma* simple, subulate (not thickened at apex).

F. SUMATRANA, Planch.

Tenasserim.

Berries the size of a peppercorn. Pyrenes smooth, convex on back.

Ludia fetida, Roxb., doubtfully referred by Hook. f. to this species is
Homalinum fetidum, Bth. (Kurz).

** *Styles* short or almost wanting, thickened and truncate at the apex or more or less bluntish 2-lobed.

^c *Pyrenes* compressed and quite flat.

F. CATAPHRACTA, Roxb. *T.*

Mixed forests of Pegu and Martaban.

Nē-yu-weh (Kurz).

Branchlets and leaves glabrous or nearly so. Stem armed with compound spines. Berries the size of a cherry, containing 5 to 7 pairs of large tubercularly wrinkled seeds.

The wood is rather heavy, brown, and close-grained (Kurz).

F. INERMIS, Roxb. *T.* Martaban.

Resembles the last, but is unarmed.

Pyrenes obovoid-3-angular with rounded back.

× *Leaves acuminate.*

F. MOLLIS, H. f. and Th. *T.* Tenasserim.

Unarmed. Branchlets and leaves tawny pubescent. Flowers in very short tawny racemes.

× × *Leaves blunt or nearly so. Berries the size of a pea.*

F. SAPIDA, Roxb. *T.* Deciduous forests of Prome and Ava.
Nē-yu-veh (Kurz).

Leaves coriaceous, 3 to 5 inches long.

F. SEPIARIA, Roxb. *S.* Chittagong.
F. obovata, Roxb.

Leaves small (1-1½ inch long), membranous. Armed with numerous long spines.

F. ROTUNDIFOLIA, Clos. *T.* Andamans.

Unarmed, or only with a few short axillary spines.

The fruit of *F. cataphracta*, *F. inermis* and *F. sapida*, and others is eaten cooked, being very sour. The young leaves and shoots are also edible, and an infusion of the bark of *Cataphracta* is a gentle astringent used to check looseness. The wood is hard and close-grained, but too small for general use.

XYLOSMA, Forster.

Flowers dioecious. *Sepals* 4-5, scale-like, imbricate in bud. *Petals* none. *Stamens* numerous, the anthers versatile, short. *Ovary* on an annular disk, 1-celled, with 2 or rarely 3-6 parietal placentas, bearing 2 or a few ovules. *Style* simple, or more or less divided. *Stigmas* dilated, or rarely peltate. *Berry* 2-8-seeded. *Flowers* small, clustered.

X. LONGIFOLIUM (?). Frequent on the swampy forests of the Irrawaddy.
Kurz not having seen the flowers or fruit is in doubt as to the species.

P. LANGIÆ.

Flowers dioecious. *Petals* with an adnate scale or basal appendage.

* *Calyx* at first entire, afterwards splitting variously.

GYNOCARDIA, R. Brown.

Flowers dioecious. *Calyx* cup-shaped, 5-toothed or rupturing into 3-5 segments. *Petals* 5. *Males*: *Stamens* numerous. *Anthers* basifixed. *Females*: *Staminodes* 10-15. *Placentas* 5, bearing numerous ovules. *Berry* large, globular, with hard rind. Trees, with simple leaves, and large fascicled flowers.

G. ODORATA, Roxb. *E.T.* Tropical forests of Chittagong, Rangoon,
Martaban, and Tenasserim.

A large tree, with fruit the size of an orange, filled with numerous seeds imbedded in pulp. These seeds washed and dried are known in the bazaar as "Chaulmoogra," and when beaten up into a paste with a little ghee are a favourite application in obstinate cutaneous diseases. The expressed oil is also used as an application to leprosy sores, and both oil and seeds are administered internally in five grains or five drop doses for the same complaint and for tape-worm. For rheumatism, stiff joints, and sprains, Mr. Christy recommends the oil should be well rubbed, with the ends of the fingers, into the parts affected. At bed-time a capsule of 5 drops may be taken, and the second night two capsules, or a capsule at mid-day; but the oil must never be

taken on an empty stomach, or it will produce nausea.¹ The relief in most cases is speedy and permanent. For neuralgia and toothache the oil should be mixed with camphor and chloroform, and rubbed over the part affected, and a plug of cotton-wool saturated in the mixture placed in the tooth or ear, as may be required. When taken internally, the oil improves the appetite, and should be used with a generous diet. Pure Chauhmugra oil is also an excellent application for mange, cancer, and open sores, both on men and animals.² The active principle of the oil has been separated as Gynocordic acid. The timber is said to be of good quality, but the tree is less common in Burma than in Silhet.

RYPARIA, *Blume*.

Flowers dioecious. *Calyx* globular, rupturing into 3-4 segments. *Petals* 4-5. *Males*: *Stamens* 4-5. *Filaments* united into a tubular column. *Females*: *Staminodes* 4-5, subulate or pedicellate. *Placentas* 1-3, bearing 2 or more ovules. *Berry* 1-2-seeded, corticate, large. Trees, with simple leaves and small racemose flowers.

R. CÆSIA, Bl. *E.T.*

South Andaman and Kamorta.

× × *Sepals* already distinct in bud.

HYDNOCARPUS, *Gaertner*.

Flowers unisexual. *Sepals* 4-5, imbricate. *Petals* 5-9. *Males*: *Stamens* definite or indefinite. *Anthers* basifixed. *Females*: *Staminodes* 5 or more. *Placentas* 3-6. *Stigmas* as many, sessile or nearly so, dilated. *Berry* large, globular, with a hard rind. Trees, with simple or serrate leaves, and small racemose flowers.

H. HETEROPHYLLUS, Bl. *E.T.*

Tropical forests of Pegu Range, Martaban and Tenasserim.

Taractogenos Blumei, Hassk.

Ka-lor-hso.

Sepals 4.

A. CASTANEUS, H. f. and Th. *T.*

King's Island, Mergui Archipelago.

Sepals 5.

The fruit of *Hydnocarpus* is the size of an orange, and is used for poisoning fish. The seeds afford an oil, which is used for dressing ulcers and in cutaneous diseases.

Order VIOLACEÆ.

Flowers usually irregular. *Sepals* 5. *Stamens* 5. *Anthers* usually curved, connective usually dilated above the cells. *Fruit* usually a capsule. *Embryo* straight. *Leaves* opposite or alternate, stipulate.

VIOLIÆ.

Corolla irregular, the lower petal much larger. *Herbs* or *perennials*.

VIOLA, *Linnaeus*.

Sepals produced at base. Lower petal spurred or saecate.

× *Stigma* 3-lobed, terminal.

V. PRIMULIFOLIA, L.

Khakyen Hills. Pongee.

V. Walkerii, Wight.

V. Patrinii, DC.

V. DIFFUSA, Ging.

Khakyen Hills. Pongee.

Stoloniferous. Stipules toothed.

¹ New Commercial Plants, No. 3, Thomas Christy and Co., London.

² It can be procured from Christy and Co., 155, Fenchurch Street, at 1s. an ounce, and the capsules in shilling boxes of 12 in each.

× × *Stigma very oblique or quite lateral.*

V. SERPENS, Wall. Khakyen Hills.

Stoloniferous. Stipules toothed or fimbriate.

V. THOMSONI, Oudem. Martaban and Tenasserim at 3000 to 6000 feet.

The roots of *Viola* contain an active principle, *Violina*, possessing emetic powers. Excellent 'issue peas' can be made of the roots.

JONIDIUM, *Voulat.*

Sepals not produced at base. *Petals* clawed, the lower ones gibbous or saccate at base.

J. (VIOLA) SUFFRUTICOSUM, L. Rangoon.

ALSODEIEÆ.

Corolla regular or nearly so. Shrubs or trees.

ALSODEIA, *Thouars.*

Petals 5, free. Connective produced beyond the anther. *Capsule* loculicidal.

Sub-genus DIORYCTANDRA, Hassk.

Stamens exserted, anthers cohering in a cone.

A. (VARECA) HETEROCALITA, Roxb. Tropical forests of the Andamans.

A. Rochburghii, Wall.

Leaves small. Capsules very small, almost sessile.

Sub-genus ALSODEIA.

Stamens included. *Anthers* free.

× *Ovary and style glabrous.*

° *Flowers in long racemes.*

A. LONGIRACEMOSA, Kz. Tropical forests of Martaban up to 1500 feet.

A. racemosa, H. f. et Th. (non Mart.)

Racemes and calyx puberulous.

° *Flowers fascicled.*

A. BENGALENSIS, Wall. Tropical forests of Pegu Range and Martaban. Andamans. The Nicobars.

Pedicels and calyx glabrous.

× × *Ovary and style pubescent or tomentose.*

A. GRIFFITHII, H. f. et Th. Near the Serpentine mines in the Hookum Valley. Ava.

Leaves rather large, glabrous or nearly so.

A. MOLLIS, H. f. et Th. Mergui. Tenasserim.

Leaves pubescent. Capsule densely pubescent.

** *Embryo large, curved, except in Moringaceæ. Albumen none.*

Order RESEDACEÆ.

Calyx 4-8-partite. *Petals* generally hypogynous, 4-8 (rarely 2-0). *Stamens* 3-10, inserted within a fleshy disk. *Carpels* usually united into a 1-celled ovary. *Fruit* a capsule or berry.

* RESEDA ODORATA. Cultivated.

Mignonette.

Griffith says this plant is indigenous to Afghanistan.

Order MORINGACEÆ.

Sepals and Petals 5. *Stamens* 8-10, perigynous. *Capsule* elongate, 3-valved. *Leaves* alternate, compound. Trees.

MORINGA, *Jussieu*.

* *M. PTERYGOSPERMA*, Gaertn. Cultivated all over Burma.
Hyperanthera moringa, Vbl.

Da-tha-lwōn.

This tree is called by Europeans the Horse-radish-tree, as its roots when scraped up are an excellent substitute for the real horse-radish. It is however cultivated for the use of its pods, which are eaten in curries and stews; and from its seeds the oil of Ben is expressed, which does not turn rancid, and from its not coagulating from cold, is used by watchmakers as a lubricant. (Seeds called drum-sticks by Europeans.)

Order CRUCIFERÆ.

Sepals and Petals 4 each. *Stamens* 6, 4 longer. *Capsule* usually spuriously 2-celled or 2- to multi-locellate. *Leaves* alternate. Herbs, or rarely shrubs.

* *Pods* elongate or short, dehiscing along their whole length, not jointed, rarely indehiscent at the summit. *Septa and valves* equally broad and parallel.

◦ *Cotyledons* accumbent.

NASTURTIUM, *Linnaeus*.

Pods turgid or not. *Seeds* small, in 2 rows. *Flowers* usually yellow.

N. INDICUM, L. From Chittagong to Tenasserim on muddy banks
N. Madagascariense, Wit. and rubbishy places near villages.
Sinapis divaricata, Roxb.

Pods rather thick, 2 to 5 times longer than the pedicels.

N. DIFFUSUM, DC. Ava.
Sinapis montana, Wall.
S. pusilla, Roxb.

CARDAMINE, *Linnaeus*.

Pods narrow, elongate linear, the valves flat and elastic. *Seeds* in 2 rows. *Flowers* usually white.

C. HIRSCUTA, L. Ava. Bhamo. Martaban.
var. β *sylvatica*, H. f. et Th.

◦◦ *Cotyledons* longitudinally conduplicate.

BRASSICA, *Linnaeus*.

Pods elongate. *Stigma* truncate or 2-lobed. *Seeds* in a single row.

* *B. CAMPESTRIS*, L. Arakan. Ava. Bhamo.
B. rapa and *napus*, L.
Sinapis dichotoma, *glauca* and *brassicata*, Roxb.

Mung-lā-u-waing or Mung-nyen.

Stem-leaves at base clasping the stem with their auricles.

B. JUNCEA, L. Ava. Bhamo. All over Pegu.
Sinapis ramosa, Roxb.
S. patens, Roxb.
S. cuneifolia, Roxb.

Stem-leaves petioled, not clasping the stem. Flowers yellow.

* *B. OLERACEA*, L.

Cultivated.

Tham-bor-mung-lā.

Stem-leaves basally broad and sessile, but not clasping the stem. Petals white or yellowish white, with violet veins.

B. campestris embraces the various sorts of 'turnips,' and *B. oleracea* the different varieties of 'cabbage.' The seeds of all species yield a useful oil.

Mason remarks, "I have seen a species of mustard on the banks of the Tenasserim several days' journey from any human habitation, and which the Karens regarded as growing spontaneously, but it did not appear to differ from the species in common culture on the coast, and the seeds had probably been dropped there by the passing traveller."

** * *Pods short, dehiscent along their whole length, not articulate, the valves flat, at right angles to the septum.*

LEPIDIUM, *Linnaeus.*

Pods oblong, notched, 2- rarely 4-seeded. Flowers white.

* *L. SATIVUM*, L.

Cultivated only.

Sa-mung-ni. Garden cress.

** * * *Pods elongate, indehiscent, not jointed, but contracted and pithy within between the seeds. Cotyledons incumbent.*

RAPHANUS, *Linnaeus.*

Flowers pale lilac or white with coloured veins.

* *R. SATIVUS*, L.

Cultivated and wild (?).

Mung-lā. The Radish.

The vegetables of this family, the cabbage for example, are valuable for their anti-scorbutic properties, and the seeds for the oil they yield. Black mustard yields a volatile pungent oil, familiar to all who have mixed mustard. The oil does not, however, exist ready made, as may be known by the dry mustard powder not exhaling it till wetted. Cold water dissolves the albuminous principle (*myrosin*) in the seed, thereby enabling it to combine with the *myronic* acid, the product being the volatile acrid principle whose fumes rise so copiously from the mustard as it is being mixed. Hence mustard should be always made with cold water, which is a more effective solvent of albumen than hot. Mustard flour to the extent of two or three teaspoonfuls in water forms an excellent emetic, especially in narcotic poisoning, effectually clearing the stomach, without producing depression. A mustard poultice is a well-known application, but rather messy, and a far more elegant preparation is sinapine tissue, which is simply a fine paper charged with the vesicating principle of the seed, and far more cleanly and pleasant to use than the crude article.

To this Order also belongs the plant 'Woad' (*Isatis tinctoria*), which furnished our remote ancestors with a blue pigment with which to ornament their bodies. Another curious plant is the Rose of Jericho¹ (*Anastatica Hierochuntica*), which when ripe contracts into a rounded cushion, formed of the pods and branches curled in on each other. This cushion is curiously susceptible to hygrometric action, and if placed in water the pods and branches unfold and expand under the influence of the moisture absorbed. Women in labour sometimes place this plant in water, in the fanciful hope that simultaneously with its expansion their own delivery may be accomplished.

¹ This name is also applied, according to Hooker, to the capsules of *Mesembryanthemum* and *Sclaginella lepidophylla*.

Order CAPPARIDEE.

Flowers usually hermaphrodite. *Sepals* 4, free or connate; valvate or imbricate, rarely open in the bud. *Petals* as many, rarely 2 or none, hypogynous or seated on the disk, imbricate or open in bud. *Stamens* 4 or more, hypogynous or perigynous, or at the base of, or on, a long or short gynophore. *Disk* none, or tumid, or lining the calyx. *Ovary-tube* stalked or sessile, 1-4-celled, with numerous amphio-, or campylotropous ovules on the 2-4 parietal placentas. *Style* short, or none. *Fruit* a capsule or berry. Seeds angular or uniform. *Albumen* none. Herbs, shrubs or trees, often armed with spiny stipules.

CLEOMIEÆ.

Fruit capsular, 1-celled, usually pod-like, rarely short or didymous. *Capsules* 4-8- or many-seeded. *Herbs*.

× *Torus* short, the stamens inserted immediately within the sepals and petals.

CLEOME, *Linnaeus*.

Torus often produced into an appendage. *Stamens* 4-6 or more, some of them often without anthers.

C. CHELIDONII, L.

Prome road, between Pongday and the Myit-ma-khā stream.

Plants thinly appressed, hispid. *Petals* white or pale rosy. This plant is probably introduced.

C. VISCOSA, L.

A weed from Chittagong and Ava to Tenasserim. The Nicobars.

Polanisia icosandra, W.A.

× × *Torus* elongated, bearing the stamens at the top under the ovary.

GYXANDROPSIS, *De Candolle*.

Stamens 6, all perfect. *Filaments* long.

G. (CLEOME) PENTAPHYLLA, L.

A weed from Chittagong and Ava, to Tenasserim. The Nicobars.

CAPPARIEÆ.

Fruit berry-like or drupaceous. *Shrubs* or trees.

* *Sepals* united at the base into a funnel- or bell-shaped tube, or forming a spathaceous calyx.

NIEBUHRIA, *De Candolle*.

Sepals united at base into a funnel or bell-shaped tube. *Petals* none. *Leaves* 1-3-foliolate.

N. VARIABILIS, Kz. S.

Ava.

Younger parts puberulous, rough. *Leaflets* coriaceous.

N. SIAMENSIS, Kz. E.S.

Siamese Province of Radboorce.

Glabrous. *Leaflets* thin, chartaceous.

* *Sepals* free or only at the very base connate. *Petals* 4.

CAPPARIS, *Linnaeus*.

Sepals usually 4, rarely 5, in 2 rows, the foremost one usually larger and galeate. *Stamens* usually indefinite, inserted on the short torus, the filaments free, filiform. *Berry* more or less stalked, globular to elongate. *Seeds* 1 or several, immersed in pulp, uniform. *Shrubs* or trees often scandent.

* *Pedicels* arising from above the axils of the leaves in a line one above the other (supra-axillary); or rarely axillary and solitary.

— *Gynophore and ovary glabrous or nearly so.*

† *Ovary almost sessile, the gynophore being only $\frac{1}{2}$ to 1 line long.*

C. ROYDSLEFOLIA, Kz. *E.S.S.* Siamese Province of Kanburee.

Glabrous. Leaves large, chartaceous. Pedicels 2–3 lines long, the upper flowers forming terminal racemes (by the reduction of leaves).

†† *Ovary on a long slender gynophore.*

× *All parts glabrous.*

C. MICRACANTHA, DC. *W. C.* Pegu. Tenasserim.

Leaves as in preceding, chartaceous, much veined, with a callous point at the usually retuse apex.

C. MEMBRANIFOLIA, Kz. *S.S.* Tropical forests of Pegu Range and Martaban.

Leaves acuminate. Unarmed. Pedicels and sepals outside glabrous. Stamens numerous, petals pilose.

C. OXYPHYLLA, Wall. (non Miq.). Swampy forests along the Irrawaddy
C. disticha, Kz. *S.* Prome. Pegu and Martaban.

Thorny. Pedicels glabrous. Sepals woolly along the borders. Stamens 8, filaments white, anthers blue.

C. MULTIFLORA, H. f. and Th. *W. C.* Ava Hills, towards Assam.

Unarmed. Pedicels slightly pubescent and numerous, in a line one above the other. Stamens 8. Filaments glabrous.

C. VIMINEA, H. f. and Th. Tenasserim (*vide* H. f. and Th.).

Unarmed or nearly so. Sepals with tomentose margins.

×× *Young shoots and sepals rusty or greyish tomentose or pubescent.*

C. HORRIDA, L. *SS.* Mixed forests of Prome, Pegu, and
C. Zeylanica, Roxb. Martaban.

Nā-mā-ni-tanyet.

Leaves chartaceous, ovate, green, while young tawny or rusty pilose beneath, flowers usually several together.

C. CRASSIFOLIA, Kz. *SS.* Mixed forests of Prome.

Leaves green, oboval, while young thinly appressed pubescent, soon quite glabrous and coriaceous. Petioles $\frac{1}{2}$ – $\frac{3}{4}$ inch long. Flowers several.

C. POLYMORPHA, Kz. *S.S.* Frequent in the Eng Forests of Prome.

Leaves glaucous, rhomboid-ovate to rhomboid-linear, acute, while young minutely greyish puberulous beneath. Petioles only $\frac{1}{4}$ to $\frac{1}{3}$ inch long. Berries verrucose. Flowers solitary.

Kurz remarks of these last three species: "*C. horrida, crassifolia et polymorpha, species inter se valde affines, habitu longe distant, et sepius in eodem solo sociatim crescut.*"—*J.A.S.B.* 11. 1873, p. 227.

— *Gynophore and ovary densely tomentose.*

C. FLAVICANS, Wall. Ava.

A shrub with the habit of *Cadaba Indica*, armed with short spreading thorns. All younger parts and leaves tomentose or pubescent. Pedicels and sepals densely tomentose.

** *Pedicels in umbels or corymbs in the axils of the leaves or on shortened axillary branchlets, sometimes collected into terminal or lateral panicles.*

× *Calyx and pedicels densely tomentose. Ovary glabrous.*

C. SIAMENSIS, Kz. C.S. Siamese Provinces of Radboorce.

Branches glabrous. Leaves thick, membranous, and of a texture like *Olar*, glabrous and faintly pubescent below on the nervation.

C. GRANDIS, L. T. Deciduous forests of Prome.

C. bisperma, Roxb.

C. auricans, Kz. MS.

Hkor-kwā.

All parts tomentose or shortly and densely yellowish pubescent, the hairs not papillose. Peduncle naked. Wood white, close-grained, heavy and durable, good for turning (Kurz).

C. ORBICULATA, Wall. S. Ava.

Apparently as preceding, upper side of leaves papillose. Peduncle 1-leaved at tip.

C. TRINERVA, H. f. and Th. Tenasserim. Tavoy (Parish).

Branches brown-tomentose. Leaves glabrous, 3-plinerved.

× × *Calyx and pedicels glabrous. Berry 1-seeded.*

° *Gynophore very short (in fruit not above ½ inch), umbels or corymb peduncled.*

C. GLAUCA, Wall. S. Ava.

Branchlets pubescent. Leaves thick coriaceous, glaucous, retuse or blunt. Umbels axillary, berries 1-2-seeded.

C. HASSELTIANA, Miq. S.S. Tropical forests of South Andamans.

C. ambigua, Kz.

Glabrous. Leaves purplish beneath, acuminate. Umbels in terminal panicles, berries 1-seeded.

°° *Gynophore long and slender.*

† *Umbels or corymbs peduncled.*

C. OLIGANDRA, Griff. W.C.

C. floribunda, Wight.

Glabrous. Leaves green, retuse. Flowers ½ inch in diameter, the umbels arranged in terminal panicles. Berries several-seeded.

C. VERSICOLOR, Griff. Tenasserim.

Glabrous. Petiole puberulous. Flowers 2 inches in diameter.

†† *Umbels sessile or nearly so.*

C. SEPIARIA, L. Pegu. Andamans.

Leaves green, retuse. Corymbs usually terminal on the branchlets, many-flowered.

CRATEVA, *Linnaeus.*

Calyx 4-partite, the lobes imbricate and deciduous. *Petals* 4, long-clawed. *Stamens* 8-20, inserted on the border of the torus. *Ovary* shortly stalked, 1-2-celled, with as many placentas, bearing numerous ovules in 2 series. *Stigma* discoid. *Berry* with a hard rind. *Seeds* reniform. Trees or shrubs with digitately 3-5-foliolate leaves, and flowers usually corymbose.

× *Ovary and berry 2-celled.*

C. LOPHOSPERMA, Kz. Tenasserim(?).

Seeds compressed-reniform, spinulosely tubercled on the back.

C. NARVALA, Ham. Tenasserim.

Seeds angular, flat, yellowish, very hard.

× × *Ovary and berry 1-celled. Seed reniform or helioid, black, smooth.*

C. ROXBURGHII, Br. T. D. forests of Prome and Upper Tenasserim.

C. religiosa, H. f. and Th.

C. trifoliata, Roxb.

Ka-dāt.

Berry globular, 1-celled, roughish, the size of a bullet or wood-apple.

C. HYGROPHILA, Kz. S. Swampy forests along the Irrawaddy.

Yē-kha-dāt (Kurz).

C. MACROCARPA, Kz., is also recorded from Katchall.

ROYDSIA, *Roxburgh.*

Sepals 6, imbricate, or almost valvate. *Petals* none. *Stamens* inserted on the short torus. *Ovary* shortly stalked, 3-celled, with numerous ovules on the 2 placentas. *Drupe* shortly stalked, with a fragile rind, containing a 1-seeded putamen. *Testa* membranous. Scandent shrubs, with simple leaves and small racemose flowers.

R. OBTUSIFOLIA, H. f. et Th. *E.S.S.* Marshy forests along the Irrawaddy,

Ngā-lpyu (Kurz). Tsittoung, and in Tenasserim.

R. PARVIFLORA, Griff. *S.S.* Ava.

+++ *Embryo minute, in the base of a fleshy albumen.*

Order PAPAVERACEE.

Flowers regular. *Stamens* many, free. *Ovary* 1-celled. *Placentas* parietal. Herbs, rarely shrubs. *Leaves* alternate, juice milky.

PAPAVER, *Linnaeus.*

Capsules opening by short valves or pores. *Stigmas* 4 or more, radiating on a sessile disk.

* P. SOMNIFERUM, L.

Opium, one of the most valuable drugs of the Pharmacopœia, is the concrete juice of the unripe capsules. The most valuable of the alkaloids contained in it, *Morphia*, is found in greatest quantity in Turkey opium, whilst Indian opium is richer than other sorts in *Narcotine*. It would require many pages to enter on the various diseases this drug is capable of being used with advantage in, but it may be remarked that *Narcotine* was esteemed by Dr. O'Shaughnessy as second only to quinine in the treatment of intermittent fever, and superior to it in some cases when complicated with dysentery.

A great deal has been written on the harrowing state to which the use of this drug reduces its victim, which is doubtless as deplorable as that of the confirmed drunkard, but the special iniquity attaching to the Indian Government as a producer of opium is by no means equally clear. In the East, opium takes the place of beer and spirits, and in either case the revenue is raised from an article unquestionably deleterious to too many of those who consume it; but, whereas opium merely injures the individual who consumes it, reducing him to the condition of a more or less of harmless imbecile, beer and spirits, when immoderately indulged in, too often convert their victims into furious and dangerous beasts, and fill our gaols with homicides and our hospitals with the victims of their alcoholic phrensy. Truly the diatribes one hears of the opium trade afford an excellent modern instance of the Pharisee with a beam in his own eye turning oculist to his less-afflicted neighbour, though no one can question the incalculable benefit which would accrue to the human race from the disuse of both intoxicating drugs and intoxicating drinks. Some people have supposed that a preparation of opium was the "Nepenthe" of Homer, but it seems more probably to have been some preparation of hemp, or possibly neither of these drugs. The seeds of the poppy are eaten when boiled, and by expression yield a bland edible oil, quite devoid of any narcotic quality.

ARGEMONE, *Linnaeus*.

Capsules opening by short valves. *Stigmas* 4-5, radiating from the top of a depressed style.

* *A. MEXICANA*, L.

Domesticated in Ava. Sporadic in Pegu.

RANALES.

Stamens very rarely definite. *Carpels* free, or immersed in the torus, very rarely connate. *Microphyte* usually inferior. *Embryo* minute in a fleshy albumen.

+ *Sepals* or *petals* 2- or 3-seriate.

Order NYMPHLEEE.

Flowers hermaphrodite. *Sepals* 3-5. *Petals* 3 to many, 1- or many-seriate. *Stamens* many, hypogynous, or attached to the torus. *Carpels* free or connate, or immersed in a fleshy obconic torus. Aquatic herbs. *Leaves* usually floating. *Flowers* solitary, on scapes.

Sub-order NYMPHLEEE.

Sepals 4-6. *Petals* and *stamens* numerous. *Carpels* confluent with one another or with the disk into one ovary. *Ovules* many. *Seeds* albuminous.

NYMPHLEA, *Necker*.

Sepals, *petals*, and *stamens* half superior, inserted on the disk, the latter confluent with the carpels. Not armed.

N. LOTUS, L.

Chittagong. Pegu. Tenasserim.

Kya-phyu (Mason).

Anthers without appendage.

N. STELLATA, Willd.

Chittagong. Pegu and Arakan.

N. cyanea, Roxb.

Kya-nyo (Mason). The blue water-lily.

* *N. RUBRA*, Roxb. (*vide* Mason).

Kya-ni.

A species of *Nymphaea* occurs in the Nicobars, *vide* Diederichsen.

BARCLAYA, *Wallich*.

Sepals inferior. *Petals* superior. *Carpels* immersed in the torus. Not armed.

B. LONGIFOLIA, Wall.

Pegu. Tenasserim, as far as Mergui,
in running streams.

B. oblonga (Mason).

Kya-ghoung-loung (Mason).

EURYALE, *Salisbury*.

Sepals, *petals*, and *stamens* superior. *Carpels* immersed in the torus. Armed with sharp thorns.

E. FEROX, Salisb.

Chittagong in swamps.

Annesleya spinosa, Roxb.

Sub-order NELUMBONEE.

Sepals 4 or 5. *Petals* and *stamens* numerous, hypogynous. *Carpels* sunk in pits without order in the flat turbinate torus.

NELUMBO, *Adanson*.

N. nucifera, Gaertn.

Pegu, in stagnant water.

Nelumbium spectosum, Willd.

Pa-dung-mā (Mason).

This is a handsome plant and useful as food. The seeds are eaten either raw or cooked, and the long tap root is boiled as a vegetable, and like others of its tribe is rich in starch. The plant is highly symbolical, and held in mystic reverence by Hindus, with whom, as with the Egyptians, it typifies the fecund powers of nature, and it is the throne of the gods, who are commonly represented as seated on it.

Order BERBERIDEAE.

Flowers regular, hermaphrodite (save in *Lardizabaliceæ*). *Sepals* 6-1, in 2 whorls or 3, and petaloid. *Petals* in many, or twice as many, rarely wanting. *Stamens* 4-9, in 2 or 3 series, opposite the petals, hypogynous. *Anther-cells* opening by a longitudinal slit or by recurved valves. *Carpels* 1-3 (rarely more), with 2 or several (rarely 1) ovules in each. *Style* short. *Albumen* copious. Shrubs or small trees.

LARDIZABALICEÆ.

+ *Leaves* digitate. *Flowers* unisexual. *Stamens* monadelphous. *Carpels* 3. *Climbers*.

PARVATA BRUNONIANA, H. f., is stated to come from Mergui. As no specimens exist at Kew from there, Kurz omits it from his Flora of Burma.

BERBERIDIEÆ.

++ *Flowers* hermaphrodite. *Carpel* solitary.

BERBERIS, *Linnaeus*.

Sepals 6, with 2 or 3 appressed bracts, imbricate, in 2 series. *Petals* as many, imbricate. *Stamens* 6, free. *Anther-cells* opening by valves. *Ovary* 1-celled, with a few basal ovules. *Fruit* a few-seeded berry. *Flowers* yellow, usually in racemes.

B. (MAHONIA) NEPALENSIS, DC. *E.S.* Temasserim.

B. Leschenaultii, Wall.

The plants of this genus yield a bitter principle, 'Berberine,' a useful tonic in cases of indigestion and febrifuge. The watery extract, called in India 'Rusot,' is esteemed as a valuable febrifuge. The bark is astringent, and some species yield a yellow dye.

Order MENISPERMACEÆ.

Flowers dioecious. *Sepals* usually 6, rarely 1-4 or 9-12, usually free, in 2-4 series. *Petals* 6, rarely 1-5 or none, free or connate. *Males*: *Stamens* hypogynous. *Filaments* and *Anthers* free or connate, the latter 2-celled. *Ovaries* rudimentary or none. *Females*: *Staminodes* 6 or none. *Ovaries* 3, rarely 1 or 6-12, with a solitary or rarely 2 ovules in each. *Style* terminal or lateral. *Ripe carpels* drupaceous, with an almost basal and excentric style-scar. *Seeds* usually curved or reniform, the endocarp often intruding. *Albumen* even, or ruminant or none. *Cotyledons* fleshy or leafy. Herbs or scandent shrubs. *Leaves* usually palmately nerved, alternate. *Stipules* none. *Flowers* minute.

TINOSPORIÆ.

Carpels 3, rarely 6. *Style-scar* almost terminal, rarely ventral or almost basal. *Seeds* menisoid or rarely oblong, albuminous. *Cotyledons* leafy, usually spreading laterally.

× *Petals* 6, shorter than the inner sepals. *Style-scar* almost terminal.

PARABONA, *Miers*.

Sepals 6. *Filaments* connate, the anthers in heads. *Seeds* menisoid.

P. SAGITTATA, Miers.

Tropical forests in Pegu Range,
Martaban, Ava, and Chittagong.ASPIDOCARYA, *Hooker, f. and Thomson.*

Sepals 12. *Filaments* connate. The anthers sessile round the peltate end of the column. *Seeds* oblong.

A. UVIFERA, H. f. et Th.

Ava. Khakyen Hills. Prome.

TINOSFORA, *Miers.*

Sepals 6, in 2 series, the inner ones larger. *Petals* 6, smaller than the sepals. *Males: Stamens* 6, free. *Females: Staminodes* 6, club-shaped. *Ovaries* 3, the stigma forked. *Drupes* 3-1, flat, with convex back, the style-scar almost terminal. *Putamen* tubercled, dorsally keeled, intruding. *Albumen* ruminant. *Cotyledons* leafy, spreading. Climbing shrubs, with woody or fleshy fibrous stems. *Flowers* in racemes or panicles.

× *Drupes* the size of a pea, the putamen tubercled.

T. (MENISPERMUM) TOMENTOSA, Roxb. C. Ava.

Young parts, and the blunt leaves beneath, tomentose.

T. MALABARICA, Miers. S.S. Chittagong.

Young parts, and the acuminate leaves beneath, pubescent.

T. (MENISPERMUM) VERRUCOSA, Roxb. Arakan. Pegu.

T. crispa, Miers. C.

All parts glabrous.

× × *Putamen* smooth, white.

T. (MENISPERMUM) CORDIFOLIA, Willd. C. Chittagong. Ava. Andamaus.

All parts glabrous, drupes the size of a pea.

T. (COCCULUS) NUDIFLORA, Griff. S.S. Tropical forests of Pegu Range on East
Hsün-dōng-mā-nweh. side. Martaban and Tenasserim.

Young leaves and shoots tomentose. *Drupes* the size of a cherry. Wood loosely fibrous, possibly good for cordage (Kurz).

× × *Petals* none.

FIBRAUREA, *Loureiro.*

Sepals 9, the three outer ones small and bract-like. *Males: Stamens* 6. *Females: Staminodes* 6. *Ovaries* 3, with 2 ovules in each. *Stigma* minute, sessile. *Drupes* 3, 1-seeded, the style-scar almost terminal. *Putamen* oblong, with convex back, the endocarp hardly intruded. *Albumen* horny. *Cotyledons* leafy. Woody climbers, with coriaceous 3-nerved leaves. *Flowers* in axillary panicles.

F. TINCTORIA, Lour.

Chittagong. Pegu Range. Tenasserim.

ANAMIRTA, *Colebrooke.*

Sepals 6, somewhat unequal. *Males: Filaments* united in a column bearing numerous sessile anthers, which are 4-lobed and 4-celled after dehiscence. *Females: Staminodes* 9-10. *Carpels* 3, rarely 4-5, the stigmas almost capitate. *Drupes* stalked, the style-scar almost basal. *Putamen* woody, the hollow endocarp process intruding into the base. *Seeds* globular, hollow. *Albumen* almost ruminant. *Cotyledons* narrow. Woody climbers with large leaves. *Flowers* in large pendulous panicles.

A. COCCULUS, L.

Tenasserim. Kamorta.

A. paniculata, Colebr.*Menispermum heteroclitum*, Roxb.

This is the *Cocculus Indicus* with which rascally brewers adulterate their beer. The berries are very poisonous, and contain a powerful acro-narcotic principle, *Picrotoxin*. The berries are used to poison fish, and a weak decoction to destroy 'ticks' in sheep. A large importation of this dangerous drug takes place into Great Britain, which it is to be feared contributes to poison other animals than 'ticks.'

COCCLIEÆ.

Flowers 3-merous. Ovaries usually 3. Style-scar almost basal, rarely almost terminal. Seeds horseshoe-shaped. Albumen copious. Embryo slender, the cotyledons linear or only slightly dilated.

TILIACORA, *Colbrookr.*

Sepals 6, the outer ones small, hardly imbricate in bud. Petals 6, minute. Males: Stamens 6, free. Females: Carpels 9-12, the styles short and subulate. Drupes stalked (the stalks connate at base), the style-scar near the base. Putamen sulcate. Seed hooked. Albumen oily, ruminant. Cotyledons fleshy, appressed. Mostly climbers with axillary panicles.

T. RACEMOSA, Colbr. Pegu.
Menispermum polycarpum, Roxb.

LIMACIA, *Loureiro.*

Sepals 6, the inner larger ones valvate or slightly imbricate in bud. Petals 6, shorter than the sepals, embracing the stamens. Males: Stamens 3-6 or 9, free. Females: Staminodes 6. Carpels 3, with short compressed style. Drupes obovate or reniform, the style-scar almost basal. Putamen 3-celled, the 2 lateral cells empty. Seed elongate, embracing the intruded endocarp. Albumen even. Cotyledons elongate, half-terete, appressed. Woody climbers, with paniced flowers.

× *Sepals 8-12, the smaller ones imbricate.*

L. CUSPIDATA, H. f. W.E.C. Tenasserim.

× × *Sepals 9, thick, valvate in bud.*

L. (MENISPERMUM) TRIANDRA, Roxb. Prome. Tenasserim.

L. Amherstiana, Miers.

Stamens 3. Adult leaves glabrous.

L. (COCCLUS) VILLOSA, Grif.

L. velutina, Miers. W.C. Tenasserim.

Stamens 6. Branches and leaves beneath tomentose.

COCCLUS, *De Candolle.*

Sepals 6, the inner larger. Petals 6, shorter than the sepals, entire or bifid. Males: Stamens 6, free, the anthers didymous, or 4-lobed or almost 4-celled. Females: Staminodes 6 or none. Carpels 3, the style linear, recurved or reflexed. Drupe obovate or globular, laterally compressed, the style-scar almost basal. Putamen tubercled on the back, horseshoe-shaped, often perforated at base. Seed curved. Albumen fleshy. Cotyledons linear, appressed. Usually climbing (rarely erect) shrubs or herbs, with paniced flowers.

× *Styles simple.*

C. GLAUCESCENS, Bl. W.C. Tropical forests of Pegu Range, East side. Martaban and Tenasserim.

C. macrocarpus, W. A.

Leaves glabrous on very long petioles.

C. (MENISPERMUM) HIRSUUS, L. In hedges at Ava. Prome. Pegu.

C. villosus, DC.

Menispermum myosotoides, L.

Leaves more or less pubescent, especially below. Petioles short.

× × *Styles bifid.*

- C. (MENISPERMUM) VILLOSUM, Roxb. Chittagong and Ava to Tenasserim up
C. incanum, Colebr. to 3000 feet. The Nicobars.
Pericampylus incanum, Miers.

Many plants of this Family are used in medicine for the bitter principle they contain. A decoction of the fresh roots of *C. Linnæus* is given for rheumatism, and is regarded as laxative and sudorific, and the leaves are sometimes made into curries. The stems are used to make baskets of, and ropes, and a durable purplish ink is expressed from the ripe berries (Wight).

CISSAMPELIDIEÆ.

Flowers 3-5-merous. Ovaries usually solitary. Style-scar usually almost basal. Endocarp dorsally muricate or echinate. Seeds horseshoe-shaped. Albumen scanty. Embryo linear, the cotyledons appressed.

STEPHANIA, Loureiro.

Petals 3-5, shorter than the sepals, rather thick. Staminal column peltate at summit. Flowers umbellate.

× *Flowers with very short pedicels.*

- S. HERNANDIFOLIA, Willd. Mixed forests from Ava and Chittagong
Cissampelos hexandra, Roxb. to Tenasserim.

× × *Flowers with slender pedicels forming loose cymose umbellets.*

- S. (CISSAMPELOS) GLABRA, Roxb. Mixed forests in Pegu. Tenasserim.
S. rotunda, Lour. Andamans.

CISSAMPELOS, Linnæus.

Male flowers: Sepals 4. Petals united in a cup. Female flowers: Sepals and Petals 1-2, the latter entire 2-cleft or -parted. Styles simple. Flowers cymose or racemose.

- C. PAREIRA, L. Common all over Burma up to 3000 feet.
C. caapa, L.
C. convolvulacea, Willd.

CYCLEA, Arnott.

Male flowers: Sepals connate. Petals more or less connate. Female flowers: Sepals 2, lateral, free. Petals none. Styles 2-parted. Flowers paniced.

- C. PELTATA, H. f. et Th. Ava and Chittagong to Tenasserim.
C. pendulina, Miers. The Nicobars.

PACHYGONIEÆ.

Flowers usually 3-merous. Ovaries and carpels usually 3, rarely 9-12. Style-scar almost basal or ventral. Seed curved, hooked, or inflexed. Albumen none. Cotyledons thick and fleshy.

PACHYGONE, Miers.

Sepals 6, the inner larger. Petals 6, embracing the stamens. Males: Stamens 6, free. Anthers nearly globular, 2-celled. Females: Staminodes 6. Carpels 3, with horizontal styles. Drupes reniform, the style-scar nearly basal. Putamen conform wrinkled. Seed horseshoe-shaped. Woody climbers with racemose flowers.

× *Inflorescence and drupes densely tomentose. Leaves with prominent nervation.*

- P. DASYCARPA, Kz. E.S.S. Upper Tenasserim.
Antitaxis ramiflora, Miers.

× × *Inflorescence glabrous. Leaves almost polished.*

- P. ODORIFERA, Miers. E.W.C. Common in swampy forests in Pegu,
 Ngã-lpyu. Martaban and Tenasserim.

PYCNARRHENA, *Miers*.

Flowers dioecious. *Males*: *Sepals* 6, with 3 bracts, the inner ones large and orbicular. *Petals* 6, small, lobed. *Stamens* 9, the filaments very short, anthers bursting transversely. *Female flowers* unknown. *Drupe* broadly oblong. *Style-scar* lateral, the endocarp almost reniform. Shrubs with small fasciated flowers.

P. PLENIFLORA, *Miers*. E.S.S. Ava. Khakyen Hills.

ANTITAXIS, *Miers*.

Flowers dioecious. *Males*: *Sepals* 8 in decussate pairs, the outer ones small, the 4 inner ones larger and imbricate. *Petals* 2, obovate. *Stamens* 4, filaments club-shaped, anthers 1-celled, opening transversely. *Females* unknown. *Drupe* 1-3, almost globose with a ventral style-scar, the endocarp crustaceous, almost reniform-oblong.

A. CALOCARPA, *Kz.* E.W.C. Tropical forests of Chittagong. Katchall.

Order MAGNOLIACEÆ.

Sepals and *Petals* very deciduous, arranged in whorls of 3, hypogynous. *Stamens* indefinite, hypogynous. *Filaments* free, or connate. *Anthers* basifix, cells adnate, bursting longitudinally. *Carpels* indefinite, free, or partly cohering in one whorl or in several on an elongated torus. *Styles* stigmatic on the inner face. *Ovules* 2 or more, or those of the ventral suture anatropous or amphitropous. *Fruit* berry-like or follicle-like carpels, rarely woody or indehiscent, sometimes arranged as a cone. The species of this family are rich in a bitter aromatic principle chiefly contained in the bark of the root and stem.

WINTERIEÆ.

Stipules none. *Perianth* double. *Carpels* in a single whorl.

ILICICUM, *Linnaeus*.

Sepals 3-6. *Petals* 9 or more, in 3 or more series. *Stamens* indefinite. *Filaments* thick. *Anthers* adnate, introrse. *Ovaries* indefinite, in a single whorl, 1-ovuled. *Style* subulate, recurved. *Follicles* stellately spreading, hard, compressed. *Seeds* compressed. *Albumen* fleshy. Evergreen aromatic trees or shrubs with simple pellucid-dotted leaves and small solitary or fasciated flowers.

I. MAJUS, *H. f. et Th.* Tenasserim. Thong-yeen, at 5500 feet.

TALAUMA, *Jussieu*.

Sepals 3. *Petals* 6 or more, in 2 or more rows. *Stamens* indefinite, in many series. *Anthers* linear, introrse. *Ovaries* sessile, indefinite, in spikes or heads, 2-ovuled. *Stigmas* decurrent. *Carpels* woody, separating from the woody axis at the ventral suture. *Seeds* suspended from a long funicle, the outer testa fleshy. *Albumen* oily. Trees or shrubs with simple leaves and convoluted stipuled leaf-buds. *Flowers* large, terminal.

Leaves glabrous.

T. (LIRIODENDRON) LILIFERA, *Roxb.* Tenasserim. Mergui.

T. Rabamiana, *H. f. et Th.*

Leaves downy beneath.

T. CANDOLLEI, *Bl.* Tenasserim. South of Maulmain.

T. mutabilis, *Bl.*

MAGNOLIA, *Linnaeus*.

Sepals 3. *Petals* 6-12, in 2-4 whorls. *Anthers* linear. *Carpels* sessile, many, oblong-spicate, 2-ovuled. Ripe carpels coriaceous, persistent and opening dorsally by a longitudinal slit. *Seeds* suspended by a filiform funicle, the outer testa fleshy. *Albumen* oily. Habit as in *Talauma*.

M. SPHENOCARPA, Roxb.

Chittagong. Pegu.

Liriodendron grandiflorum, Roxb.

MANGLIETIA, Blume.

Petals 6 or more, in 2 or more rows. *Anthers* linear. *Carpels* sessile, many, forming an oval or oblong cone, 6- or more-ovuled. Ripe carpels almost woolly, persistent, free, dehiscing dorsally by a longitudinal slit. *Seeds* suspended from a filiform funicle, the outer testa fleshy. *Albumen* oily. Trees with simple leaves and large terminal flowers.

M. INSONIS, Bl.

Pegu.

MICHELIA, Linnæus.

Sepals and *Petals* usually conform, 9 or more, imbricate, in 3 or more rows. *Anthers* linear. *Carpels* stalked, numerous, in spikes, with 8 or more ovules in each. Ripe carpels laxly spiked on the elongate torus, coriaceous, persistent, dehiscing dorsally by a longitudinal slit. *Seeds* and *albumen* as in *Manglietia*. *Flowers* large, solitary, axillary.

M. CHAMPACA, L.

Martaban (rare), Tenasserim, Ava, Bhamo, Prome.

M. aurantiaca, Wall.

Sa-gā.

This tree, says Mason, is "in flower or fruit a great part of the year, and its orange blossoms, which are exquisitely fragrant, are also used by Burmese maidens to adorn their long dark hair." The yellow flowers are powerfully scented, and it is one of the five flowers with which the Hindu God of Spring tips the five shafts of the God of Love. The bark is bitter and aromatic, and used in intermittent fevers.

Order ANONACEÆ.

Flowers usually monœcious. *Sepals* 3, free or connate, usually valvate in bud. *Petals* 6, hypogynous, in 2 rows, or the inner series wanting. *Stamens* numerous, rarely definite, hypogynous, closely packed on the torus. *Filaments* short or wanting. *Anthers* adnate, the cells extrorse or almost lateral, the connective often produced. *Ovaries* several, or rarely solitary, free (in *Anona* connate). *Styles* short or none, ovules one or more in each cell. Ripe *carpels* 1 or more on the torus, sessile, or stalked, 1- or more-seeded, usually berry-like and indehiscent. *Seeds* glossy, crustaceous or coriaceous. *Albumen* dense, ruminant, often divided almost to the axis into horizontal plates. *Embryo* small or minute, the cotyledons diverging. Trees or shrubs, often scandent, with alternate simple and entire leaves. *Stipules* none.

UVARIÆ.

Petals in 2 rows, 1 or both rows imbricate in bud. *Stamens* many, closely packed.

UVARIA, Linnæus.

Sepals 3, usually united at the base, valvate in bud. *Petals* 6, imbricate in 2 rows, sometimes united at base. *Stamens* indefinite, the connective foliaceous or truncate-dilated and produced beyond the anther-cells. *Torus* somewhat raised. *Ovaries* many, with numerous, rarely few, or a single ovule in each. *Berries* differently shaped, many or by abortion few to 1-seeded. Scandent, rarely erect shrubs with opposite leaves and usually conspicuous flowers.

× *Ovules* usually solitary, rarely 2 or 3. *Erect shrubs*.

U. FERRUGINEA, Ham. E.S.

The 'Eng' forests of the Irrawaddy zone, especially in Prome; also Upper Tenasserim.

Hooker gives *U. dulcis*, Dun., as a Burmese plant, but I suspect it is referable to this species (Kurz).

×× *Ovules many, rarely few. Scandent shrubs.*

§ *Flowers large.*

† *Carpels on long stalks.*

- U. PURPUREA, Bl. *E.S.S.* Martaban. Tenasserim.
 Flowers solitary. All parts tomentose.
 U. HIRSCUTA, Jack. *E.S.S.* Rare on the Eastern Slope of Pegu Range.
 Flowers solitary. All parts hirsute.
 U. PSYCHOCALYX, Miq. *E.S.S.* Not uncommon on Southern Slopes of
 Tha-bwöt-nweh. the Pegu Range and in Tenasserim.
 Flowers 2 or 3 on a peduncle. All parts minutely puberulous.

†† *Carpels sessile or on a very short stalk.*

§ *Flowers large.*

- U. MACROPHYLLA, Roxb. *E.W.C.* Mixed forests of Chittagong. Ava.
 Tha-bwöt-nweh. Pegu. Tenasserim.
 Peduncles 3-5-flowered. Carpels glabrous.
 U. BRACTEATA, Roxb. *E.W.C.* Tenasserim.
 Peduncles 1-2-flowered. Carpels tomentose.

§§ *Flowers minute. Berries long-stalked.*

- U. MICRANTHA, H.f. et Th. *E.W.C.* Pegu. Tenasserim. Andamans,
U. Sumatrana, Kz. Kamorta.

Mason describes the fruit of *U. purpurea* (*U. grandiflora*) as like the North American 'Pawpaw,' and as common in the Tenasserim jungles.

BOCAGEA, *St.-Hilaire.*

Sepals orbicular or ovate, imbricate. *Petals* 6, imbricate, in 2 series, nearly equal, concave. *Stamens* 6-21, imbricate, in 2 or more series, broadly oblong, thick, fleshy, the connective produced beyond the dorsal oblong anther-cells. *Ovaries* 3-6, with 1 or 2-8 ventral ovules in each. *Style* short. *Stigma* obtuse or capitate. *Berries* globose, stalked. Trees with shining leaves and small flowers.

- B. ELLIPTICA, H. f. et Th. *E.T.* Tenasserim.

UNONIEÆ.

Petals valvate in the bud, more or less spreading, somewhat unequal, or those of the inner row small or wanting, not or little narrowed at base.

* *Petals* spreading from the base.

× *Ovules many, ventral.*

ALPHONSEA, *Hooker, f. and Thomson.*

Sepals 3, small, valvate. *Petals* valvate, in 2 series, larger than the sepals, or the inner rather smaller. *Torus* cylindrical or hemispherical. *Stamens* numerous, loosely packed, the connective apiculate. *Ovaries* 1 or more, with 4-8 ventral ovules in 2 rows in each. *Style* oblong or depressed. *Berries* stalked or nearly sessile. Trees with coriaceous leaves. *Flowers* rather small, in leaf-opposed peduncled fascicles.

- A. (UVARIA) VENTRICOSA, Roxb. *T.* Chittagong. Andamans.
 Carpel as long or longer than the stalk.
 A. (UVARIA) LUTEA, Roxb. *T.* Ava.
 Stalk of carpels very short.

CANANGA, *Rumphius*.

Sepals 3, valvate in bud. *Petals* 6, valvate, in 2 rows, nearly equal or the inner smaller. *Stamens* indefinite, closely packed, the connective ovate, acute. *Torus* slightly convex and somewhat concave in the centre. *Ovaries* many, with numerous ovules in 2 rows. *Style* narrow oblong. *Stigma* capitate. *Berries* stalked. *Seeds* imbedded in pulp. A large tree, with rather large solitary or fasciated flowers.

C. (UVARIA) ODORATA, Lamk. Martaban. Tenasserim. Ava.
Uvaria axillaris, Roxb.
 Kalāt-ngān.

CYATHOSTEMMA, *Griffith*.

Sepals 3, connate. *Petals* 6, valvate, in 2 rows, with fleshy base, the inner ones rather smaller. *Torus* flat, with convex margin. *Stamens* many, linear. *Anthers* almost introrse, the connective process obliquely incurved. *Ovaries* many. *Style* cylindrical, notched. *Ovules* many, in 2 series. *Ripe carpels* turgid, many-seeded.

C. VIRIDIFLORUM, Griff. H. Tropical forests of South Andaman.

UNONA, *Linnaeus*.

Sepals 3, valvate. *Petals* 6, valvate in 2 rows, almost equal, or the inner ones smaller or wanting. *Stamens* numerous, closely packed, cuneate-4-gonous, the connective beyond the anther-cells globular or truncate-dilated. *Torus* somewhat raised, flat, or slightly concave. *Ovaries* numerous, with 2 or more ovules in a single row. *Style* ovate or oblong, rarely elongate. *Berries* usually stalked, often moniliform and elongate, rarely ovoid and continuous. Trees or shrubs, with rather large solitary flowers.

× *Petals* 6. *Berries* necklace-like, constricted between the seeds.

† *Petals* glabrous.

U. DUNALII, Wall. S.S. Chittagong.
 Leaves glabrous, pale below.

†† *Petals* appressed, pubescent.

U. DISCOLOR, Vhl. E.S. Tropical forests of Chittagong, Ava,
 Ta-nāt-sā (Mason). Tenasserim.
 Leaves glabrous, glaucous below. Peduncle 2-4 inches long. Petal 2 inches long by 1 inch broad.

U. DESMOS, Dun. E.S. Pegu. Martaban. Tenasserim. Katchall.
 Leaves beneath glaucous, and usually pubescent. Peduncle 4-8 lines long. Petals 2½ by 1 broad.

U. LATIFOLIA, H. f. T. Martaban. Deciduous forests on limestone rocks
 along the Ngā-choung of the Salween.
 Leaves while young greyish tomentose. Peduncle 4-8 lines long. Petals 1-1¼ inches long, oblong.

U. STENOPETALA, H. f. T. Tenasserim.
 Leaves pale coloured and below pubescent along the nerves.

††† *Outer petals* 3, large. *Inner ones* suppressed.

U. LONGIFOLIA, Roxb. E.S. Chittagong.
 Petioles rather long. Petals 4-6 inches long.

U. DASYMACHALA, Bl. E.S. Tropical forests of Ava, Andamans,
 Martaban, Tenasserim.
Pelticalyx argentea, Griff.

Leaves almost sessile, cordate at the base. Petals nearly 3 inches long.

- var. *a Blumei*, H. f. et Th.
var. *β Wallichii*, H. f. et Th.

POLYALTHIA, *Blume*.

Sepals 3, usually valvate. *Petals* 6, valvate, in 2 rows, but spreading or opened out long before full sized, nearly equal and flat. *Stamens* numerous, cuneate, the connective truncate dilated beyond the anther-cells. *Torus* slightly raised, flat, or slightly concave. *Ovaries* numerous, with 1 or 2 erect ovules. *Style* short, oblong, or capitate. *Berries* stalked, globose, or oblong, 1-seeded.

- × *Flowers hermaphrodite. Petals flat. Ovules solitary, erect.*
† *Flowers large. Carpels oblong, elongate, or cylindrical.*

- P. LATERIFOLIA, Bl. T. Tropical forests of Pegu, Martaban,
P. simiarum, Bth. Tenasserim, and the Nicobars.
G. spathulata, Y. et B.

Petals oblong-spatulate. Leaves glabrous, unicolorous.

- P. (GUATTERIA) SUMATRANA, Miq. E.S. Tenasserim.

Petals linear-lanceolate. Leaves glabrous, whitish beneath.

- P. (GUATTERIA) NITIDA, DC. E.T. Tenasserim.

Petals ovate, thick, rusty-velvety beneath.

- P. JENKINSII, Bth. et H. f. E.T. Tropical forests of South Andaman,
P. Andamanica, Kz. and adjacent islands.

Carpels elongate, oblong, glabrous. Leaves oblong, the nerves pubescent.

- †† *Flowers small on slender pedicels. Carpels pisiform.*

- P. (UVARIA) SUBEROSA, Roxb. D.T. Upper Tenasserim.

Leaves blunt, nerves beneath pubescent.

- P. (UVARIA) CERASOIDES, Roxb. S.T. Prome.
P. bifaria, Bth.

Leaves acuminate, pubescent beneath.

- ×× *Flowers hermaphrodite. Petals flat. Ovules 2, superposed, ascending.*

- P. DUBIA, Kz. E.S. Tropical forests of Andamans var. *a*,
and Upper Tenasserim var. *β*.

- var. *a glabriuscula*. Leaves and branchlets glabrescent.
var. *β Falconeri*. Leaves and branchlets pubescent below.

P. COSTATA, H. f. et Th., is a small tree of Tenasserim imperfectly known, and referred by H. f. and Th. to *Tricalvaria*.

ANAXAGOREA, *St-Hilaire*.

Sepals 4, valvate, connate at base. *Petals* 6, valvate, nearly equal, in 2 series. *Torus* convex. *Stamens* indefinite. *Anther-cells* extrorse or sub-lateral, the connective with a terminal process. *Ovaries* few or many. *Style* variable. *Ovules* 2, almost basilar, collateral, ascending. *Ripe carpels* dehiscent, follicle-like, stalked. *Seeds* 1 or 2, shining. Shrubs, with small white, leaf-opposed flowers.

- A. LIZONENSIS, A. Gray. E.S. Pegu Range. Martaban. Andamans.
A. Zylanicæ, H. f. et Th.

CYATHOCALYX, *Champion*.

Sepals united in a cyathiform 3-toothed calyx. *Petals* 6, free, valvate in 2 rows, concave at base. *Stamens* numerous, the connective truncate-dilated beyond the anther-cells. *Torus* depressed, conical, concave. *Carpels* solitary, with many ovules

in a double row along the ventral suture. *Stigma* large, peltate. *Berry* ovoid, large. Small trees, with glabrous leaves, and solitary or clustered flowers.

C. MARTABANICUS, H. f. et Th. *E.T.* Martaban. Tenasserim.

XYLOPIÆ.

Petals valvate, connivent or hardly open, those of the outer row usually thick, not narrowed at base, and inclosing the 3 inner, smaller or minute ones, or the latter wanting.

* *Ovules* solitary.

ANONA, *Linnaeus*.

Sepals 3, valvate. *Petals* usually 6, valvate, in 2 series, the outer ones fleshy, connivent or almost spreading, the inner ones almost conform, but somewhat smaller, rarely wanting. *Stamens* numerous, the connective, beyond the anther-cells, ovate. *Torus* hemispherical. *Ovaries* numerous, usually united with a solitary ovule in each. *Style* oblong. *Berries* fleshy, connate into a many-celled oval or globular fruit. Trees or shrubs with solitary, terminal, or leaf-opposed flowers. The genus is indigenous to America.

× *Fruit* arcolate.

* A. SQUAMOSA, L. Cultivated.

Au-zā. Custard apple.

Leaves usually blunt, fruits with prominent convex arches.

* A. RETICULATA, L. Cultivated.

Bullock's heart.

Leaves acuminate. Arcoles of fruit barely convex.

× × *Fruit* very large. *All parts* glabrous.

* A. MURICATA, L. Cultivated in Burma and the Nicobars.

Sour sop.

ARTABOTRYS, *R. Brown*.

Sepals 3, valvate in bud. *Petals* 6, valvate in 2 rows, concave at base, the flat or terete limb more or less spreading. *Stamens* numerous, the connective truncate dilated beyond the anther-cells. *Torus* plano-convex. *Ovaries* numerous, with 2 erect ovules in each, the style ovate, or linear-oblong. *Berries* variously shaped. Shrubs with yellow or yellowish-white flowers, solitary or clustered.

§ *Petal-limb* flattened. *Petals* oblong lanceolate.

× *Flowers* rising from hooked peduncles.

A. CRASSIFOLIUS, H. f. et Th. *E.W.C.* Tenasserim.

Leaves firmly coriaceous and glabrous. Young parts rusty-tomentose.

A. ODORATISSIMUS, R. Br. Martaban. Tenasserim. Ava.

A. hamatus, Bl.

Uraria nucata, Roxb.

A. Blumei, H. f.

A. intermedius, Hassk.

Leaves thin coriaceous, glabrous.

× × *Flowers* rising without peduncles from lateral branchlets.

A. KURZII, H. f. et Th.

Eng forests of the Irrawaddy region.

Adult parts all glabrous.

Toukya-gat. Martaban.

§§ *Petal-limb terete or triquetrous, fleshy, subulate or linear.*

A. BURMANICUS, DC. *E.W.C.* Ava. Pegu. Tenasserim.
Rhopalopetalum uniflorum, Griff.

Petals triquetrous. Leaves pubescent below.

A. SUAVEOLENS, Bl. *E.W.C.* Chittagong. Tenasserim.

Petals terete. All parts glabrous.

POPOWIA, *Endlicher*.

Sepals 3, ovate, valvate. *Petals* 6, valvate in 2 series, the outer ones sepal-like, spreading, the inner ones thick, concave, connivent, acute or the tips reflexed. *Stamens* indefinite or nearly so, cuneate. *Anther*-cells dorsal, remote. *Ovaries* few, about 6, ovoid. *Style* oblong or almost clavate, straight or recurved. *Ovules* 1-2 on the ventral suture, rarely 1 and basilar. *Carpels* berry-like, stalked. Trees with extra-axillary or leaf-opposed flowers.

P. HELPERI, H. f. et Th. Tropical forests of South Andaman and adjacent islands.

P. PARVIFLORA, Kz. Tropical forests of Kamorta. Car Nicobar. Trice and Track.

Berries 3-1-seeded.

MITREPHORIEÆ.

Petals valvate, the outer ones open, the inner ones erect, connivent or connate at their tips and often claw-like, narrowed at the base.

* *Petals of the inner row shorter or equally long.*

† *Petals not narrowed at the base or the claw-like base broad.*

OXYMITRA, *Blume*.

Sepals 3, valvate, usually united at base. *Petals* 6, valvate in 2 series, the outer ones elongated, narrow, the inner smaller and broader, sometimes narrowed at base. *Stamens* numerous, linear oblong, the connective truncate. *Torus* conical or almost truncate. *Ovaries* many, with 1 or 2 ascending ovules in each. *Style* obovate. *Berries* stalked, 1-seeded. Shrubs or trees with usually large solitary flowers.

× *Sepals* short coriaceous, 2-3 lines long.

O. STENOPETALA, H. f. et Th. *S.* Upper Tenasserim.

Petals from a broad base narrowly linear, nearly 2 inches long, slightly pubescent.

O. MACCLELLANDII, H. f. et Th. *E.S.* Pegu Range.

Petals oblong lanceolate, blunt, very thick, tawny puberulous.

O. UNONIFOLIA, H. f. et Th. Tenasserim. Tavoy.

Imperfectly known.

×× *Sepals* large, membranous, nerved, 7-8 lines long.

O. (UVARIA) FORNICATA, Roxb. *S.S.* Tenasserim and South Andaman.

GONIOTHALAMUS, *Blume*.

Sepals 3, usually large, valvate. *Petals* 6, in 2 rows valvate, the outer ones flat, the inner ones united in a conical mitre, and at base narrowed into a broad claw. *Stamens* numerous, the connective beyond the anther-cells ovate or capitate. *Torus* truncate, or excavate in the centre. *Ovaries* numerous with 2 superposed ovules in each. *Style* oblong or elongated. *Berries* 1-seeded. Small trees or shrubs, with solitary, axillary, or lateral flowers.

G. SESQUIPEDALIS, Wall. *E.S.* Ava. Khakyen Hills. Tenasserim.

Flowers about 9 lines long.

G. GRIFFITHII, H. f. et Th. *E.S.* Pegu Range, East side, Martaban, Tenasserim.
Flowers about 2 inches long.

MELODORUM, *Dum.*

Sepals 3, small, united at base, valvate. *Petals* 6 in 2 rows, valvate, nearly conform and thick-fleshy, the inner ones smaller, or triquetrous upwards. *Stamens* numerous, the connective beyond the anther-cells, oblong or truncate. *Torus* conical. *Ovaries* numerous, with 2 or more ventral ovules in each. *Style* oblong. *Carpels* berry-like, stalked. Shrubs, often scandent, with terminal or leaf-opposed flowers.

× *Calyx* cup-shaped, 3-lobed. *Flowers* 4-5 inches long.

M. MACRANTHUM, Kz. *E.T.* Tropical forests of South Andaman.

× × *Calyx* deeply trifid. *Flowers* small, 1 inch or less.

M. RUBIGINOSUM, H. f. et Th. *E.S.S.* Tropical forests of Chittagong,
Flowers an inch long. *Carpels* tomentose. Martaban, Tenasserim.

M. SCANDENS, Griff. Tenasserim.

M. Griffithii, H. f. et Th. *S.S.*
Flowers 3-4 lines long.

M. VERRUCOSUM, H. f. et Th. *W. C.* Ava. Khakyen Hills.

Flowers nearly an inch long. *Carpels* densely verrucosely pubescent.

M. (UVARIA) BICOLOR, Roxb. *E.S.S.* Pegu Range, Western Slopes. Ava.
Flowers 1 inch long. *Carpels* almost glabrous.

†† *Petals* narrowed into curved not angular free slender claws, the laminae cohering in a sort of mitre.

MITREPHORA, *Blume.*

Sepals 3, orbicular or ovate. *Petals* 6, in 2 rows, valvate, the outer ones free and spreading, the inner ones clawed and cohering, their blades forming a mitre. *Stamens* oblong, cuneate, the connective truncate-capitate. *Ovaries* many, with many ovules in each, attached to the suture in 1 or 2 rows. *Style* oblong. *Berries* stalked. Trees or shrubs, with rather conspicuous flowers.

× *Flowers* small, dioecious, about 3 lines long.

M. (UVARIA) RETICULATA, Bl. *S.T.* Tenasserim.

× × *Flowers* conspicuous, 1-2 inches in diameter.

M. TOMENTOSA, H. f. et Th. *T.* Chittagong. Pegu Range.

Leaves tomentose beneath. Flowers on short and thick pedicels.

M. VANDEFLOA, Kz. Chittagong. Pegu Range. Martaban.

Leaves almost glabrous. Flowers 1 inch in diameter, and on long slender pedicels.

There is a variety, *chartacea*, with broader leaves, thin papery, and above glaucous. Wood is light-brown and perishable (Kurz).

OROPHEA, *Blume.*

Sepals 3, valvate. *Petals* 6, valvate, in 2 series, the inner ones clawed and cohering with their tips into a mitre-shaped cap. *Stamens* 6-12, ovoid, fleshy; the anther-cells dorsal, large, continuous. *Ovaries* 3-15, with 4 ovules in each. *Style* short or none. *Berries* 1- or few-seeded. Trees or shrubs, with usually small axillary flowers, solitary, fasciated, or cymose.

* *Flowers* very small, hardly 2 to 3 lines in diameter.

O. POLYCARPA, A. DC. Tropical forests of the Andamans and
Melodorum monospermum, Kurz. the Salween Valley.

Leaves glabrous. *Sepals* minutely hispid, ciliate. *Carpels* globular, stalked.

O. HEXANDRA, Bl. Tenasserim.
O. acuminata, A. DC.

Leaves along the nerves pubescent. Sepals densely pubescent. Carpels elongated, oblong, sessile.

* * *Flowers rather large, about an inch in diameter.*

O. KATSCHALLICA, Kz. Katchall (Nicobars).

“It comes nearest to *O. Brandisii*” (Kurz).

O. BRANDISII, H. f. et Th. Tropical forests of Tenasserim.

Leaves rather large, pubescent beneath.

SACCOPE TALUM, Bennett.

S. HORSFIELDII, Benn. Katchall.

MELIUSA, Leschenault.

Flowers usually dioecious. *Sepals* 3, minute, valvate, usually reflexed. *Petals* 6, valvate, in 2 series, the outer ones minute and usually conform with the sepals, the inner ones much longer, erect, connivent, sometimes cohering. *Stamens* few or numerous, the connective hardly apiculate. *Torus* cylindrical. *Ovaries* numerous, with 1 or 2, rarely more, ventral ovules in each. *Style* oblong. *Berries* globular or oblong. Trees with solitary or clustered flowers.

× *Pedicels 2-4 inches long.*

M. (UVARIA) VILLOSA, Roxb. Ava. Pegu. Rare in Tenasserim.

M. velutina, H. f. et Th.

Tha-bwõt-gyi.

Tomentose. Berries tomentose. Shortly stalked.

× × *Pedicels short, only 6-10 lines long.*

M. (HYALOSTEMMA) ROXBURGHIANA, Wall. T. Chittagong. Tenasserim.

M. (Uvaria) dioica, Roxb.

Pheanthus dioicus, Kz.

Branchlets and leaves beneath rusty-pubescent. Flowers about $\frac{1}{2}$ an inch long. Pedicels bracted.

M. TRISTIS, Kz. E.T. Ava. Khakyen Hills.

Leaves glabrous. Flowers nearly an inch long. Pedicels bracted.

M. SCLEROCARPA, Kz. T. Martaban. Tenasserim.

Almost glabrous. Pedicels without bract.

* *Sepals usually 5 or fewer. Petals uni-seriate.*

Order DILLENIACEÆ.

Sepals usually 5 (rarely 4 or 6), persistent, imbricate in æstivation. *Petals* 5, rarely fewer, deciduous. *Stamens* usually indefinite and free, rarely variously connate at base. *Anthers* adnate, dehiscing by lateral slits or by terminal pores. *Gynæcium* free, of 1 or many distinct or coherent carpels. *Ovules* solitary, or many in each carpel. *Styles* distinct, terminated by a single stigma. *Ripe carpels* either capsule-like, and opening along the top edge, or succulent and indehiscent, rarely crustaceous. *Seeds* solitary or many, with an arillus. *Embryo* very small at the base of a fleshy albumen. Most species of this Order possess astringent properties. The very scabrous leaves of some are used for polishing wood. The fruits of *Dillenia* enveloped in the enlarged fleshy calyx are eaten either raw or cooked.

DILLENIEÆ.

Filaments equal. Anther-cells parallel. Trees or herbs.

DILLENIA, *Linnaeus.*

Sepals and petals 5, spreading. Stamens almost free. Carpels 5-20, adhering to the axis and united only by the ventral margin. Styles as many, stellately reflexed. Obovate many, in 2 rows. Fruit indehiscent, almost berry-like, 5 to many-celled, inclosed in the fleshy calyx. Seeds in pulp, or pulpless without arillus. Trees with large parallel-nerved leaves. Flowers white or yellow, solitary or in lax panicles.

× *Seeds along the margin hairy. Flowers very large, white.*

- D. INDICA, L. *E.T.* Martaban. Tenasserim. Rather rare
D. speciosa, Thbg. in the Pegu Range.
D. elongata, Miq.

Tha-hpyu.

×× *Seeds smooth. Flowers yellow.*

† *Calyx pubescent. Flowers solitary.*

- D. PULCHERRIMA, Kz. Pegu. Martaban.
 Byu or Hpyu.
 Peduncles very long, straight. Styles 12.
 D. AUREA, Sm. *H.S.* Martaban. Tenasserim.
C. ornata, Wall.
 Peduncles short and thick. Styles 10.
 D. PILOSA, Roxb. Andamans. Nicobars.
 Peduncles very long and slender. Styles 6.

The insular species may require separation, as Kurz writes of it: "I formerly identified this tree with Roxburgh's, but I now entertain great doubts as to the correctness of my identification, having ascertained that the insular species is a Southern form, which is unlikely to extend so far North as Assam" (J.A.S.B. 1876, Part ii. p. 115).

†† *Flowers fasciated.*

- D. PARVIFLORA, Griff. Pegu. Tenasserim, to 2000 feet.
 Calyx and peduncles densely tomentose. Styles 5-7.
 ††† *Calyx and peduncles glabrous. Flowers fasciated.*
 D. SCABRELLA, Roxb. Chittagong.
 Peduncles bracted.
 D. PENTAGYNA, Roxb. *H.S.* Pegu, Tenasserim to 2000 feet, M.F.
D. floribunda, H. f. and Th.
 Zyu-bywōn or Zym-byun.
 Peduncles without bracts.

Mason calls the trees of this genus the "Magnolias of Burma," but in opposition to general belief considers the wood to be the reverse of durable. Most authorities however describe the wood of the *Dillénias* as strong and good, though rather coarse. The large fruits the size of a small melon have when ripe a very pleasant smell, something like that of an apple, but are terribly astringent. Elephants are however very fond of them, and Mason says they are brought to the bazaars, and are a favourite fruit with the natives, who put them into their stews or 'messes,' for a Burman does not eat curry, or any dish containing butter. To the habitual chewers of 'pān' the rough astringent flavour is doubtless not so disagreeable as it is to the palate of a European.

ACROTREMA, *Jackson.*

Carpels 3. Stemless herbs, with radical leaves.

- A. COSTATUM*, Jack. Maulmain.
A. Wightianum, Wall.

DELIMIEÆ.

Filaments more or less dilated at apex. *Anthers* short, the cells diverging, or rarely parallel. *Woody* climbers.

DELIMA, *Linnaeus.*

Sepals 5. *Petals* 2-5. *Filaments* dilated at the upper end; outer cells much diverging. *Carpel* solitary, 2-3-ovuled, almost globose, narrowed in a subulate style. *Ripe carpels* follicle-like, coriaceous. *Seed* solitary, with a cup-shaped toothed arillus. Climbers, with harsh leaves and small paniced flowers.

- D. SARMENTOSA*, L. *E.W.C.* Chittagong. Ava. Pegu. Andamans.

TETRACERA, *Linnaeus.*

Sepals 4-6. *Petals* as many or fewer. *Filaments* dilated at apex. *Anther-cells* distinct, or more or less diverging. *Carpels* 3-5, rarely fewer, many-ovuled. *Ovules* in rows. *Ripe carpels* follicle-like, coriaceous, 1-5-seeded. *Arillus* lacerate. Climbers, with usually harsh leaves, and small white paniced flowers.

- T. ASSA*, DC. *E.C.* Chittagong.
T. trigyna, Roxb.
T. HYGROPHILA. Swamps between the Hlein and Irrawaddy Rivers.

Order RANUNCULACEÆ.

Flowers hermaphrodite, regular, sometimes irregular and spurred. *Sepals* 3-5, often petaloid, deciduous, rarely wanting. *Stamens* indefinite. *Anthers* adnate, opening by lateral slits, filaments subulate. *Arillus* none. *Stipules* none. Herbs or shrubs with opposite or alternate leaves. Many of the herbaceous species possess acrid vesicatory and poisonous properties. A virulent poison is obtained from a species of *Aconitum* in the hills North of Ava.

CLEMATIDIEÆ.

Sepals valvate. *Carpels* inbhiscent, with a solitary ovule or seed in each. *Leaves* opposite. Usually woody climbers.

CLEMATIS, *Linnaeus.*

No petals, or if any they gradually pass into stamens. *Leaves* without tendrils. The stems when fresh are often used for ropes and are very strong.

× *Achenes* simply braked, without feathery tail. *Flowers* large.

- C. (THALICTRUM) BRACTEATA*, Roxb. *C.* Ava.
C. cadmia, Ham.

× × *Achenes* terminating in a feathery tail.

† *Leaves* simple. *All parts* glabrous.

- C. SMILACIFOLIA*, Wall. *W.C.* Ava. Tenasserim.
C. subpeltata, Wall.
C. Munroana, Wight.
C. inversa, Griff.

†† *Leaves* compound.

- C. HEYDYSARIFOLIA*, DC. *W.C.* Pegu (?).
Anthers terminating in a subulate appendage.

- C. GOURIANA, Roxb. C. Ava. Tenasserim.
 Leaflets serrate, glabrous, shining.
- C. SUBUMBELLATA, Kz. W.C. Martaban. Karen-ni.
C. floribunda, Kz.
 Leaflets entire, tomentose.
- C. HOTILE, Kz. S.S. Khakyen Hills.
 Leaflets entire, glabrous.
- C. ACUMINATA, DC. W.C. Martaban. Toung-ngoo 3000 to 4000
 feet. Ava. Khakyen Hills.
 Filaments hairy. Flowers small.
- C. BUCHANANTIANA, DC. W.C. Martaban Hills.
 Filaments hairy. Flowers large.

NARAVELIA, *De Candolle.*

Petals terete, abruptly separated from the stamens. *Leaves* 2-foliolate, the petiole tendril-bearing. Woody climbers of the tropical plains.

- *N. (ATRAGENE) ZEYLANICA, L. Pegu. Ava.
N. dasyneura, Korth.
 Leaves tomentose.
- *N. LAURIFOLIA, Wall. Martaban. Tenasserim.
 All parts quite glabrous.

RANUNCULIÆ.

Sepals imbricate. *Carpels* with a solitary ascending ovule or seed in each. *Achenes* indehiscent. *Herbs* or perennials.

RANUNCULUS, *Linnaeus.*

- *R. DIFFUSUS, DC. Ava. Bhamo.
R. sub-pinnatus, W.A.
 A spreading creeping pubescent annual.
- *R. SCLEBRATUS, L. On mud banks between Prome and Henzadah.
R. Indicus, Roxb.
 An erect, glabrous, somewhat succulent annual.

HELLEBORIÆ.

Sepals imbricate. *Petals* small, deformed, or sometimes none. *Carpels* many-seeded, dehiscent. Usually herbs.

NIGELLA, *Linnaeus.*

Petals small or clawed, never spurred. *Carpels* more or less connate.

- *N. SATIVA, L.
N. Indica, Roxb.

Sa-mung-net. The small fennel flower, or 'Devil in a bush,' or the 'Kalonja,' or 'Kala-jira,' of Indian Bazaars. "The seeds of this plant, which were formerly used for pepper, are valued by the inhabitants for their carminative properties, but the plant is rarely seen in cultivation. The Hebrew word which in Isaiah is rendered 'fitches' designates this plant, but not in Ezekiel, where the original word for 'fitches' signifies 'spelt,' a species of wheat" (Mason).

The seeds are black, triangular, and have been likened to coarse gunpowder. They are warm and stimulating, and therefore used to mix with unpalatable drugs.

They are also supposed to stimulate the secretion of milk, and are mixed in curry or administered to nursing mothers with that object, and they enter into the composition of chutnies.

DELPHINIUM.

Petals small, 2-4, the two upper prolonged into a pointed spur.

* D. AJACIS.

Cultivated.

Larkspur.

Having now completed the review (so far as the imperfect record in the foregoing pages deserves the name) of the plants and animals of Burma, nothing remains for the Editor save to close his labours with an expression of the strong testimony which, in his opinion, the contemplation of the works of Nature bears to the presence throughout of Providential design. Theology has been too much discredited, and rightly, by the well-meant and sincere, but not the less absurd and misdirected efforts of schoolmen, to elucidate the mystery of the unseen and declare the laws and principles of the universe, in accordance with their own preconceived views of the fitness of things. In the hands even of a Milton, and as an avowed effort of the imagination, this tampering with the impenetrable mystery of being, with the result of making "God the Father turn a School divine," is at the present day somewhat of a pitiable spectacle, but when pressed further, and identified with a dogmatic assertion of spiritual truth, becomes offensive and (using the phrase in its proper sense) blasphemous—"Who is this that darkeneth counsel by words without knowledge?" Job. xxxviii. 2.

With a wider knowledge of Nature than was possessed by schoolmen of this class, came a reaction against all confident assertions of the relation of man to the universe, resulting in that form of 'agnosticism,' which those of the 'old religion' characterize by a harsher and more opprobrious term. Here the study of Nature comes in as a corrective, just as the mediæval conception of a camel, as it was presumed to be, stands corrected by our knowledge of a camel, as we find that it now-a-days is; and whilst admitting that there are some subjects, which, even in their physical relations, such, for example, as matter and space, we must admit to be beyond the grasp of the human mind, yet that same mind, limited as its powers are in particular directions, nevertheless compels us to admit that all we see around us is not the result of blind chance. In the very existence of the creature, an 'agnostic' may read in signs not to be misunderstood the antecedent interference of a Creator, and without attempting to fathom what by us is unfathomable, we are compelled to own that inanimate nature teaches a no less significant lesson than does the animate world, whereof we ourselves are a part, of the power, glory, and pervading presence of the unseen Author of all.

Sol qualis niteat, quali sit origine natus,
 Indicia, assiduo dum redit orbe, facit;
 Per quascumque vagum late jubar extulit oras,
 Sedulus Artificem predicat ille suum.

Cum modo victrices descendunt Vesperis umbræ,
 Excipit alternam luna diserta vicem;
 Et sua miranti memorans primordia terræ,
 Edita quo fundat lumina forte, refert.

Illius ætherium quot servant sidera cursum,
 Quot gyri in cælo, noctivagæque faces,
 Singula confirmant cantu, quæ singula narrant
 Et capit unanimes axis uterque modos.

Psalm xix. W. G. Humphrey, *Arundines Carm.* p. 315.

APPENDIX A.

PART I. ADDENDA.

THE following list of plants is composed mainly of species (communicated to me by the Rev. C. Parish) which, though referred in the Flora Indica to Burma, are not mentioned by Kurz, in some cases perhaps, from their not being recognized specifically by that botanist, in others, from his not being possessed of the store of materials accumulated at Kew. A few species already enumerated, but again given for some additional information of habitat or synonymy, are included in brackets, and for fuller details the reader is referred to Hooker's great work above quoted.

P. 145 (before POTAMEÆ).

Order APONOGETEÆ.

APONOGETON UNULATUM.

An aquatic stemless herb, with starchy rhizome.

P. 220 (before BALANOPHOREÆ).

Order PODOSTEMACEÆ.

Aquatic herbs, sometimes frondose, often resembling *Alge* or *Hepaticæ*. One genus only is Indian.

EUPODOSTEMACIÆ.

Flowers hermaphrodite, without perianth, and inclosed in an involucre. Ovary 2-3-celled with axile placentas, or 1-celled with a central placenta.

HYDROBYTUM LICHENOIDES, Kz.

Martaban.

Leaves very few, scale-like at the base of the pedicels. Pedicels filiform, half a line long. Capsules globose, a quarter line in diameter, broadly 8-ribbed. Rhizome broad, lobed and membranous, applied to the earth or rocks, and up to 3 lines in length. Discovered by the Rev. C. Parish near Maulmain.

Order CERATOPHYLLIÆ.

Flowers monœcious, sessile in the axils of the leaves, involucrate, aclamydous. Anthers numerous. Ovary 1-celled and 1-ovuled. Ovule pendulous, orthotropous. Albumen none. Aquatic, submerged, branched herbs.

CERATOPHYLLUM, *Linnaeus*.

Stamens several. Styles 2. Fruit a nut.

C. DEMERSUM, L.

C. verticillatum, Roxb.

Page 220. Order BALANOPHOREÆ.

LANGSDORFFIA INDICA. Hook. Icones, Plantarum, tab. 205 b.

A parasite on roots of trees.

Page 221. Order SANTALACEÆ.

HENSLOWIA HOOKERIANA. Tenasserim. Maulmain.

Page 280. Order PROTEACEÆ (after ELEAGNEÆ).

* GREVILLEA ROBUSTA.

A tree of Australia with pinnatifid fern-like leaves of a prevailing grey colour. Mr. Parish adds: "I introduced it into Maulmain, and left two fine specimens at my departure, one in my compound in cantonments, and the other in the Burial-ground. They must have been 30 feet high when I left."

P. 317. Order ACANTHACEÆ.

„ EBERMERIA LEUCOBOTRYS.

P. 321. Order GESNERACEÆ (after EPITHEMA).

„ BEA. sp.

P. 322. Order UTRICULAREÆ (LENTIBULARIACEÆ).

„ UTRICULARIA FLEXUOSA, Vahl.

P. 331. Order CONVOLVULACEÆ.

„ IPOMEA FILICAULIS, Bl.

P. 333. CALYSTEGIA HEDERACEA.

P. 344. Order APOCYNÆÆ.

„ CARISSA SPINARUM, A. DC.

P. 345. RAUWOLFIA PEGUANA, Kz.

„ R. MICROCARPA, Hook. f. Upper Burma (Wallich).

„ OCHRORHIZA BORBONICA, Gmel.

P. 346. HUNTERIA CORYMBOSEA, Roxb. Tavoy.

P. 348. (VALLARIS HEYNEI).

Kurz says: "The follicles are always solitary." "On the contrary, having had an immense plant of this species under my eye for many years, I can testify to their being as often twin."—C. Parish.

P. 348. PARAMERIA POLYNEMA, H. f.

P. 350. MICROCHITES POLYANTHA, Miq.

„ WRIGHTIA TOMENTOSA, Roem. et Schult.

„ STROPHANTHUS WALLICHII, A. DC.

P. 371. Order VACCINIACEÆ.

„ (AGAPETES MACROSTEMON, Clarke) = V. SEIFIGERA, Don.

„ A. SALIGNA, Hook. f. Maulmain, 5000 feet (Lobb).

„ A. PARISHII, Clarke. Nāt-toung, 6000 feet (Parish).

„ A. MACRANTHA, Hook. f. Kalā-mā-toung (Lobb).

„ A. BRACTEATA, Hook. f. Dauna-toung, 5000 feet (Parish).

„ A. CAMPANULATA, Clarke. Nāt-toung (Parish).

P. 372. VACCINIUM ARDISIODES, Hook. f. Nāt-toung (Parish).

„ V. BANCANUM, Miq. Martaban (Kurz).

P. 373. Order ERICACEÆ.

Parish records *R. Veitchianum* from Moolce-it at 6000 feet.

and *R. PARISHII*, Clarke. Moolce-it.

- P. 374. Order CAMPANULACEÆ.
 ,, CODONOPSIS CELEBICA, Bl. Chittagong. Burma.
 P. 375. LOBELIA MICROCARPA, Clarke. Tenasserim.
 ,, L. TRIALATA, Ham. Pegu at 5000 feet.
 ,, L. PYRAMIDALIS, Wall. Syn. of L. WALLICHIANA.
- P. 379. Order COMPOSITÆ.
 ,, WEDELIA WALLICHII, Less.
 P. 382. ARTEMISIA CARUIFOLIA, Ham. At 5000 to 6000 feet.
 P. 383. INTLA EUPATORIODES, DC.
 P. 385. GNAPHELIUM PULVINATUM, Delile.
 ,, SPILERANTHUS AFRICANUS, L.
 P. 389. LAGGERA ALATA, Schultz.
 P. 390. CONYZA VISCIDULA, Wall.
 ,, C. STRICTA, Willd.
 P. 392. DICROCEPHALA LATIFOLIA, DC.
 ,, LAGENOPHORA BILLARDIERI, Cass.
 ,, GYNURA ANGULOSA, DC. Maulmain (P.).
 ,, G. PSEUDO-CHINA, DC. Martaban. K. (?).
 P. 394. SENECIO ZEYLANICUS, DC.
 ,, S. DENSIFLORUS, Wall. Tenasserim (Parish).
 ,, var. *Parishii*. Nāt-toung at 6000 feet (Parish).
 ,, var. *Lobbii*. Thoung-yeen at 5000 feet (Lobb).
 P. 398. VERNONIA HELFERI, H. f.
 ,, V. LOBBII, H. f.
 ,, V. CLIVORUM, Less.
 ,, V. CINEREA, L.
 ,, V. SOLANIFOLIA, Benth.
 ,, V. PARISHII, H. f. Hills along the Attaran (Parish).
 ,, V. SCANDENS, DC.
 P. 400. SAUSSUREA AFFINIS, Spreng.
 P. 401. CREPIS ACAULIS, H. f.
 ,, C. SILHETENSIS, H. f.
- (Included no doubt by Kurz under C. JAPONICA.—W.T.)
 P. 402. PRENANTHES HOOKERI, Clarke. Martaban Hills (Kurz).
 ,, LACTUCA SAGITTEFOLIA, Clarke. Upper Burma.
 ,, L. POLYCEPHALA, Clarke.
- P. 436. Order UMBELLIFERÆ.
 ,, PIMPINELLA INVOLUCRATA, Roxb. = *Carum Roxburghianum*, Benth.
- P. 440. Order FICOIDEÆ.
 ,, TRIANTHEMA MONOGYNE, L. = *T. obovata*, Roxb.
- P. 443. Order BEGONIACEÆ.
 ,, BEGONIA DUX, Clarke. Moolce-it (Parish).
 ,, B. ALBOIDA, Clarke. Limestone Rocks, Maulmain (Parish).
 ,, (*B. Cathartii*, H. f.). Syn. of B. NEMOPHILA, Kz. (Parish).
 ,, (*B. MODESTIFLORA*, Kz.). Limestone Hills, Maulmain (Parish).
 ,, (*B. SURCULIGERA*, Kz.). Arakan.
 ,, B. TRICUSPIDATA, Clarke. Limestone Hills, Maulmain (Parish).
 ,, B. TRIRADIATA, Clarke. Limestone Hills, Maulmain (Parish).
 ,, B. MAULMAINENSIS, Clarke. Maulmain (Lobb).

- P. 443. *B. BARBATA*, Wall. Burma and Chittagong.
 ,, *B. INTEGRIFOLIA*, Dalzell. Maulmain (Parish).
 ,, *B. GONDIOTIS*, Clarke. Burma at 3000 to 4000 ft. (Griffith).
 ,, *B. SANDALIFOLIA*, Clarke. Burma (Griffith).
 ,, *B. PARISHII*, Clarke. Limestone Hills, Maulmain (Parish).
 ,, *B. CRENATA*, Dryander. Tenasserim (Helfer).
 ,, *B. DELICATULA*, Parish. Limestone Rocks, Maulmain (Parish).
 ,, *B. FIBROSA*, Clarke. Limestone Rocks, Maulmain (Parish).

P. 445. Order CUCURBITACEÆ.

- ,, *TRICHOSANTHUS PALMATA*, Roxb. = *T. bracteata*, Kz.
 ,, *T. MULTILoba*, Miqnel. Bhamo.

P. 446. *LUFFA ACUTANGULA*, Roxb.P. 447. (*THLADIANTHA DUBIA*, Bunge).

A Japanese plant. The confusion arose out of a misrepresentation in Bot. Mag. t. 5469.

- P. 447. *MOMORDICA BALSAMINA*, L.
 ,, **CITRULLUS COLOCYNTHIS*, Schrad. Cultivated.
 P. 448. **CUCURBITA MAXIMA*, Duch. Cultivated.
 ,, **C. PEPO*, DC. Cultivated.
 ,, *MELOTHRIA WALLICHII*, Clarke. Prome (Wallich).
 P. 449. *RHYNCHOCARPA FETIDA*, Schrad. Ava (Wallich).
 ,, *ALSOMITRA CLAVIGERA*, Hook. f. Tenasserim (Helfer).
 ,, *ZANONIA INDICA*, L.

P. 450. Order SAMYDACEÆ.

- ,, *CASEARIA GRAVEOLENS*, Dalz.
 ,, *C. tomentosa*, Roxb. = *C. CANZIALA*, Wall.
 ,, *C. LOBBIANA*, Turczaninow. Maulmain (Lobb).
 ,, *C. KURZII*, Clarke.
 P. 456. *AMMANIA BUCCIFERA*, L. Burma.

P. 458. Order LYTHRARIÆ.

- ,, *SONNERATIA ALBA*.

P. 461. Order MELASTOMACEÆ.

- ,, *OTANTHERA MOLUCCANA*, Bl. Mergui (Griffith).
 ,, *O. NICOBARIENSIS*, Teysm. Nicobars.
 ,, *PHYLLAGATHIS ROTUNDIFOLIA*, Bl. Andamans (Helfer).
 P. 462. *OXYSPORA VAGANS*, Wall. Chittagong (Roxb).
 P. 463. *SONERILA RECTA*, Jack. Maulmain (Lobb).
 ,, (*S. PICTA*, Korth.). Maulmain (Parish), Mergui (Griff.).
 ,, *S. NUDISCAPE*, Kurz. Mergui (Griffith), Andamans (Helfer).
 ,, (*S. MACULATA*, Roxb.) = *S. Brandisiana*, Kurz.
 ,, (*SARCOPIRAMIS LANCEOLATA*, Wall.) = *S. Nepalensis*, Wall.
 ,, (*ASPLECTRUM cyanocarpuum*) = *A. GLAUCUM*, Triana.
 ,, *MARI MIA RETICULATA*, Bl. Tenasserim.
 P. 464. (*MEMECYLON LEVIGATUM*) = *M. pachyderma*, Wall.
 ,, (*M. CELESTRINUM*, Kz.) = *M. GRANDE*, Ritz. var.
 P. 466. (*M. FIDULE*, Roxb.) = *M. umbellatum*, Burm.
 ,, *M. punctatum*, Presl. = *M. scutellatum*, Nand.
 ,, *M. ovatum*, Smith.
 ,, *M. HETEROPLEURUM*, Bl. Burma (Griffith).
 ,, *M. GRANDE*, Retz.
 ,, **M. AMPLEXICAULE*, Roxb. In gardens.
 ,, *M. INTERMEDIUM*, Bl.

- P. 466. Order MYRTACEÆ.
 ,, BECKIA FRUTESCENS, L. Burma (Griffith).
 ,, LEPTOSPERMUM JAVANICUM. Maulmain (Lobb).
- P. 450. Order SAMYDACEÆ.
 ,, CASEARIA GRAVEOLENS, Dalz.
 ,, C. TOMENTOSA, Roxb.
 ,, C. ESCULENTA, Roxb. Maulmain (Lobb).
 ,, C. LOBBIANA, Turczaninow. Maulmain (Lobb).
 ,, C. KURZII, Clarke.
- P. 483. Order DROSERACEÆ.
 ,, (DROSERA BURMANNI, Vhl.).
 "Grows abundantly on the sandy flats a little way from the sea, between Tavoy and Henzai" (Parish).
- P. 485. Order ROSACEÆ.
 ,, PARINARIUM COSTATUM, Bl. and
 ,, *P. Sumatranum*, Benth. and *petrocarya*, Jack.
 ,, P. GRIFFITHIANUM, Benth. Tenasserim and the Andamans (Helfer).
 ,, (P. SUMATRANUM, KURZ Flora, non Bush)=P. HELFERI, Hook. f.
- P. 486. PYGÆUM CAPITELLATUM, Hook. f. Tenasserim (Helfer).
 P. 487. ERIOBOTRYA LATIFOLIA, Hook. f. Maulmain (Lobb).
 ,, E. BENGALENSIS, Hook. f. Ava (Wallich), Tenasserim (Helfer).
 P. 489. RUBUS HEXAGYNUS, Roxb. Khakyen Hills.
 ,, *R. pycnophyllus*.
 ,, R. BIRMANICUS, Hook. f. Burma (Griffith).
- P. 490. (R. FLAVA).
 ,, *R. ellipticus*, Smith.
 ,, DOCYNIA INDICA, Dem. Burma (Kurz).
 ,, POURTHLEA ARGUTA, Dem. Burma (Griffith).
- P. 494. Order LEGUMINOSÆ.
 ,, DESMODIUM OBLATUM, Baker.
 ,, D. ROTTLEI, Baker. Prome (Wallich).
- P. 499. LOUREA VESPERTILIONIS, Desv.
 ,, L. ORCORDATA, Desv. (Wallich).
 ,, L. CAMPANULATA, Benth. Ava (Wallich).
- P. 500. URARIA REPANDA, Wall.
 P. 501. SMITHIA GEMINIFLORA, Roth. Tavoy.
 P. 503. (ABRUS LEVIGATUS). Tavoy, sea-shore (Parish).
 P. 504. GALACTIA OXYPHYLLA, Benth. Tavoy (Gomez), Amherst (Parish).
 P. 508. VIGNA LUCENS, Baker. Tavoy (Gomez).
 P. 509. PHASEOLUS CALCARATUS, Roxb.
 ,, P. FUSCUS, Wall. Prome (Wallich).
 ,, P. VELUTINUS, Grah.
- P. 510. DOLICHOS CILIATUS, Klein.
 P. 513. GLYCINE JAVANICA, L.
 ,, ATYLOSIA SCARABÆOIDES, Benth.
- P. 514. ERIOSEMA VISCOSA, Bl.
 P. 515. FLEMINGIA WALLICHII, W. et A. Prome (Wallich).
 ,, F. INVOLUCRATA, Benth.

- P. 519. *CROTALARIA SEMPERFLORENS*, Vent.
 „ *C. INCANA*, L.
- P. 520. (*PAROCHETUS COMMUNIS*, Hum.). Top of Moolec-it (Parish).
- P. 521. *INDIGOFERA CORDIFOLIA*, Heyne.
- P. 527. *DALBERGIA GLOMERIFLORA*.
- P. 529. *DERRIS DALBERGIOIDES*, Baker.
 „ *D. ELEGANS*, Benth.
 „ *D. FERRUGINEA*, Benth.
- P. 539. *MELONEURUM SUMATRANUM*, W. et A.
 „ *PIERLOBIUM INDICUM*, A. Rich.
- P. 530. *CASSIA ABSUS*, L.
- P. 537. *SARACA LOBBIANA*, Baker.
 „ *S. TRIANDRA*, Baker.
- P. 535. *AZELIA PALEMBANICA*, Baker.
- P. 533. *BAUHINEA TOMENTOSA*, L.
 „ *B. SEMITRIFIDA*, Roxb. Tenasserim (Helfer).
 „ *B. GLABRIFOLIA*, Baker. Tenasserim (Helfer).
 „ *B. DIVERGENS*, Baker. Burma (Griffith).
 „ *B. BRACTEATA*, Graham.
- P. 541. *PARKIA BIGLANDULOSA*, W. et A.
 „ *P. ROXBURGHII*, G. Don.
- P. 545. *PITHECOLOBIUM BIGEMINUM*, Benth.
 „ *CALLIDURA UMBROSA*, Benth.
- P. 556. (*DITTELASMA RARAK*).

Mr. Parish adds: "I left a fine young tree which I raised from seed in my compound, Maulmain cantonments; it must have been some 30 feet high when I left in 1876."

P. 557. Order SAPINDACEÆ.

- „ *ALLOPHYLLUS LOBBI*, Bl.
- P. 559. *NEPHELIUM MUTABILE*. Bhamo (Griffith).
- P. 561. *ÆSCULUS PANUANA*, Wall. Wayta-mayng, near the three Pagodas (P).

P. 564. Order AMPELIDÆ.

- „ *VITIS PALLIDA*, W. et A.
 „ *V. INDICA*, L.
 „ *V. AURICULATA*, Roxb.
 „ *V. TENUIFOLIA*, W. et A.
 „ *PEDATA*, Vahl.

P. 570. Order RHAMNACEÆ.

- „ *RHAMNUS NIPALENSIS*, Wall. Burma (Griffith).

P. 572. Order CELASTRINEÆ.

- „ *CELAESTRUS STYLOSA*, Wall. Burma (MacClelland).
 „ *KURRIMIA PULCHERRIMA*, Wall. Burma (Griffith, Helfer).
- P. 574. *LOBLOPITALUM CELASTROIDES*, Lam.
 „ *L. FILIFORME*, Lam. Mergui (Griffith).
- P. 573. *SALACIA VIMINEA*, Wall. Burma (Griffith, Helfer).
- P. 574. *HIPPOCRATEA OBTUSIFOLIA*, Roxb.

P. 576. Order OLACINEÆ.

- „ *OLIX MERGUENSIS*, Planch. Burma (Griffith).

- P. 578. GOMPHANDRA CRASSIPES, Mart.
 P. 579. SARCOSTIGMA WALLICHI, Baill.
 P. 580. Order CHAILLETIACEÆ.
 ,, CHAILLETEA LONGIPETALA, Turc. Mergui (Helfer).
 P. 581. Order MELIACEÆ.
 ,, MELIA DUBIA, Cass.
 P. 583. AGLAIA ROXBURGHIANA, Miq. Burma (Helfer).
 P. 584. AMOORA CHITTAGONGA, Hierb.
 P. 588. Order OCHNACEÆ.
 ,, OCHNA PUMILA, Ham.
 ,, O. BREVIPES, Planch.
 P. 589. Order SIMARUBEÆ.
 ,, SAMADERA LUCIDA, Wall. Burma (Helfer).
 P. 591. Order RUTACEÆ.
 ,, ZANTHOXYLON RETSA, DC.
 P. 592. MURRAYA ELONGATA, Alphonse DC.
 P. 595. CITRUS.

Parish remarks: "I have gathered wild oranges of good size, but of an indifferent character, in the Tenasserim jungle on the Eastern border, but I do not know what species."

- P. 597. Order GERANIACEÆ.
 ,, (OXALIS CORNICULATA, L.) A weed, introduced, *vide* Parish.
 P. 598. (IMPATIENS PARISHII and CIRCÆOIDES).

Of both species Parish remarks: "A lovely little plant, abundant during the rains on the limestone rocks, Maulmain."

- P. 599. Order MALPIGHIACEÆ.
 ,, HIPTAGE THADABLOTA, Gaertn.
 P. 600. Order ZYGOPHYLLACEÆ.
 ,, TRIBULUS TERRESTRIS, L.
 P. 601. Order LINEÆ.
 ,, (ERYTHROXYLON KUNTHIANUM).
 ,, var. ? PARISHII. Top of Dauna-tonng (Parish).
 P. 604. Order TILIACEÆ.
 ,, GREWIA UMBELLATA, Roxb.
 ,, G. MULTIFLORA, JUSS.
 ,, G. POLYGAMA, Roxb.
 P. 605. TRIUMFETTA SEMITRILoba, L.
 P. 606. PLAGIOPTERON FRAGRANS, Griff.
 P. 608. ELLEOCARPUS CUNEATUS, Wight.
 ,, E. TUBERCULATUS, Roxb.
 ,, E. ORBONGUS, Gaertn.
 ,, E. MONSCERA, Cav.
 P. 609. *MALVASIUM SPICATUM, A. Gray. Mergui (Griffith).
 P. 611. URENA SINUATA, L.

- P. 616. HIBISCUS RADIATUS, Wall.
 P. 618. DURIQ MALACCENSIS, Planch. Wild Durian.

P. 620. Order STERCULIACEÆ.

- „ STERCULIA GUTTATA, Roxb.
 „ S. STRIATIFLORA, Masters. Burma (Griffith).
 „ S. RUBIGINOSA, Vent.
 „ S. CAMPANULATA, Wall.
 P. 621. HERITIERA FOMES, Buch.
 „ KLEINHOFIA HOSPITA, L.
 P. 622. HELICTERES ANGSTIFOLIA, L.
 „ H. SPICATA, Colebr.
 „ PTEROSPERMUM SCABERIFOLIUM, Lam.

- P. 623. ERIOLENA QUINQUELOCULARIS, Wight.
 „ MELUANA HAMILTONIANA.
 „ MELOCHIA VELUTINA, Beddome.

P. 625. Order DIPTEROCARPEÆ.

- „ ANCISTROCLADUS EXTENSUS, Wall. Burma (Helfer).
 „ A. ATTENUATUS, Dyer.
 P. 630. Vatica GRANDIFLORA, Dyer. Burma (Wallich).
 „ V. FAGINEA, Dyer. Burma (Helfer).
 „ V. HELFERI, Dyer. Mergui (Helfer).

P. 633. Order TERNSTROMIACEÆ.

- „ (SCHIMA CRENATA, Korth.) = *Gordonia floribunda*, Wall.
 P. 635. GARCINIA XANTHOCHYMUS, Hook. f.
 P. 636. CALOPHYLLUM RETUSUM, Wall.

P. 641. Order POLYGALACEÆ.

- „ POLYGALA TRIPHYLLA, Ham. Ava (Wallich).

P. 645. Order BIXINEÆ.

- „ FLACOURTIA RUKAM, Zoll. et Moritz. Mergui (Griffith).
 „ F. RAMONTCHI, L'Héritier.

P. 647. Order VIOLACEÆ.

- „ (VIOLA SERPENS, Wall.) Dauna-toung, 4-5000 feet (Parish).

P. 651. Order CAPPARIDACEÆ.

- „ CAPPARIS TENERA, Dalz.

P. 655. Order BERBERIDACEÆ.

- „ (BERBERIS NIPALENSIS, Sprengl.)

Parish remarks: "The Flora of British India gives '*Mergui, Griffith,*' but I venture to think there must be some error here."

P. 659. Order MAGNOLIACEÆ.

- „ TALAUMA LANIGERA, Hook. f. et Th.

P. 664. Order ANONACEÆ.

- „ ARTABOTRYS SPECIOSUS, Kurz.

- P. 663. POLYALTHIA MACROPHYLLA, Hook. f. et Th.

- P. 665. (POPOWIA HELFERI, Hook. f. et Th.) King's Island, Mergui (Helfer).
 Maulmain (Parish).

P. 667. SACCOPTALUM SCLEROCARPUM, Hook. f. et Th. Martaban (Wallich).

P. 668. Order DILLENIACEÆ.

„ DILLENIA GRANDIFOLIA, Wall.

ADDITIONAL ORCHIDS.

MICROSTYLIS TRILOBELATA, Kuntz. Gard. Chron. Sept. 23, 1882.

LIPARIS GROSSA, R. fil. Gard. Chron. Jan. 27, 1883. Near to *L. PACHYPUS*.

BULBOPHYLLUM CUPREUM, var. FLAVUM, Gard. Chron. March 11, 1881.

“A variety with light yellow flowers instead of the red ones.” The so-called variety is, from my experience, the prevailing one. I never saw “red” flowers, though I have seen dull rufous ones.—C.P.

DENDROBIUM (PEDILONUM) IGNOBUS, R. fil. Gard. Chron. Dec. 23, 1882.

DENDROBIUM SECUNDUM, var. NIVEUM. Gard. Chron. June 3, 1882.

DENDROBIUM DEAREI, R. fil. Gard. Chron. Sept. 16, 1882. Burma?

DENDROBIUM LUBBERSIANUM, R. fil. Gard. Chron. April 8, 1881.

“In growth like a small *D. formosum*. The flowers are much like those of *D. cariniferum*. Sepals and petals yellowish-white, with a white chin. On each of the lateral divisions of the 3-lobed lip there is a cinnabar blotch, and the same colour is seen at the base of the middle lobe.”

DENDROBIUM DALHOUSIANUM, var. ROSSIANUM. Gard. Chron. June 17, 1882.

“A variety described as differing from the normal plant in its shade of yellow (‘nankin’), somewhat shaggier lip and richer markings on the stem-sheath.

“These slight differences are carefully noted and made the most of by Orchid growers at home with a view to a new name, and the consequently increased sale of the plant; but their after want of value is soon learnt by observers of Orchids in their native wilds.”—C.P.

CÆLOGYNE BRACHYPTERA, R. fil., near to *C. LENTIGINOSA*. Gard. Chron. July 2, 1881.

AERIDES EMERCH, R. fil. Gard. Chron. Nov. 4, 1882.

Exceedingly close to *A. VIVENS*.

THRIXPERMUM BERKLEYI, R. fil. Gard. Chron. April 29, 1881. Andamans?

A species with terete leaves.

VANDA BOXALLII, var. COBBIANA. Gard. Chron. Dec. 17, 1881.

VANDA PARISHII, var. MARCOTTIANA. Gard. Chron. June 12, 1880.

A distinct variety as far as colour is concerned, as the flowers are wholly purple.

VANDA VIPANI, R. fil. Gard. Chron. July 29, 1882.

For an account of the fertilization of Orchids consult Darwin's work on that subject. Le Maout also observes: “In *Orchideæ*, owing to the consistence of their pollen, extraneous agency is required to ensure fertilization, which, as in *Asclepiadææ*, is effected by insects; and in our hot-houses, where these auxiliaries are wanting, fertilization must be artificially secured. In some species the lip is irritable; it oscillates opposite the column (*Megaelinium*), or turns round it (*Calceana*); on an insect settling on the surface of the lip, the latter quickly approaches the column, and presses the insect against it, which in its efforts to disengage itself, breaks up and crushes the pollen-masses, and spreads them over the stigma.”

APPENDIX A.

PART II.

FIRE BY FRICTION (Page 103).

ANOTHER method of obtaining fire from bamboos is thus described by Capt. T. H. Lewin, as practised in the Chittagong Hills. "The Tipperahs make use of an ingenious device to obtain fire; they take a piece of dry bamboo, about a foot long, split it in half, and on its outer round surface cut a nick or notch, about an eighth of an inch broad, circling round the semi-circumference of the bamboo, shallow towards the edges, but deepening in the centre until a minute slit of about a line in breadth, pierces the inner surface of the bamboo fire-stick. Then a flexible strip of bamboo is taken, about $1\frac{1}{2}$ feet long and an eighth of an inch in breadth, to fit the circling notch or groove in the fire-stick. This slip or band is rubbed with fine dry sand, and then passed round the fire-stick, on which the operator stands, a foot on either end. Then the slip, grasped firmly, an end in each hand, is pulled steadily back and forth, increasing gradually in pressure and velocity as the smoke comes. By the time the fire-band snaps with the friction, there ought to appear through the slit in the fire-stick some incandescent dust, and this placed, smouldering as it is, in a nest of dry bamboo shavings, can be gently blown into a flame."—*Hill Tracts of Chittagong and the Dwellers therein*, Calcutta, 1869, p. 83.

COCOS NUCIFERA (Page 143).

The native plan of soaking, crushing, and carding the strongly cohering fibre of the cocos husk (coir), which now occupies weeks and months, and entails severe manual labour to carry out, will, it can scarcely be doubted, be entirely replaced in future, or so soon as Europeans devote themselves to its manufacture by the Ekman (Patent) process or some similar one. A late experiment on this material is thus described by Mr. Christy:¹—

"At the request of Mr. Hinde some husks were put in the cylinder by Mr. Ekman, and they yielded in one hour a fibre that could be removed with the hand, the soft pithy waste disappearing. The fibre when dry was strong and had a good colour. It is quite a mistake to suppose that the fibre can be simply extracted by boiling in water." With this result of the 'Ekman' process before us, who can doubt the enormous supply of cordage and textile fibres that Burma is capable of yielding, as numbers of other palms, rattans, and other vegetable products, which may be had for the cost of gathering, treated as the above 'husks' were, would yield similar and even superior products? The Forest Department would do wisely to purchase the right of using this process in experimenting on Burmese forest-products and similar materials.

¹ *New Commercial Plants and Drugs*, No. 6, p. 52.

DEATH OF KAYKREE (Page 188).

The following note, communicated by the Rev. C. Parish, points out an appalling danger, which may through want of care or foresight overtake the sportsman or collector in the rankly luxuriant jungles and savannas of Burma.

“Before leaving the subject of Orchids, perhaps I may be allowed to say a few words on the sad end of my poor old collector—*Kaykree* by name, and by race a “*Mug*,” or native of Arracan.

“He came to me about the year 1859 from Gen. Johnson, in whose service at Toung-ngoo he developed a taste for observing and collecting wild flowers. When Gen. Johnson left Toung-ngoo, *Kaykree* accompanied him to the Nilgiris, but, after a short stay there, he begged permission to be allowed to return to Burma. On his return he entered my service, in no very definite capacity at first; but, as he proved himself to be extremely intelligent in the recognition of plants, and was evidently fond of jungle life, I soon found him congenial employment, and he became finally my botanical collector. I purchased a boat, of which he was to all intents and purposes the owner, and as he was fond of sport after his fashion, I gave him a gun; and it was this last gift which, unhappily, like Nessus’ shirt, proved the cause of his death.

“He invariably accompanied me in my journeys, whensoever I left home, and when in the jungles with me, he acted as guide, interpreter, and general factotum. As, after a while, he became well known in all the villages far and near, I never found any difficulty in procuring supplies, elephants, and carriers, Burman or Karen. Altogether he had a very happy time of it, spending all the fine seasons in making longer or shorter jungle trips, going and returning nearly as he pleased, but always ready to start when I desired him, and to go whithersoever I bade him and however far. In these journeys, however, he always had a companion, a second man, also in my service, to help him in paddling the boat and otherwise; and he farther had ‘*carte blanche*’ from me to enlist any number of additional hands, when he left the boat, as he might require, either as carriers or for safety.

“In the rainy season he seldom went out, and then not very far, but lounged about the house, drying my plants, or playing with my children, who were extremely fond of him.

“He was always keenly alive to the pleasure of any new discovery, and was proud when he could bring me a plant which he thought I had not seen before. On one occasion he brought me in this way a very pretty new *Bulbophyllum*, which I determined at once to call *D. Kaykreei*, but, alas for his immortality! it has disappeared without record. For want of leisure just at the time I allowed the flower to perish, without drawing or description, and, being a small plant, I suppose it died when sent to England with other things. At all events I never saw it again. All I recollect is that it came from the top of *Dan-kyeik*, near *Kaukarit*. I always intended to have sent him for more, but, before I could do so, his career was suddenly cut short.

“One day, when he had been but five or six years in my service, and he was out on one of his excursions, his companion returned in haste alone, and informed me that he had left *Kaykree* in a Karen village, about three days’ journey off, badly burned. I at once sent him back with my head servant, and a supply of cotton and sweet oil, bidding them make all possible speed; but, alas! before they could reach him, the poor fellow had expired in dreadful agony.

“It appears that he had climbed a tree with his gun to watch for and shoot a wild pig, and that, while waiting for some Karens to beat the jungle, the grass in the neighbourhood caught fire, and advanced rapidly towards him. The Karens shouted to him to come down, but, fancying himself safe, and out of the reach of the flames, he did not do so till too late. The fire reached the tree and soon enveloped it in flames, through the midst of which he was at last obliged to let himself down as he best could, but in so doing was so fearfully scorched that, after lingering for two or three days, he died. It was always surprising to me that so experienced a jungle traveller as he was should not have known better! I need not dwell on

the grief this terrible accident caused us—as we were all very fond of him—and it was long before we ceased to mourn the loss of as kind and good, true and faithful a servant as ever Christian could be.”

MUSA PARADISIACA (Page 204).

As Burma is emphatically a plantain-growing country, I give the following extract¹ for the information of those who may be inclined to try, even on a small scale, the manufacture of plantain fibre for exportation:—

“The extraction of plantain fibre is accomplished in two ways, the first by machine-crushing, and the second by fermentation. The tree is cut by a single stroke of a hatchet or cutlass, six inches above the surface of the ground; the trunk is then divided longitudinally into four parts, and the heart is taken out, which is always left for manure. One man can cut and split 800 trees in a day. If fermentation is decided on, the trees are left upon the ground until the juice and sap are separated from the fibre, when considerable weight will have been lost, and the labour of transportation much reduced. On the other hand, if the tree is not subjected to this process, it must be carried to the mill at once, and passed through the rollers, which are a foot in diameter, and about three feet long. In crushing, the tender layers are separated from those which are harder and riper, and the different kinds passed through the mill lengthwise, the rollers being placed horizontally. The produce is about 4 pounds of fibre to each tree. The stalks of the branches give the best fibre, and a larger quantity as compared with the body of the tree. One hundred pounds of stalk will give about 15 pounds of fibre, net weight, and when a whole tree furnishes 4 pounds of fibre, one-fourth of the quantity is derived from the stalks. One hundred plantain trees can be crushed in twenty minutes, with one horse, allowing five minutes for rest.

“After crushing, the fibre is boiled to separate the gluten and colouring matter, carbonate of soda and lime being used as chemical agents.

“To make three tons of fibre a day, it is necessary to have four boilers of 800 gallons each, and give five boilings in a day, which amounts to 1650 pounds of net fibre for each boiler or 6600 pounds for the four boilers. They require about 300 pounds of soda and a proportionate amount of quicklime. As the different grades of fibre are pressed separately, they should also be kept separate in the process of boiling, the lighter fibres requiring about six hours to bleach, while the darkest require fully eighteen. Levers are arranged to lift the mass from the kettles or tank when sufficiently boiled, allowing it to drain into the boiler before it is carried away to be washed.

“The washing should be thorough, that no extraneous matter may be left upon the fibre, and the work is done by machinery, such as is used by paper-makers, or the arrowroot-makers in the West Indies. After a thorough washing it is hung up to dry, and when thoroughly dried is ready for baling, hydraulic pressure being used for the purpose.”

ORIGIN OF MYTHS (Page 219, note).

In his preface to ‘Zoological Mythology,’ De Gubernatis thus alludes to the relationship between many a Christian myth and its pagan prototype:—“It is by no means true that the ancient systems of Mythology have ceased to exist; they have only been diffused and transformed. The *women* is changed, the *numen* remains. The splendour is diminished because it has lost its celestial reference and significance, because it has become more earthly; but its vitality is still enormous. . . . Nothing clings more to the earth, nothing is more vegetative than a superstition. A scientific truth requires years and sometimes centuries of demonstration before it can obtain for itself general acceptance, and, rather than suffer martyrdom, its defender will generally prefer to succumb to the infamous Papal motto ‘Laudabiliter se subiecit,’ but an error that is founded upon a sense of the supernatural does not need the

¹ New Commercial Plants and Drugs, No. 6, p. 49, Christy and Co., 155, Fenchurch Street, London.

electric wires to flash it from heart to heart, and awaken a response in the credulous world, while the ponderous dialectics of an entire army of rationalists will not thereafter suffice to dislodge it."

Space will not permit any more lengthened quotation, but one interesting example may be given of how imagination and simplicity unite to people the sky with material beings instinct with life, the *dramatis personæ*, so to speak, of the great celestial epic, in which all Mythology has its ultimate root.

"The children of to-day will repeat the experiences of the ancient ones, that is, our ancestors in the youth of Humanity; and will enable us to understand certain illusions which may appear impossible to the perception or even imagination of the erudite and sceptical modern. I myself, to realize more thoroughly the simplicity of our ancestors, am obliged to remember that one of the most vivid impressions ever made on me was received when, a child of scarcely four years of age, I was looking up into the sky. My family was living in a remote part of Piedmont; one autumn evening, towards night, one of my elder brothers pointed out to me, over a distant mountain, a dark cloud of a rather strange shape, saying, 'Look down there, that is a hungry wolf running after the sheep.' I do not know whether my brother was then repeating what he had heard the villagers say, or whether that heavenly scene had presented itself to his own imagination; but I well recollect that he convinced me so entirely of that cloud being really a hungry wolf running down the mountains, that fearing it might in default of sheep overtake me, I instantly took to my heels and escaped precipitately into the house. The reader will kindly pardon this personal allusion. I recall and refer to it now, to explain how the credulity which we always find in children may give us an idea of the credulity of infant nations. When Faith was pure, when Science did not exist, such illusions must have been continually awakening enthusiasm or fear in the breasts of our ingenuous forefathers, who lived in the open air with their herds of cattle, and stood with earth and sky in constant relation, and in continual communion. We busy dwellers in great cities, held back by a thousand social ties, oppressed by a thousand public or private cares, never happen to raise our eyes towards the sky, except it be to consult it on the probability of fine or wet weather; but evidently this is not sufficient to enable us to comprehend the vast and complicated epic poem transacted in the heavens."—*Zoological Mythology*, p. xxiv.

As no one passage which space allows me to introduce here can give a full idea of the mode in which the subject-matter of myths originated in the childhood of our race, so no attempt can be here made to follow the process of development whereby the elemental changes furnished matter for the countless mythical creations which the mind of primeval man so prodigally evolved. A few words, however, may be here quoted from that interesting and valuable work, "Mythology of the Aryan Nations," by the Rev. G. W. Cox, which illustrates two prominent points which may not be known to every reader, *i.e.* the polymorphic adaptations, of one and the same idea, and the disguises and variations it is capable of assuming; and, secondly, how a pure and spiritualized fancy or conceit comes in time (as a matter of course it may almost be said) to degenerate into a gross and sensual symbolism. Speaking of the Vedas, Cox remarks (*Mythology of the Aryan Nations*, vol. i. p. 52):

"In these poems the names of many, perhaps of most, of the Greek gods indicate natural objects which, if endued with life, have not been reduced to human personality. In them Daphné is still simply the morning twilight ushering in the splendour of the new-born sun: the cattle of Helios there, are still the light-coloured clouds, which the dawn leads out into the fields of the sky. There, the idea of Hæraclès had not been separated from the image of the toiling sun, and the glory of the life-giving Helios had not been transferred to the God of Delos and Pytho. In the Vedas, the myths of Endymion, of Kephalos, and Prokris, Orpheus and Eurydiké are exhibited in the form of detached mythical phrases, which furnished for each their germ. The analysis may be extended indefinitely, but the conclusion can only be that in the Vedic language we have the foundation, not only of the glowing legends of Hellas, but of the dark and sombre mythology of the Scandinavian and the Teuton. Both alike have grown up chiefly from names which have been grouped around the sun; but the

former has been grounded on those expressions which describe the recurrence of day and night, the latter on the great tragedy of alternation of summer and winter.

“Of this vast mass of solar myths, some have emerged into independent legends, others have furnished the groundwork of whole epics, others have remained simply as floating tales whose intrinsic beauty the poet has wedded to his verse. Whether the whole may be classified in order of priority may be doubtful; but the strong presumption would be, that those which have not been systematized into coherent narratives are the oldest, as not having sufficiently lost their original meaning. At the least, they exhibit to us the substance of Mythology in its earliest form. Thus the legends of Kephalos and Prokris, of Daphnè, Narkissos and Endymion, have come down to us in a less artificial form than that of Heraklès, while the myth of Heraklès has been arrested at a less advanced stage than that of Zeus and Apollôn. But all alike can be translated back into mythical expressions, and most of these expressions are found in the Vedas with their strict mythical meaning. The marvellous exuberance of this early language, and the wealth of its synonyms, may well excite astonishment as we watch its divergence into such myths as those of Kephalos and Endymion, Heraklès, Daphnè, the Pythian and Delian Apollôn, Phaethôn and Meleagros, Memnon and Bellerophon.

“That the form of thought which found utterance in mythical language would lead to the accumulation of a vast number of names for the same object, we have already seen; and so clearly does the mythology of the Aryan nations exhibit the working of this process, that the task of tracing it through the several legends of which it is composed becomes almost a superfluous work. It seems impossible not to see that when the language of Mythology was the ordinary speech of daily life, the night laboured and heaved with the birth of the coming day, and that his toil and labour is reproduced in the Homeric hymn, in which Leto, the power of forgetfulness and sleep gives birth to the lord of light in Delos. His coming was preceded by the pale twilight, who, in mythical times, drove his cows to their pasture, but in the *Odyssey* his herds feed at Tainaron or in Thrinakia far away, where Phaethousa and Lampetiè, the bright and gleaming daughters of Neaira, the early morning, tend them at the rising and the setting of the sun. . . . But the sun loves not only the clouds, but the dawn who is their leader; and so the dawn comes before us as followed by him, and flying from his love, or else returning to it. The former phrase (‘the dawn flies from the sun’) is embodied in the legend of Daphnè, who flies from her lover and vanishes away as he seeks to embrace her. In the tale of Orpheus she appears under the name of Eurydikè, as the bride of the sun, loved by him and returning his love, yet falling a victim to it, for whether to Daphnè or Eurydikè, the brightness of his glance is fatal as he rises higher in the heaven. . . . So again the legend of Meleagros exhibits only the capricious action of the sun, and the alternations of light and shade are expressed in the sudden exploits and moody sullenness of the hero: but this life is bound up with the torch of day, the burning brand, and when its last spark flickers out, the life of the hero is ended. More commonly, however, he is the mighty one labouring on, and finally worn out by an unselfish toil, struggling in his hard task for a being who is not worthy of the great and costly sacrifice. So Phoibos Apollôn, with his kinsman Heraklès, serves the Trojan Laomedôn; and so he dwells as a bondsman in the house of Admètos. So likewise, as Bellerophon, he encounters fearful peril at the bidding of a treacherous host, and dies, like Sarpèdôn and Memnon, in a quarrel which is not his own. But nowhere is his unutterable toil and scanty reward brought out so prominently as in the whole legend, or rather the mass of unconnected legend, which is gathered round the person of Heraklès. Doomed before his birth to be the slave of a weak and cruel master, he struggles while yet in his cradle the serpents of the night, which stung to death the fair Eurydikè. His toils begin. His limbs are endued with an irresistible power, and he has a soul which knows no fear. He may use this power for good or for evil, and his choice for good furnishes the groundwork for the apologue of Prodikos. Other legends there were, which perverted this idea; and in these he is exhibited under gross, uncouth or repulsive forms. But he goes upon his way, and is hurried on through many lands. In all he has mighty

works to do, and he fails in none. The remembrance of Iolè may linger in his memory, but there are others who claim his love in the days of his strength and power, and it would seem as though he had forgotten the daughter of Eurytos. But his time draws towards its close: the beautiful maiden, whose face had gladdened him long ago, returns to cheer him in the evening of his life. With her comes the poisoned robe (the mantle of cloud) which he strives in vain to tear away from his bleeding limbs. In a deeper and redder stream flows the life-blood, till, after a convulsive struggle, the strife is closed in the dead silence of night.

“But it is in the case of Heraklès that the perfect truth of the old mythical language gave rise more especially to that apparently strange and perplexing meaning which repelled and disgusted even the poets and philosophers of Greece. Pindar refuses to believe that any God would be a sensualist or a cannibal: he might in the same spirit have rejected the tales which impute something of meanness and cowardice to the brave and high-souled Heraklès. For Heraklès fights with poisoned arrows, and leaves them as his bequest to Philoktètès. But the poisoned arrows are the piercing rays which burn on the tropical noon-day, and they reappear as well in the poisoned robe of Deianeira, as in that which the Kolchian Medeia professes to have received from her kinsman Helios.

“A deeper mythical meaning, however, underlies and accounts for the immorality and licence which was introduced into the transmuted legend of Heraklès. The sun looks down on the earth, and the earth answers to his loving glance by her teeming and inexhaustible fertility. In every land she yields her special harvest of fruits and flowers, of corn and wine and oil. Her children are countless, but all spring up under the eye of the sun as he journeys through the wide heaven.

“It is easy to see what must be the result when the sun is transmuted into the human, yet god-like Heraklès, and how repulsive that myth must become which, in its primitive form, only told how

‘The sunlight clasps the earth
And the moonbeams kiss the sea.’¹

The same explanation removes the mystery of the even greater degradation to which the Hellenic mythology reduces Zeus himself, the supreme father of gods and men. He who should be the very type of all purity and goodness becomes the very embodiment of headstrong lust and passion, while the holiness of the lord of life and light is transferred to Apollôn, and his virgin sister Athênê. The difficulty is but slight. Zeus, the Vedic Dyaus, is but another form of Ouranos, the veiling heaven or sky, and again, as in the words of our own poet, who sings how

‘Nothing in the world is single,
All things by a law divine
In another’s being mingle,’

and how

‘The mountains kiss high heaven,’

so Ouranos looked down on Gaia, and brooded over her in his deep, unfailling, life-giving love. But these are phrases which will not bear translation into the conditions of human life, without degrading the spiritual god into a being who boasts of his unbounded and shameless licence.”

The intelligent reader will be amply repaid by studying this interesting subject at greater length in the work of Cox and other writers, but the above short extracts will, I hope, show by what process a pure and spiritual idea becomes converted into an impure and sensuous one. There is one other point also which I will here briefly refer to as connected with the early mental conceptions of man: “Thus far it is only on Iranian soil that we have seen the struggle between day and night, the sun and the darkness, represented as a conflict between moral good and evil, the result

¹ Shelly, *Love’s Philosophy*.

being a practical, if not a theoretical, dualism, in which the unclean spirit is at the least as powerful as the righteous being with whom he is at war. This absolute partition of the universe between two contending principles was the very groundwork of Iranian belief; but the idea was one which could not fail to strike root in any congenial soil. To a certain extent it found such a soil in the mind of the Jewish people, who had become familiar, by whatever means, with the notion of a being whose office it was to tempt or try the children of men. The Satan who discharges this duty is, however, one of the sons of God; and in the Book of Job there is no indication of any essential antagonism between them. The position of Satan in this narrative is, indeed, in strict accordance with the Hebrew philosophy which regarded God as the author both of good and evil, as the being who hardened Pharaoh's heart and authorized the lying spirit to go forth and prevail among the prophets of Ahab. But when a portion of the Jewish people was brought into contact with the fully developed system of Persian dualism, the victory of the Iranian mythology seemed complete. Henceforth the notion of two hierarchies, the one heavenly, the other diabolical, took possession of their minds; and the Satan who ruled over the powers of darkness and exercised a wide dominion as prince of the air, was confined to a level lower than that of Ahriman, only because he had once stood among the most brilliant angels in the courts of heaven. At this level he remained a fallen creature, ruling over hosts of malignant demons, who did his will among mankind, plaguing them with sorrow, disease, and madness, until the convictions of the first Christian societies magnified him into proportions if possible more overpowering than those of the Iranian enemy of Ormuzd. The Jew, chiefly, if not wholly, from the conviction which led him to regard God as the author both of good and evil, drew no sharp distinction between mind and matter as existing in irreconcilable antagonism; and since as a nation they can scarcely be said to the last to have attained to any definite ideas either of the fact or the conditions of a life continued after death, Satan could with them obviously have no definite dominion beyond the bounds of our present existence. He could torture the bodies, afflict the souls, or darken the minds of men; but of his everlasting reign over countless multitudes, ruined by his subtle wiles, we find no very definite notion.

"But Christianity, while it rested on a distinct assurance of personal immortality, altogether stronger than any to which the most fervent of the Hebrew prophets had ever attained, took root among nations who had filled all the world with gods or demons, each with his own special sphere and office. These deities the Christian teachers dethroned; but far from attempting to destroy them, they were careful to insist that they had always been, and must for ever continue to be, malignant devils;¹ but unless their horrible fellowship was speedily to come to an end, they must be under the rule of some king, and this they found in the Semitic Satan. . . . Hence grew up, by a process which cannot much excite our wonder, that severe theology which, known especially as that of Augustine, represented the Christian Church as an ark floating on a raging sea, open only to those who received the sacrament of baptism, and shut both here and hereafter to infants dying before it could be administered. It was inevitable that under such conditions the image of Satan should more and more fill the theological horizon for the Jew, whose enthusiasm and convictions were sincere. But these conditions were changed with the conversion of tribes, in whom the thought of one malignant spirit marring and undoing the work of God had never been awakened; and although henceforth the teaching of the priesthood might continue to be as severe as that of Augustine or Fulgentius, it was met by the passive resistance of men whose superstitions were less harsh and oppressive. 'The Aryan nations,' says Professor Max Müller, 'had no devil. Pluto, though of a sombre character, was a very respectable personage:

¹ The Christian missionaries were further conscious that their own thaumaturgy might be called into question if that of the old creed were treated as mere imposture or illusion. "Die neue Lehre konnte leichter keimen und wurzeln wenn sie die alte als gehässig und sündlich, nicht als absolut nichtig schilderte: die Wunder des Christen erscheinen dadurch glaubhafter, dass auch dem althergebrachten Heidenthum etwas übernatürliches gelassen wurde."—*Grimm*.

and Loki, though a mischievous person, was not a fiend. The German goddess, Hel, too, like Proserpine, had seen better days.' It was thus no easy task to imbue them with an adequate horror of a being of whose absolute malignity they could form no clear conception."—Rev. G. W. Cox, *Mythology of the Aryan Nations*, vol. ii. p. 360.

It is lamentable to reflect how deeply imbued modern Christianity is with so contemptible a leaven as the belief in a personal¹ and almost omnipotent fiend! No reasonable man can doubt that the religion of the future must be purged of this monstrous admixture, meanwhile how many devoted servants of Christ are wasting their energies in preaching the gospel of everlasting damnation, as it merits being called, in place of the simple gospel of Love. In years gone by it was perhaps as possible to believe in a personal Devil, as in a personal Saviour, but we, who know whence the idea of the Christian devil has been derived, and how in monkish times Satan came to be elevated into the position he holds in popular theology, have not the same excuse, if we fail to lift up our voices in protest at the continued profanation involved in the prominence vulgarly assigned to the Devil in the religion of Christ.

ARISTOLOCHIA (Page 229).

An undetermined species is thus alluded to in a note by Rev. C. Parish:—"At the top of Zwa-ka-bin, the limestone rock, known as 'the Duke of York's nose,' North of Maulmain, a small species of *Aristolochia* is to be found, which may prove to be new. I have not seen the flower, but the fruit is very remarkable, resembling when dry and fully expanded and empty (the state in which I found it) a small inverted parachute."

According to De Gubernatis² a species of *Aristolochia* was used as a counter charm for fumigating the bridegroom, "*si quis devotatus deficiusque fuerit in suis nuptiis.*" These words refer to that very curious superstition which lived down to past the time of the Tudors, called 'point-tying,' it being supposed that a magical knot being tied in one of the 'points' or laces of the bridegroom's dress, prior to the wedding, wholly prevented him from reciprocating the endearments of his bride till the charm was removed or destroyed by some more powerful counter-charm. One such counter-charm quoted from Apuleius (l.c.) was as follows: "Herbæ pedis leonis frutices numero septem sine radicibus decoque cum aquâ, linnâ decrescente, lavato eum, et teipsum qui facis ante limen extra domum primâ nocte, et herbam iucende Aristolochiam et suffumigato eum, et redito ad domum, et ne post vos respiciatis, resolvisti eum." The superstition is a very curious one and laughable, but for the fact that it has consigned numbers of hapless creatures to the stake, and the dread of being 'point-tyed' was a veritable sword of Damocles to many a mediæval bridegroom. The practice was, of course, usually believed to originate from the malice of a discarded mistress or jealous rival, but it might also be done as a joke by some friend of the luckless bridegroom. Anyhow, if there was the least suspicion of any such trick having been perpetrated, it was one of the most arduous tasks of the groomsmen to furnish a counter-charm. A similar superstition is evidently alluded to by Ovid:

"Quid me ludis? ait, Quis te, male sane, jubebat

Invitum nostro ponere membra toro?

Aut te trajectis Aëca venifica lanis

Devocet, aut alio lassus amore venis."

Amorum, iii. 7. 77.

¹ It is hardly necessary, of course, to more than simply remark that the tempter or serpent in Paradise of the Book of Genesis is wholly distinct from the Satan of the Book of Job, or the Persian or Miltonic Satan of the New Testament, and is (it is well known) simply an allegorical impersonation of sensual love, an explanation less recondite perhaps than that commonly dilated on to poor Sunday School children, but claiming nevertheless our consideration from its essential truth. The subject is doubtless one which does not readily lend itself to a very copious exegesis before a mixed or juvenile audience, but that is no excuse for the deliberate falsification so much in vogue of the now well understood sense of the original myth.

² *Mythologie des Plantes*, vol. i. p. 208.

THE ALLEGORY OF THE FALL OF ADAM (Page 274).

The Semitic legend of the tree of life should be compared with its Aryan counterpart, wherein the same personae, a tree, a fruit and a dragon, figure, and of which De Gubernatis remarks: "The legends¹ concerning the tree of the golden apples or figs, which yields honey or ambrosia, guarded by dragons, in which the life, the fortune, the glory, the strength, and the riches of the hero have their beginning, are numerous among every people of Aryan origin; in India and in Persia, in Russia and in Poland, in Sweden and in Germany, in Greece and in Italy, popular myths, poems, songs, and fairy tales amplify with a great variety of incidents, partly unconscious of their primitive signification, this strange subject of phallic cosmogony."

On the same page De Gubernatis gives a variation of the legend of the Cross which he concludes with the following words pregnant with meaning: "To the continuers of the admirable studies of Strauss and Renan will be reserved the office of seeking the sense hidden in this myth, made poetical by the evangelical morals. When we shall be able to bring into Semitic studies the same liberty of scientific criticism, which is conceded to Aryan studies, we shall have a Semitic Mythology; for the present, faith, a natural sense of repugnance to abandon the beloved superstitions of our credulous childhood, and more than all, a less honourable sentiment of terror for the opinion of the world have restrained men of study from examining Jewish history and tradition with entire impartiality and severity of judgment. We do not wish to appear Voltairians, and we prefer to shut our eyes not to see, and our ears not to hear what history, studied critically and positively, presents to us less agreeable to our pride as men, and to our vanity as Christians."

Well did James Russell Lowell write:

"I do not fear to follow out the truth,
Albeit along the precipice's edge.
Let us speak plain: there is more force in names
Than most men dream of: and a lie may keep
Its throne a whole age longer, if it skulk
Behind the shield of some fair-seeming name.
Let us call tyrants, *tyrants*, and maintain
That only freedom comes by grace of God,
And all that comes not by his grace must fall;
For men in earnest have no time to waste
In patching fig-leaves for the naked truth."

OATHS IN PATRIARCHAL TIMES (Page 274).

Those who would know more of the curious oath imposed by Abraham (Genesis xxiv. 2), and again by Israel (Genesis xlvii. 29), may refer to Dr. Ginsburg's observations on oaths in Kitto's Cyclopædia, or Dr. Iman's work, vol. i. p. 79.

TECTONA GRANDIS (Page 301).

The following are some of the results arrived at by me with reference to the experiments in question. So far as I know they are uncontradicted on their merits to this day.

"Forty-four samples were experimented on. Of this number, six were described as ungirdled teak, from the Tharrawadi forests. To these must be added three from Karenee, three from foreign Thonngyeen, and four from Mandalay, all which I have reason for treating as ungirdled, though it is not stated in the experiments. Should this be objected to, yet my general conclusion is not impaired; since, though the inclusion of these ten samples among the girdled teaks would raise their average breaking weight from 182 to 192, yet their abstraction from the column of ungirdled teaks would raise their average also from 238 to 241 lbs. breaking weight; or, to place

¹ *Zoological Mythology*, vol. ii. p. 410.

it in another light, the average strength of six samples of *ungirdled Tharrawadi Teak* is 241 lbs.; of *girdled Tharrawadi Teak* only 184 lbs.! Yet more, the average breaking weight of the whole 28 samples of certainly girdled teak experimented on is only 182 lbs., against the 241 lbs. of ungirdled Tharrawadi teak; and of the whole 28 samples, not one attains the average of the 6 ungirdled samples! Of the 10 samples, which, though not so specified, I treat as ungirdled teak (for a reason given below),¹ the average breaking weight is 222 lbs., one specimen only of the ten falling below the average of the 28 girdled samples, whilst two specimens exceed the remarkably high average of ungirdled Tharrawadi teak.

"Assuming therefore that the forty-four samples of teak may be classed as twenty-eight girdled and sixteen ungirdled, we have an average breaking weight of 182 lbs. for the former, and 229 lbs. for the latter.

"To arrive, however, at perfectly satisfactory results, a little elimination is desirable, as specimens rendered unsound by knots or other causes cannot give fair results, and I accordingly prefer to select from the above experiments only those which are free from any objection of unsoundness in the samples under trial.

"Rejecting then all samples rendered unsound either by knots or other causes, and all cut 'across grain,' we find fourteen samples of sound girdled teak to give a breaking weight of 202 lbs., whilst eleven samples of ungirdled teak give a mean breaking weight of 238 lbs., a difference of about 15 per cent. *cateris paribus* in strength in favour of ungirdled over girdled teak."

These experiments strongly support the view I have all along entertained of the injurious results of girdling timber, based on personal observation of trees so killed in clearings, and on the rapid decay of many woods if allowed to remain 'unconverted,' some of which there is little doubt would yield fairly useful timber if at once sawn into planks, and thereby allowed at once to season, instead of weltering for months in their own sap, at a mean temperature of 80° or thereabouts. Other remarks of mine were nearly as follows:

"Regarding the practice as it now obtains of 'Girdling' or killing timber (teak) before felling it, I shall endeavour to show that, whereas no one single good reason can be advanced in its favour, three valid objections to it can be satisfactorily made out. The Forest Office rule is—'*The trees will always be allowed to stand three years before felling, which is one year longer than is generally considered to be sufficient for seasoning in this climate.*' From this it may be inferred that the seasoning of the timber was the main reason for the practice being introduced into Pegu by Dr. J. McClelland, and continued to the present day by his successors. Now practically no timber seasons to an appreciable extent till it is felled; and how should it? The fluids circulate in a tree very much as they do in an animal, and the moisture consequently remains in the trunk, till by cutting it into logs a ready exit is afforded for their transudation; and it is absurd to suppose that any notable abstraction of sap from the body of the tree takes place till it is felled. The three years therefore a tree is allowed to stand under the present system are simply three years wasted, and something more, as I shall presently show. In standing three years girdled, a portion of the trunk towards its circumference becomes seasoned, and by the time the tree is felled and 'logged' its general gravity is reduced sufficiently for rafting; but there can be no question, if the tree were felled at once, without 'girdling' and converted into logs, that a far more complete seasoning of the whole tree would take place at an earlier period than is now allowed for felling it, and that consequently the process of girdling actually tends to retard the very end, to accelerate which it would seem to have originally been devised. This then is my first objection

¹ My reason for classing the foregoing ten samples of foreign teak as ungirdled is, that the native method of "girdling" (if it can be so called) or killing trees differs in toto from the method enforced by the Forest Department, and consists, as I am informed by Mr. Slyn, *in half cutting through the tree as it stands, and driving augur holes through and through the remaining portion.* This plan, as far as regards the abstraction of the sap, differs little from cutting the tree down at once, as *I argue should be done*; anyhow, its superiority over the ridiculous system of "girdling" in vogue in Pegu cannot for a moment be contested.

to girdling. The second involves a more serious question than mere delay, and lies in the fact of the deterioration which the practice causes in the timber of trees so treated.

“Major Morgan (Report 1861-62) tells us Malabar teakwood has been discontinued in Madras for the use of gun carriage wheels by the Superintendent, as *it was found brittle*; but he had explained to Colonel Maitland, and shown him that the manufactory must have been supplied with *girdled teak*. Good cross-grained Malabar teak, Major Morgan adds, is superior to any wood for wheels, and *the girdling of teak*, he says, *has long ago been given up, as it makes the wood brittle and deprives it of its oil*. Major Morgan, of course, is speaking of Malabar, but is it not strange, if girdling has been abandoned for such a reason in Malabar, that it should still flourish unsuspected, and be rigorously enforced in Pegu? Major Pearson thus also writes of girdling: ‘With reference to the girdling of teak, it seems to me that the process tends to a certain extent to make the timber brittle. This was found to be the case with a number of trees which were girdled, for some European timber merchant, in the Boree forest, prior to its being formed into a Reserve. When those trees were felled by this department, *many of them used to split and splinter in the fall*, rendering some portion of the timber quite useless, *whereas trees that are felled without being girdled do not seem to be liable to injury of this kind*. The natives of this part of India seem never to have practised the killing of trees before felling, and yet you find timber cut by them a century ago as sound as if it had only been cut for a few years.’

“The above extracts go far to establish conclusively the injurious results of ‘girdling,’ and that the results are not more palpable than they are, is simply due to the great excellence of teak timber and its capacity of withstanding trying conditions. It is a matter of certainty that there are numbers of trees which, if felled and at once converted into planks, would yield an average timber for common purposes, but which, if ‘girdled’ and allowed to stand weltering in their own sap, would be rotten before the official term of three years had expired, owing to the fact that there is no real seasoning whatever, so long as a tree remains standing in the ground.

“The third objection is a more trivial one, viz. that many trees are girdled in spots where they cannot be profitably removed, but where they might have been advantageously preserved for propagation—and few traders would ever think of felling a tree which they did not think was capable of being removed. I am, of course, aware of the claim of the Forest Department to select trees for the axe; but this right is in no wise bound up with the question of girdling, since a broad-arrow mark impressed by the Department would as clearly indicate the trees for felling as the laborious plan of girdling them; hence I cannot but hope that a dispassionate revision of the subject may lead to the abandonment of a pernicious custom. As for the fact that a broad-arrow mark might be dishonestly imitated, there is surely no more difficulty in girdling a tree surreptitiously than in branding it; and the same means of detection and punishment that succeed in one case would equally well apply in the other, any difference, so far as security goes, being in favour of the broad-arrow brand *versus* girdling, as the mere possession of such a branding hammer would suffice for conviction, whereas for surreptitious girdling a ‘dah’ alone is required, which is in everybody’s hands.”

AGANOSMA ACUMINATUM (Page 349).

Mr. A. L. Hough tells me this makes an excellent ‘chutnee.’

BLUMEA BALSAMIFERA (Page 389).

Dr. Mason remarks: “One of the most abundant weeds throughout Burma is a species of *Blumea*, that grows six to eight feet high, with leaves like ‘mullen,’ which, when bruised, emit a strong odour of camphor. Many years ago the Tavoyers informed me that they were in the habit of making an impure camphor from the

weed by a very simple process; but Mr. O'Riley was the first to make a good article from it, and to bring it to public notice. He made more than a hundred pounds, and the specimens which he sent to Calcutta were reported: 'In its refined form it is identical in all its properties with Chinese camphor.' The plant is so abundant that Burma might supply half the world with camphor. Wherever the trees are cut down, this weed springs up, and often to the exclusion of almost everything else; so that an old clearing looks like a field under cultivation." The apparatus required for the distillation of camphor is extremely simple, consisting simply of a capacious vessel wherein the material containing the camphor, cut up and mixed with water, is boiled, and a head, consisting of one or more pots, to receive the products of distillation, and which, being kept cool by means of wet cloths, receive the crude camphor deposited during the process of condensation. A redistillation by dry heat of the crude camphor, produced by the first process, is all that is required to produce the refined article.

ENTADA SEEDS (Page 540).

The seeds of the *Entada* are used for playing the game gohn-nyin-toh-pwē, so popular and universal in Burma, and which is equally popular, as we learn from Capt. Lewin,¹ among the wild tribes of the Chittagong Hills. The game resembles 'nine-pins' in miniature. The large flattish seeds are stuck up on end, and a player fires at them with another seed, projected by drawing back, with a flip, the middle finger of the right hand. The party bowling over most seeds wins.

PENTACME SIAMENSIS (Page 629).

This is the tree which the Burmese believe to be the one which has been petrified and scattered so plentifully over many parts of Pegu, and the petrified wood is therefore called *Enjyn chouk*. They believe when a tree reaches maturity and dies it becomes petrified, especially if immersed in water, and this nonsense is believed by many Europeans, and even receives a sort of *quasi*-confirmation by the solemn recognition of it in Dr. Balfour's work,² who writes: "It is said to harden by exposure to water, and even to strike fire with steel after having been kept in water a length of time." It is to be hoped this passage will be in future editions expunged, and committed to the limbo where similar curiosities find their last home.

¹ Hill Tracts of Chittagong, p. 40.

² Balfour's 'Timber Trees,' under *Shorea robusta*.

APPENDIX A.

PART III.

NOTES ON SOME BURMESE WOODS.

IN the following notes are embodied the observations of the Editor on some of the woods of Burma, and some vernacular names of trees are given which have not been recorded by any previous writer.

Many of the woods here recorded, which are little known or esteemed, would probably prove of value if quickly seasoned by being at once converted into planks and stacked under cover for a couple of years in a manner to insure proper ventilation. By felling and converting at once into planks on the spot, the costly employment of elephants to drag the logs is dispensed with, as planks could be removed on buffaloes or bullocks; but it is to be feared some hampering regulation or other of the Forest Department may stand in the way of this. How exceedingly unpractical and piddling some of these rules are is exemplified by that one which prescribes (or did do so) that all creepers are to be cut with an *upward* stroke of the 'dah,' a piece of nonsense worthy some bespectacled fogie who had never handled a dah in his life!

The figures denote the weight of a cubic foot of the seasoned wood, in all cases from original experiments.

Bam-bwē *Careya arborea*, Roxb. 55

Reddish-brown, close-grained, strong and durable. Adapted for furniture and house carpentry.

Kurz applies the name to *Planchonia valida*, which Gamble also styles Bam-bwē-ni. This is clearly because its wood resembles that of *Careya*, for a tree confined to the Andamans can by no possibility possess of right a Burmese name. Of course Burmese or Indian convicts, if asked, apply the names of Indian or Burmese trees with which they are familiar to trees resembling them, in the Andamans; but this is a misuse of terms, and should be discouraged as leading to confusion.

Ban-a-nen 43

A pale-coloured wood, like English ash; little known, but deserving of attention for light work.

Ba-shu *Mimusops littoralis* 65

A very close-grained wood, of a very dark-brown, the sapwood a pale-brown, but close-grained and of excellent quality. For strength and durability surpassed by few.

This is also called Kap-pa-li, according to Kurz.

Bē-byā *Cratoxylon nervifolium*, Kz. 52

A nice-looking rather close-grained wood of a reddish-brown colour, but deficient

in strength and endurance; would suit, however, for various uses where it would not be exposed to the weather.

Kurz describes the wood as "brown, close-grained, rather soft." Gamble calls it "hard."

Byu-ben *Dillenia pulcherrima*, Kz. 66

Wood pale reddish-brown, fine-grained, but rather coarse-looking, reputed to be strong, but not much used. It splits more easily than any wood I know, and is therefore of value as a firewood and for faggots. For sleepers, however, it would have to be hooped at the ends to prevent splitting.

Bwē-zyn *Bauhinia variegata* 42

Wood a very pale brown, rather coarse, but easy to work. Would probably prove a fair second-class wood where protected from exposure.

Bha-mor. *Tetranthera grandis*, Wall. 52

Wood a pale yellow, rather close and straight-grained. A good second-class wood. In his 1862 catalogue Brandis did not know the tree yielding this wood. In his Forest Flora, Kurz (who, it must be remembered, was a botanist as well as mere forest officer) identifies the wood as belonging to *Tetranthera*; yet Gamble (or Dr. Brandis, who really dictated the words, I presume) refers the wood to *Anonaceæ*. Now this I consider as hardly justifiable. The wood before Gamble may have belonged to the *Anonaceæ* as is suggested, but as he describes it as "olive grey" (page 11) it is very unlikely that it is *Bha-mor* at all, for *Bha-mor* is a yellowish wood comparable with box. At all events, before so completely ignoring the testimony of Kurz, the authority should at least have been given, on which the *Anonaceous* (?) wood, forwarded in 1867 from Burma, was identified as *Bha-mor* (Baman) by Gamble, in so summary a fashion.

Bōn-mē-zā *Albizia stipulata*, Boiv. 28

Colour a lively brown, grain coarse and open, but a thoroughly good wood for light carpentry purposes, with much of the look of walnut, only much lighter.

Byn-gā *Nauclea rotundifolia*, Roxb. 37

Wood a very pale yellowish-brown, rather close and easy to work. A good second-class wood. Gamble gives 47 lbs. as the weight of the wood, but this I regard as erroneous for the seasoned wood.

Chin-yōk. *Garuga pinnata*, Roxb. 45

Pale reddish-brown. A coarse wood, not much esteemed.

Choun-douk *Paysonia multijuga* 25

Yellowish-brown, straight-grained and not unlike teak in appearance. Works easily and seems a good second-class wood for light indoor work.

The wood described by Gamble (Brandis) from the Andamans seems totally different from the Pegu tree, the wood of which is certainly not "orange-brown." As a single specimen only is quoted, I consider it not improbable that the Andaman wood may have been wrongly identified. *Choundouk* in Pegu is certainly not a "fine wood," as Gamble (Brandis) describes it.

Chē-ben. *Smeacarpus panduratus*, Kz.

Wood worthless.

Chē-thē, see Thayet-thyt-si.

Dwā-ni *Eriolœna Candollei*, Wall. 42

Wood pale orange-red, rather coarse, and a fair second-class wood for light carpentry.

Eng-jyn. *Pentacme Siamensis*, Miq. 55

Colour light brown, grain close and straight, wood strong and lasting. A first-class wood, surpassed by few for general purposes.

Eng *Dipterocarpus tuberculatus*, Roxb. 57

Brown, pretty close-grained and easily worked. Decays when exposed to the weather, but for indoor purposes is worthy of attention from its size and cheapness. It would probably prove durable enough if fully seasoned first, and painted afterwards, or tarred if exposed out of doors.

Gyn-di *Quercus Amherstiana*, Wall. 59

Colour when fresh brownish-red, fading to pale reddish-brown. Wood hard, strong and durable, but not easy to work from its crooked grain. An excellent wood for coarse carpentry, and these remarks doubtless apply to more than one species of *Quercus* in Burma.

Gān-gor *Mesua ferrea*, L. 69

Red or brownish-red. Wood hard, strong and imperishable; close, but cross-grained, and very difficult to dress. Selected slabs would form handsome furniture, and for all purposes calling for strength and durability this wood has few superiors.

Hmā-ni *Gardenia erythroclada*, Kurz. 54

Wood very pale, but hard and close-grained. Is too small in scantling to prove of use, save perhaps for the manufacture of toys.

Hmā-chouk (Botanical name unknown) 51

Brown, with rather a fine and pretty grain. It would serve for ornamental furniture.

Hnor (Hnau) *Nauclea cordifolia*, Roxb. 61

Heartwood brownish-yellow, sapwood paler and brighter, both close-grained and excellent for furniture, toys, combs, and the like. The wood dresses easily, and looks well when finished.

Gamble says this tree has no heartwood. In speaking therefore above of the heartwood, I mean the inner wood, which is certainly differently coloured from the outer: call it heartwood or not. I cannot understand the weight of this wood as given by Gamble, only one of his specimens reaching 50 lbs., whereas mine weighs 61 lbs., a picked sample it is true. The name is correctly given by Brandis 'Hnau' (Catalogue, 1862), but mis-spelt by Kurz. Hnau, which is unfortunately copied by Gamble.

Hpān-gā *Terminalia tomatella*, Kz. 64

Heartwood dark brown, sapwood pale yellowish. Hard, strong and durable, the sapwood of old trees being scarcely inferior to the heart. An excellent wood for house carpentry and strong furniture, and procurable of great size. Furniture made of the dark heartwood would be scarcely inferior in look to that made of walnut.

Hpa-la-wā (*Garcinia speciosa*, fide Gamble) 60

Reddish-brown, with a rather fine grain, and probably well suited for furniture.

Hpē-wun *Berrya anonilla*, Roxb. 56

Reddish-brown, with a fine grain, dresses easily, and is well adapted for ornamental carpentry, but usually of small scantling. Seasons very slowly, never seeming thoroughly to get rid inside of a certain amount of moisture.

Hpet-thān *Spathodea stipulata*, Wall. (fide Brandis) . . . 53

Pale brownish-orange, pretty close-grained, dresses easily, and when polished is a remarkably handsome wood, equal to mahogany. It is admirably adapted for furniture and fancy carpentry.

Brandis was no doubt correct in his original reference of Hpet-thān to *Spathodea*, and Gamble has followed Kurz in his error of applying the name to *Heterophragma*. Kurz is also in error in applying the name *Malwā* to the same tree. I judge this to be the case, as Gamble describes the wood of *Heterophragma* as "yellowish-white," which does not apply to 'Hpet-thān.'

- Hpet-lē-zin (Botanical name unknown) 55
 Very pale brownish. Runs small, but useful for light carpentry.
- Htonk-shā *Vitex leucocylon*, L. 38
 Pale brown, rather open grain, soft, and easily worked, but deficient in strength and readily decays. A very inferior wood. Kurz describes it as 'durable.' If so, it would do well for furniture; but I believe it to be the reverse.
- Jio *Schleichera trijuga*, Willd. 68
 Pale brown, very hard, close-grained, and lasting. A handsome wood when polished, but usually of rather small scantling. Valuable for all purposes demanding hardness and strength.
- Jio-bō *Walsura villosa*, W.A. 61
 Heartwood purplish, very hard and strong.
- Jōk *Diospyrus cordifolia*, Roxb. 45
 Very pale brownish, and of rather coarse fibre, adapted for ordinary purposes. No dark heartwood, or only in aged trees. This is of course the 'Chope-pen' of Kurz.
- Ka-thyt *Erythrina ovalifolia*, Roxb. 23
 A very light open wood, adapted for some of the purposes to which cork is put, as buoys for nets, etc. Kurz applies this name erroneously to *Pentace Burmanica*, Kz., a heavy red wood.
- Kam-lā (Botanical name unknown) 43
 A tree loving salt or brackish water. Very pale brown, grain moderately fine, and fit for ordinary purposes.
- Ka-la-mat *Cordia fragrantissima*, Kz. 47
 A fragrant brown wood much prized by the Burmese. Kurz identifies it as above. Gamble, however, applies the name *Young Kalamat* to this species, reserving (as I understand the reference, Manual, p. 322) the name *Kalamat* for a species of *Santalum*. I question if Young kalamat refers to a *Cordia*, and think Kurz undoubtedly right, and still less likely is it that either apply to a *Santalum*.
- Kal-o-wē *Cinnamomum obtusifolium*, N.E. 42
 Very pale brown, grain moderately fine, seems adapted for planking and ordinary uses.
- Kē-u-ē (Botanical name unknown) 39
 Pale brown, grain fibrous and open, suitable for coarse planking and packing cases.
- Ka-tēn (Botanical name unknown) 63
 Pale orange-brown, like a pale mahogany, grain close; works up well, and when polished is a very handsome wood, and well adapted for ornamental furniture.
- Ka-thyt (Botanical name unknown) 42
 Reddish-brown, grain rather fine, but a little feathery. A soft, easily-worked wood, adapted for most purposes for which *Cedar* is used, but not for pencils.
- Ka-sha-wē (Botanical name unknown) 38
 Yellowish-brown, grain rather coarse, but when dressed looks well, and seems suitable for planking and light carpentry.
- Ka-nā-zo, or Pyn-lē-ka-nā-zo *Heritiera littoralis*, Dry. 66
 Brownish-red, close-grained, hard and difficult to work, but very strong and imperishable. It is closely allied to the Bengal 'Sundri,' one of the toughest woods known, and is highly deserving of attention for all purposes demanding strength and durability. The wood seasons slowly.

- Ka-nā-zo *Baccaurea sapida*, Muell.
- This is an entirely different tree, and cultivated in Burma for its fruit. Its timber must not be confounded with the last, which bears the same name.
- Kan-y-oung *Dipterocarpus* (?) 48
- Pale yellowish-brown, grain coarse, but works easily, and is suitable for planking and common uses.
- Kan-y-in *Dipterocarpus alatus*, Roxb.
- Similar to the last. The timber of *Dipterocarpus* is only worth attention from its cheapness and great scantling. It would be more valuable could any chemical process be devised for increasing its durability.
- Kurz says *D. laevis* is *Kanyin-ni*, and *D. alatus*, *Kanyin-hpyu*.
- Kyun-lō (Botanical name unknown) 43
- Yellowish brown, dresses easily and resembles teak, but is an inferior wood, fit only for light work.
- Koun-a-lyn *Premna tomentosa*, Willd. 45
- Pale yellowish, of medium grain, dresses easily and deserves attention for small articles.
- Kay-zai (Botanical name unknown) 45
- Very pale yellowish-brown, close-grained and dresses easily. Seems adapted for furniture.
- Koung-gouk (Botanical name unknown) 43
- Pale reddish-brown, close-grained, but an inferior wood, fit only for planking and common uses.
- Kōn-tha-byē *Eugenia*, sp. 52
- Pale purplish-brown, rather close-grained, but an inferior wood, good only for planking and packing cases.
- Kū-zī (Botanical name unknown) 59
- Pale brown, fine-grained, but an inferior wood, fit only for planking.
- Kō-kō *Albizzia lebbek*, Bth. 42
- Dark brown, grain coarse and open, but an excellent furniture wood, being easy to work, handsome in appearance, and not heavy.
- Kya-nān (Kyat-hnan) *Carapa?* 47
- Dark brownish-red, very much resembles mahogany. Fine-grained and easy to dress. An excellent furniture wood, and superior in every way to 'Toon.'
- Kyet-mouk *Nephelium longana*, Camb. 59
- Very pale brown, grain rather coarse and irregular. A good second-class wood for planking and common carpentry.
- Kyet-yō *Vitex pubescens*, Vhl. 61
- Yellowish brown, or nankin colour. Hard and close-grained, and a handsome furniture wood, taking a beautiful polish, and lighter in colour than most similar woods. Gamble gives its weight as 55 lbs.; but picked samples as above run heavier even when fully seasoned.
- Lē-yō (Botanical name unknown) 52
- Pale reddish-brown, heartwood very dark. Fine-grained, but an inferior wood, useful perhaps for toys and fancy carpentry.
- Lē-myor (Botanical name unknown) 43
- Pale reddish-brown, rather coarse in grain, but suitable for planking and common carpentry.

- Lai-zā *Lagerstræmia tomentosa*, Presl. 39
 Very pale brown, grain rather fine, but fit for planking and coarse carpentry only.
- Ma-da-mā (Botanical name unknown) 65
 Orange-red, hard, fine and straight-grained, but very fissile. A favourite wood for knife or sword handles, sticks or the like, and posts, being very durable.
 Kurz applies this name (incorrectly I think) to two species of *Dalbergia* (*D. glauca* and *ovata*).
- Mani-ok-khā *Carallia lucida*, Roxb. 47
 Pale orange-yellow, fine-grained, but feathery; dresses easily, but has no great strength. It would make a good furniture wood, as it looks well when polished.
- Ma-ji. *Tamarindus Indica*, L. 86
 Heartwood dark purple. Sapwood pale yellowish. Intensely hard and close-grained, the heartwood being one of the most imperishable woods I know. A splendid ornamental wood for massive carved furniture, but costly to work, and never used. No workman could carve it without specially tempered tools. Highly to be commended for turnery, blocks, etc., as a substitute for *lignum vitæ*.
- Mā-tha-lē. (Botanical name unknown.)
- Mā-u. *Sarcocephalus cadamba*, Miq. (*vide* Kurz). 37
 Light yellow, soft and easily worked, and therefore much used for common carpentry, but terribly liable to the attacks of xylophagous coleoptera. Having no specimen of this wood, I follow Brandis, as Kurz is certainly wrong in giving 73 lbs. as its weight.
- Mā-ū-ka-dun *Sarcocephalus cordatus*, Miq. (*vide* Kurz). 37
 Light yellow, close-grained and easily dressed, and a good wood for light carpentry. Selected planks display a pretty dotted or mapled grain.
- Mōng-theh-ōk (Botanical name unknown) 53
 Reddish-brown, fine-grained and easily dressed. Would probably prove a good second-class furniture wood and adapted for indoor work, not requiring great strength.
- Mi-ai-ā *Grewia microcos*, L. 45
 Very pale reddish-brown, fine-grained, and would serve for planking and coarse carpentry.
- Mi-na-bān. Myet-hna-bān. (Botanical name unknown). 55
 Pale, or whitish, hard and very close-grained. A good wood for ordinary carpentry purposes, planking, etc., and as a substitute for 'Box.'
 This is I believe the so-called Martaban lance-wood. Kurz applies the name to a shrub, *Strobilanthes flava*.
- Myouk-na-doung *Cassia auriculata*, L. 52
 Pale orange-brown, grain coarse, but wood strong and esteemed for rough uses.
- Myouk-meng-thwē-gē (Botanical name unknown) 50
 The name signifies "The blood-gouts of the monkey king."
 Pale coloured, rather fine-grained, but little used save for bows and spears, for which it is highly esteemed. Whence its vernacular name I cannot say.
- Myouk-shor *Homalium tomentosum*, Bth. 62
 Pale yellowish-brown, close-grained, but little esteemed. It probably decays rapidly under exposure, but from its abundance and large scantling is deserving attention for coarse indoor work, planking, etc.
 Gamble says the wood is 'durable,' which requires confirmation.
- Myouk-goung (Botanical name unknown) 43
 Pale yellowish-brown or yellow, open grain, but an excellent light furniture wood resembling *Young-ben*, and perhaps some species of *Artocarpus*.

- Na-bhē *Odina wodier*, Roxb. 39
 Pale reddish-brown, grain a little coarse, but a good second-class wood for furniture and indoor carpentry, planking, etc.
- Na-ji. *Pterospermum lanceaefolium*, Roxb. 41
 Pale brown, grain rather coarse. An inferior wood of small scantling, might be used for toys and small domestic articles.
- Nē-u-ē *Placourtia cataphracta*, Roxb. 56
 Very pale reddish, with many dark knots (thorns), close-grained, but works unkindly, and is of small scantling. It might serve for toys or turning.
- Ngū or Ngū-gyi *Cassia fistula*, L. 53
 Brown, with a slight orange tint, fine-grained, hard, and imperishable, but of small scantling. Good for tool handles and purposes demanding hardness and durability.
- Ngu-shwē *Cassia renigera*, Kurz 54
 Wood similar to the last.
- Ngān-pē-yōk (Botanical name unknown) 52
 Bright brown, with a close grain, and often mottled or clouded. Looks very well when polished, and is an admirable wood for ornamental furniture, though deficient in strength. Might veneer well.
- Ōng-dē-bō (Botanical name unknown) 35
 Pale brownish-yellow, of a rather coarse and open grain, fit only for packing cases and common purposes.
- Onk-chyn-zā *Diosypros chretioides*, Wall. 47
 Dark greyish, paler streaked, no black heartwood, grain a little coarse, but would prove a good furniture wood and useful for planking and common purposes. The name signifies "Hornbill's food." The tree determined as above was felled by myself and identified by Kurz.
- Pa-dē. (Botanical name unknown) 55
 Pale brownish-red, fine-grained and esteemed, I believe, for boxes and small articles; might answer for some sorts of ornamental carpentry.
- Pal-en *Casuarina equisetifolia*, Forst. 61
 Pale reddish-brown, close-grained, hard and imperishable, but difficult to work, and not a handsome wood. Excellent where strength and hardness are required.
- Pāu-tha-gā (Botanical name unknown) 53
 Brownish-red, with an open grain, but rather crooked or feathery. Would answer well for planking and boxes and common carpentry.
- Pa-douk *Pterocarpus Indicus*, Wall., and *P. macrocarpus*, Kz. 61
 Red, hard, strong, and imperishable, grain rather crooked, and when so, difficult to dress, but a first-class wood, unsurpassed for general utility.
- Pein ē *Artocarpus integrifolia*, Willd. 53
 Pale orange-brown, loose-grained, but dresses easily, and is an excellent furniture wood.
- Pein-ē hō (Botanical name unknown) 44
 Like the last, but a browner wood, would answer the same purposes.
- Pyn-dor-thēn (Botanical name unknown) 58
 Pale brownish red, would answer for planking and common carpentry.
- Pwai-nyet *Calophyllum inophyllum*, L. 41
 Pale brownish-red, tough, and cross-grained, and well fitted for spars, the

celebrated 'Poon' spars being probably cut from a species of *Calophyllum*, if not from the present tree. Good for coarse carpentry.

Pyeng-mā *Lagerstræmia flos-reginæ*, Retz. 39

Reddish-brown, a coarse-looking wood, but useful for house carpentry and furniture, dressing easily and being not too heavy, as is so commonly the case with handsomer woods.

Pyan-ān. *Carapa obovata*, Bl. (?) 46

Dark red, selected planks look as well when polished as mahogany. A first-class furniture wood, and good for house carpentry and general use.

Kurz applies the name Pyn-lē-ōng to both *Carapa obovata* and *C. Molluccensis*.

Pyn-lē-ōng *Carapa Molluccensis*, Lam. 44

Similar to the last, and an excellent substitute for mahogany, for furniture and ornamental carpentry. Is intermediate in looks between mahogany and cedar.

Pyn-lē-ka-nā-zo, see Ka-nā-zo.

Pyn-ga-dō *Xylia dolabriformis*, Bth. 68

Brownish-red, hard, close-grained, strong and imperishable. For strength and durability has no superior.

Shā *Acacia catechu*, Willd. 69

Brownish-red, hard, strong, and imperishable. It dresses easily, and, when polished, looks like mahogany. But that it is very fissile and apt to split, it would for hardness and durability have no superior; old stumps exposed to the weather seeming to defy its influence, as though made of iron.

Shā-hpyu. 'White Shā.' *Cicca emblica*, L.

Kurz incorrectly calls this tree *Ta-sha-pen*. At all events throughout Pegu it is only known as the 'White Shā.'

The wood is said to be durable under water, and so of use in timbering the sides of wells and such purposes.

Shām-pai-ōk (Botanical name unknown) 42

Reddish-brown. A second-class wood for coarse carpentry.

Sow-yō *Walsura robusta*, Roxb. 57

Pale yellow, rather coarse-grained, but very tough and strong. A coarse but valuable timber where strength is desired, as for house carpentry, etc. I am not sure however if the specific name is correctly determined. Balfour gives its vernacular name as "Joe-boe" (sic), jio-bō, which is *Schleichera trijuga*! Kurz gives "Gyo-pho" (jio-bō or hpyu? which I do not know). Perhaps both names may be applied to the same tree, and it is called Sow-yō in Tenasserim. Mason says it is a *Dalbergia*.

Syn-nen-thayet . . *Mangifera sylvatica*, Roxb. 30

Grey, coarse-grained, and fit only for coarse carpentry and rough boxes. It resembles mango wood, but is not so strong.

Syt *Albizzia procera*, Bth. 34

Pale yellowish-brown, open fibrous grain, but dresses easily and takes a good polish. An excellent wood for furniture, being very light and good-looking.

Swē-dōr, or Sowē-dō (Botanical name unknown)

A strong, hard wood of Tenasserim, of which I only know the name.

Tar-hpi *Calophyllum inophyllum* 35

Pale brownish-red, soft, and easily worked. Excellent for light carpentry, and resembles cedar in appearance.

Tē *Diospyros Burmanica*, Kz. 53

Pale greyish-yellow, rather streaky. A strong wood for coarse carpentry, but of small scantling. The name Tē is applied probably to other species of *Diospyros*.

- Tēn or Tein . . . *Nauclea parvifolia*, Roxb. 57
 Pale greyish-yellow, rather fine-grained, and seems well fitted for common carpentry, though rather heavy for furniture.
- Thā-hlwin *Olea dioica*, Roxb. 39
 Pale yellowish-brown, fine-grained, and easy to work. An excellent wood for furniture and indoor carpentry. This tree gives its name to the 'Salween' River, as it is commonly called.
- Tha-mē *Aricennia officinalis*, L. 47
 A coarse cross-grained wood, little used except for rice mortars, for which its interlacing fibres well fit it. It is a tree of the delta and tidal region.
 Gamble (Brandis) describes this wood (Manual, p. 300) as "very brittle," which is singularly erroneous, as from the interlacing of its fibres it is one of the most difficult, I may say impossible, woods to split that grows. On this account it is selected to make the large mortars wherein rice is husked in a Burman's house.
- Tha-mein-hpyu . . . *Gardenia sessiflora*, Wall. 60
 Hard, reddish-white, and close-grained, but brittle. Seems adapted for turning and fancy work.
- Tha-kūt-mā . . . *Spathodea Rheedei*, Wall. 35
 Very pale reddish-white or grey. Seems a fair timber for indoor use, and being light might be useful for common furniture.
- Tha-noung *Acacia Suma*, Buch. 43
 Pale orange-red. Wood very coarse, but strong and tough. Would do for coarse work only.
- Tha-lē *Symplocos leucantha*, Kz. 39
 Pale reddish-brown, straight, and fine-grained, and suitable for furniture and light carpentry.
- Tha-kut-hpyu, or Tha-kwot-hpo *Stereospermum chelonoides*, DC.
 Thān-hlwyn . . . *Elaeocarpus*.
 Thayet *Mangifera Indica*, L. 42
 Grey, or pale greyish-brown, coarse and open grain, but strong and tough, and suited for coarse carpentry. The wood is said to hold a nail more firmly than any other. Commonly used for packing cases, but selected planks make very tolerable furniture.
- Thayet-thyt-si. . . *Gluta Tavoyana*, Wall. 52
 I have seen the name Chē-thē applied to this wood, but I consider, from the character of the wood, that Thayet-thyt-si is the correct name, as the wood much resembles *Melanorrhœa* (Thyt-si). The wood is dark red, with a handsome grain, and in appearance is not inferior to mahogany. It is a first-class furniture and ornamental wood. Of the Indian allied species, *G. travancorica*, Gamble remarks: "The wood is little used, but its splendid colour and markings should rapidly bring it to notice as a valuable wood for furniture. It seems to season very well, and works and polishes admirably."
- Thi-dyn (Botanical name unknown). 45
 Very pale brown. A coarse wood suitable for boxes and common purposes.
- Thi-wyu *Millettia leucantha*, Kz. 63
 Dark purplish-brown, when fresh, purplish. Hard, cross-grained, very tough and durable. An excellent wood where great strength and durability are sought.
 Kurz applies the name *Theng-weng*, or *Thin-win*, to two distinct trees, e.g. *Pongamia glabra* and *Millettia leucantha*. Brandis also refers it to *Pongamia*, but Kurz transfers Brandis' description of the wood of *Pongamia* to his *Millettia leucantha*, describing the wood of *Pongamia* as white and light. The *Thi-wyu* is certainly a

dark wood, such as in the trade would pass as a 'rosewood,' and one of the toughest known; and I have here preferred relying on Kurz rather than Brandis, but the two authorities are in direct contradiction.

Selected planks of *Thi-wyn* would make handsome furniture, but would be very heavy and very difficult to dress. The wood, however, would probably answer well for turning.

Thi-wyn-pouk-hpyu . (*Dalbergia*?) 59

Pale yellow, coarse-grained and strong, but seems liable to the attacks of insects. Useful for rough carpentry.

Thy-i-ā *Shorea obtusa*, Wall. 67

Yellowish-brown; a handsome close-grained wood, very strong and durable, resembling in its properties the Sāl of India, but darker in colour. It is a first-class wood, though too heavy for furniture, and not easy to work up. For house carpentry it is rivalled by few woods.

Thym-ma-ji *Albizzia odoratissima*, Bth. 54

Rich brown, with the *Albizzia* grain, dresses easily, and would make very handsome furniture equal to walnut. An excellent wood for ornamental and general carpentry.

Thy-myn, or Thyt-myn . *Nageia bracteata*, Kz. 41

Pale brownish-yellow, close-grained.

Thyn-ga-du *Anisoptera glabra*, Kz. 40

Pale brown, very coarse and open grain, well fitted for making canoes, but an inferior wood for carpentry purposes.

Thyn-gān-net *Hopsea odorata*, Roxb. 48

Yellowish-brown, close but rather wavy grain, easily worked, strong and durable. A first-class furniture wood used for general carpentry. The freshly cut wood darkens rapidly on exposure to the air.

Thyu-gān-wā (Botanical name unknown) 46

Similar to the last, but a little paler in colour.

Thyt-kā *Pentace Burmanica*, Kz. 37

Reddish-brown or pale reddish-brown. Soft, fine-grained, and easy to work, but of rather feathery fibre, a good wood for cigar boxes and such purposes as 'cedar' is applied to, but is of no great strength, and unsuitable for outdoor exposure.

Kurz calls it *Pentace Burmanica*, but as he describes the wood as "rather heavy," it cannot be the same as known to me by the name, as *Thyt-kā* is certainly not a heavy wood, but the name is probably applied to more woods than one.

Thyt-ka-do (*scented wood*) *Cedrela toona*, Roxb. 34

Pale reddish-brown, rather coarse-grained, easily worked, and, when freshly cut, having a delicious scent. This wood is the 'Toon' of India, so largely employed for furniture, but is subject to the attack of insects, and furniture made of it often possesses the unpleasant habit of creaking at night, which might, however, be probably obviated by varnishing and so rendering it less susceptible of hygrometric changes.

Thyt-lyn-dā *Heterophragma sulphurea*, Kz.

Thyt-pyong (Botanical name unknown) 48

Pale brownish-yellow, rather fine-grained and easily worked. Seems suitable for furniture and indoor work.

Thyt-si *Melanorrhæa usitata* 57

Dark brownish-red, fine-grained, and a good substitute for mahogany in appearance, but more brittle. An excellent wood for furniture and fine carpentry.

Thyt-si-bō 54

Reddish-brown, fine-grained, easily dressed, and takes a good polish. It resembles Thyt-si, but is not so red and not quite so heavy. My specimen was obtained in the Bassein district, but I could not discover the tree which produced it.

Thyt-so-ay-lē . . . *Schrebera swietenoides*, Roxb. 47

Kurz recommends this wood as hard and durable, and as not given to warping. Gamble says the wood is "durable, works freely, and does not warp or split."

Thyt-to (Botanical name unknown) 35

Very pale reddish-grey, easy to dress and rather close-grained. Seems suitable for indoor carpentry and ordinary furniture.

Touk-kyān *Terminalia crenulata*, Roth. 70

Dark brown, close-grained, hard and durable. An excellent first-class timber for all purposes, too heavy perhaps for ordinary furniture, though handsome, and, allowing for its hardness, not difficult to work. Gamble says 57 lbs. is its average weight; but this is far too low.

Toung-ben *Artocarpus chaplasha*, Roxb. 34

Pale reddish-brown, rather coarse grain, but easily worked, and suitable for furniture and general carpentry purposes, where no great strength is required.

Toung-gān-gor . . . (Botanical name unknown) 75

Pale yellowish-brown, very close-grained and intensely hard. One of the strongest, hardest and most durable woods known, and a first-class wood for all purposes calling for strength and durability. It is a very handsome wood as well, taking a superb polish. I do not think either Kurz or Gamble notice it.

Toung-ka-la-mat . . *Cordia fragrantissima*, Kz. (?) 47

Brown, rather fine-grained and easily worked, and suitable for furniture and light carpentry, and a rather handsome wood. See *Kā-la-mat*.

Toung-ma-ji . . . *Eleocarpus floribundus*, Bl. 46

Pale purplish-red, rather fine-grained and easy to work. Seems suitable for light carpentry.

Toung-mhu. (Botanical name unknown).

A large tree used for making canoes. Wood light and suitable for light carpentry.

Toung-pa-dē . . . (Botanical name unknown) 45

Very pale reddish-brown, coarse and fibrous, fit only for the commonest purposes.

Toung-tha-but . . . (Botanical name unknown) 44

Pale yellowish-grey. A rather fine-grained, but an inferior wood.

Toung-tha-lē . . . *Garcinia Kydia*, Roxb. 46

Very pale brown, rather fine-grained and easy to work, and seems adapted for light carpentry. Kurz says it is very perishable, but this probably is only the case under exposure to the weather.

Tseit-ki or Tseit-chē. *Briodelia retusa*, Spreng. 39

Pale brownish or greyish. A somewhat coarse but strong useful timber for house carpentry. Its name 'goat's-dung' is due to the spotted appearance the planks display, when one of the imbedded dark woody thorns with which the young tree is armed is cut through, these thorns in section bearing a fanciful resemblance to a dried currant, or to goat's dung.

Tseit-ki-hpa-lān . . *Briodelia*, sp. 45

Reddish-brown, not much used.

Yē-bi-mā (Botanical name unknown) 51

Reddish-brown, fine-grained and works easily. Well adapted for light carpentry.

- Yem-a-nen (Botanical name unknown) 42
 Very pale buffish-yellow, fine-grained, with a satin lustre, and something like bird's-eye maple. A good wood for fancy carpentry.
- Yē-myaing. (Botanical name unknown).
 Pale brown. An inferior wood.
- Yen-daik *Dalbergia cultrata*, Grah. 58
 Sapwood white and said to be perishable, but deserves trial for indoor work. Heartwood dark brown, or blackish, very hard, tough and imperishable. An excellent wood where great strength and toughness are desired. The weight of my specimen is unusually low from excessive seasoning. Gamble gives a more general average at 69 lbs.
- Yen-gāt. *Gardenia coronaria*, Ham. 53
 Pale yellow, hard and brittle, an inferior wood, that might be used for combs and small wares.
- Yeng-bāt (Botanical name unknown) 50
 Pale yellow, fine-grained and dresses well. Might be used as a substitute for 'box' for combs and fancy articles.
- Yeng-zāt (*Dalbergia*, sp.?) 75
 Purplish-black, very close-grained, hard, strong and durable. A good substitute for *ebony*, though more fibrous in grain.
- Yi-mā *Chikrassia tabularis*, Juss. 53
 Pale reddish-brown, rather close-grained, and easy to work. An excellent furniture wood, commonly known as 'Chittagong' wood.
- Yōng *Anogeissus acuminata*, Wall. 51
 Very pale reddish-yellow, rather fine-grained, but an inferior wood, and I believe very subject to the attacks of insects before it is seasoned. Seems adapted for coarse carpentry only. Kurz recommends it for indoor use.
- Zam-ba-lē (Botanical name unknown) 42
 Pale yellowish-grey. Rather coarse-grained, and fit only for common uses.
- Zi-hpyu (Botanical name unknown) 49
 Pale reddish, rather fine-grained, but an inferior wood. Would do for coarse work and packing cases.
- Zym-byun *Dillenia pentagyna*, Roxb. 46
 Pale brown, close-grained, and seems a good wood for general carpentry.

APPENDIX B.

VERNACULAR NAMES OF BURMESE PLANTS.

Aik-mwē-nweh	<i>Embolia robusta.</i>
A-kyor	<i>Aquillaria agallocha.</i>
Ā-nān	<i>Fagraea fragrans.</i>
Ā-nān-bō (or hpyu)	<i>Crypteronia paniculata.</i>
A-pang	<i>Achyranthes aspera (Balfour).</i>
A-tha-wa-dī	<i>Passiflora.</i>
A-thor-kā	<i>Amherstia nobilis.</i>
A-thor-kā-bō	<i>Saraca Indica.</i>
Au-zā	<i>Anona squamata and reticulata.</i>
Ay-ka-yit	<i>Millingtonia hortensis.</i>
Ba-la (or Pa-la)	<i>Elettaria cardamomum.</i>
Ba-lu-let-wā	<i>Heptapleurum venulosum.</i>
Ba-lu-wā	<i>Abelmoschus esculentus.</i>
Ba-lu-wā-gyi	<i>A. moschatus.</i>
Bam-bwē	<i>Careya arborea.</i>
Bam-bwē-nweh	<i>Ancistrocladus Griffithii.</i>
Ba-mor	<i>Tetranthora grandis.</i>
Ban-khā	<i>Terminalia bellerica.</i>
Ba-shu	<i>Mimusops littoralis.</i>
Ba-wā-net	<i>Justicia gendarussa.</i>
Bē-byā	<i>Cratoxylon neriifolium (Kurz).</i>
Bch-kyo	<i>Clerodendron serratum (Kurz).</i>
Ben	<i>Cannabis sativa.</i>
Bet-mwē-shor	<i>Paritium macrophyllum.</i>
Bet-yā	<i>Tragia involuerata.</i>
Bi-zat	<i>Spilanthes.</i>
Bō-da-tha-ra-nā	<i>Cinna Indica.</i>
Bok-net	Zebra wood of Tavoy.
Bō-meh-zā	<i>Albizia stipulata.</i>
Bor	<i>Triclisia palmata.</i>
Bor-thi-dyn	<i>Rottlera tinctoria.</i>
Bouk-wā	<i>Bambusa, sp.</i>
Bu-dī-nā	<i>Mentha sylvestris.</i>
Bu-gyi-hpyu	<i>Clerodendron viscosum.</i>
Bu-gyi-nī	<i>C. squamatum.</i>
Bu-hsen-swēh	<i>Lagenaria vulgaris.</i>
Bu-ta-let	<i>Elaeocarpus lacunosus (Kurz).</i>
Bu-ta-yet	<i>Egiceras corniculata.</i>
Bwē-zyn	<i>Bauhinia variegata and Malabarica.</i>
Byin-hsen	<i>Antidesma ghaesembilla.</i>

Byn	<i>Cannabis sativa.</i>
Byn-gā	<i>Nauclea rotundifolia.</i>
Byu-ben (or Hpyu)	<i>Dillenia pulcherrima</i> and <i>pentagyna.</i>
Chā-thoung-wā	<i>Bambusa polymorpha.</i>
Cha-yā	<i>Mimusops elengi.</i>
Chē	<i>Semecarpus panduratus</i> and <i>albescens.</i>
Chē-ni	<i>Barringtonia acutangula.</i>
Chē-thā (or dā)	<i>B. pterocarpa.</i>
Chē-thē	Tavoy red wood.
Chōk-ben (or Chōp-ben).	<i>Diospyros montana</i> and <i>cordifolia.</i>
Choun-douk	<i>Paysonia multijuga.</i>
Choung-yā	<i>Colosanthus Indica.</i>
Chyn-boung-hpyu	<i>Hibiscus.</i>
Chyn-douk-nweh-zouk	<i>Vitis latifolia.</i>
Chyn-thyā-lek-nweh	<i>Hymenopyramis brachiata.</i>
Chyn y-ōk	<i>Garuga pinnata.</i>
Chyn-u-wē	<i>Abrus precatorius.</i>
Da-mā-ngeh-nweh	<i>Millettia extensa.</i>
Dān	<i>Lawsonia alba.</i>
Dān-da-let	<i>Impatiens balsamina.</i>
Dān-kyweh	<i>Cassia tora.</i>
Da-ni	<i>Nipa fruticans.</i>
Da-noung	<i>Calamus arboreseens.</i>
Dan-yat	<i>Symplocos racemosa.</i>
Da-tha-lwōn	<i>Moringa pterosperma.</i>
Da-weh-hmaing	<i>Lumnitzera racemosa</i> (Tavoy, Mason).
Dhē-lē-ben	<i>Symplocos leucantha.</i>
Dī-du	<i>Bombax Malabaricum.</i>
Dōk-ka-tet (let)	<i>Conarus.</i>
Douk-loung	<i>Dalbergia reniformis</i> (Mason).
Douk-let	<i>Ficus.</i>
Douk-ta-louk	<i>Dalbergia glauca.</i>
Douk-ta-loung-nweh	<i>D. stipulacea.</i>
Douk-ya-mā	<i>Turpinia Nipalensis.</i>
Douk-yat	<i>Photinia.</i>
Doung-kyet-tet	<i>Cudrania pubescens.</i>
Doung sāp (or sōk)	<i>Casalpinia pulcherrima.</i>
Doung-tsat-pyā	<i>Callicarpa arborea.</i>
Du-yin	<i>Durio zibethinus.</i>
Du-yin-yaing	Wild durian.
Dwā-bōk	<i>Kydia calycina.</i>
Dwā-ni	<i>Eriolæna Candollei.</i>
Dwōt-ta-bat	<i>Achras sapota.</i>
Eing-bi-zāt	<i>Spilanthes paniculata.</i>
En-daik, see Yen-daik.	
Eng	<i>Dipterocarpus tuberculatus.</i>
En-gyen	<i>Aporosa macrophylla</i> (Kurz).
Enjiu	<i>Pentacme Siamensis.</i>
Gan-gor (or Ken-gor)	<i>Mesua ferrea.</i>
Gōn-nyin-ya	<i>Breynia rhamnoides.</i>
Gung-men	<i>Amomum corymbostachyum.</i>
Gwē	<i>Spondias mangifera.</i>
Gyen-baing	<i>Basella alba.</i>
Gyeng-ma-ōk	<i>Ardisia humilis</i> and <i>anceps.</i>
Gyen-gā	<i>Mollugo spargula.</i>
Gyung-sa-bā	<i>Triticum sativum.</i>
Gynt-nweh	<i>Gnetum edule</i> and <i>paniculare.</i>
Hēn-ka-lā	<i>Spilanthes acmella.</i>

Hên-ka-nweh	<i>Amaranthus spinosus.</i>
Hkor-kwâ	<i>Capparis grandis.</i>
Hleh-zâ (or Lai-zâ)	<i>Lagerstrœmia tomentosa.</i>
Hlông or Hlung	<i>Ocimum villosum.</i>
Hmaing	<i>Lumnitzera racemosa.</i>
Hmân	<i>Feronia elephantum, Randia, Gardenia.</i>
Hmân-hpyu	<i>Randia uliginosa.</i>
Hmân-ni	<i>Gardenia erythroclada.</i>
Hmân-thyn (or thên)	<i>Curcuma Roscoeana.</i>
Hmân-then	<i>Sassafras (Mason).</i>
Hmi-a-sait (or sêk)	<i>Antiaris toxicaria.</i>
Hmo	<i>Arca catechu.</i>
Hmo-a	<i>Grewia.</i>
Hmyin-wâ	<i>Dendrocalamus strictus.</i>
Hnân-ben	<i>Nauclea cordifolia.</i>
Hnân or (Hnân-mâ)	<i>Sesamum Indicum.</i>
Hnân-peh	<i>Odina wodier.</i>
Hnen-hsi	<i>Rosa.</i>
Hnet-pyâ	<i>Musa paradisiaca.</i>
Hnor	<i>Nauclea cordifolia.</i>
Hnyn-ek	<i>Clerodendron.</i>
Hpa-lâ	<i>Elataria.</i>
Hpa-lân	<i>Bauhinia racemosa.</i>
Hpa-la-wâ	<i>Garcinia speciosa.</i>
Hpa-yong-khâ	<i>Cucurbita maxima.</i>
Hpa-young-ben	{ <i>Allamandra cathartica (Mason).</i> <i>Theretia neriifolia (Kurz).</i>
Hpet-thân	<i>Heterophragma adnophylla.</i>
Hpet-yâ	<i>Tragia (Mason).</i>
Hpet-yâ-gyi	<i>Laportea erenulata.</i>
Hpet-wun (or Hpê-wun)	<i>Borria amonilla.</i>
Hpôn-ma-thên	<i>Blumea grandis.</i>
Hpoung-gâ	<i>Saccharum procerum.</i>
Hpw-to-ma	<i>Calamus.</i>
Hpyu	<i>Rhizophora mucronata and conjugata.</i>
Hpyin-hsên-swê	<i>Lagenaria vulgaris.</i>
Hpyu	<i>Dillenia pulcherrima.</i>
Hpyu-soung	<i>Bruqiera parviflora.</i>
Hsâ-nwen	<i>Curcuma longa.</i>
Hsat-le-kyoung	<i>Commelina caespitosa.</i>
Hsat-la-hpyu	<i>Pandanus odoratissimus.</i>
Hsat-thwê-gyi	<i>P. furcatus.</i>
Hsch-than-byâ	<i>Gelonium bifarium.</i>
Hsê-ma-gyi	<i>Vangueria spinosa.</i>
Hsê-than-pay-a }	{ <i>Gardenia campanulata.</i>
Hsê-than-bya }	{ <i>Randia longispina.</i>
Hsen-dông-mâ-nweh	<i>Tinospora nudiflora.</i>
Hsen-ka-dê	<i>Solanum frœe.</i>
Hsen-mâ-nô-pyin (or Sin-ma- no-pyin)	{ <i>Grewia abutilifolia (Kurz).</i> <i>Bridelia stipularis (Kurz).</i>
Hsen-nen-thayet	<i>Mangifera sylvatica.</i>
Hsen-ngô-myit	<i>Eleusine Indica.</i>
Hsen-thu-hpân	<i>Ficus regia and Roxburghii.</i>
Hsen-weh	<i>Ochna squarrosa.</i>
Hsi	<i>Nicotiana tabacum.</i>
Hsi-lê	<i>Daphne pendula.</i>
Hsi-mi-touk	<i>Methonica superba.</i>
Hseik-ba-lu	<i>Nyctanthes arbor-tristis.</i>

Hseik-chē	<i>Pancoria rubiginosa.</i>
Hseik-gyi	<i>Bridelia retusa.</i>
Hsu	<i>Carthamus tinctorius.</i>
Hsu-kouk	<i>Cesalpinia paniculata.</i>
Hsu-kyan-bō	<i>C. sepiaria.</i>
Htaip-kouk-pen	<i>Gualtheria lateriflora</i> (Kurz).
Hta-men-sā-hpyu	<i>Gardenia sessiflora.</i>
Hta-men-sā-ni	<i>G. turgida.</i>
Hta-men-tsōk-gyi	<i>Agyneia coccinea.</i>
Htan	<i>Borassus flabelliformis.</i>
Htan-myōuk-lu	<i>Livistonia speciosa.</i>
Htat-ta-yā	<i>Calendula officinalis.</i>
Htēk-kouk-ben	<i>Gualtheria laterifolia.</i>
Htein (or Htēn)	{ <i>Nauclea parvifolia</i> (Kurz). <i>N. cordifolia</i> (Mason). <i>N. sessifolia.</i>
Htein-ga-lē (or ka-lū)	<i>Mimosa pudica.</i>
Hti-ka-yōng	<i>Bambusa regia.</i>
Hti-wā	<i>Bambusa regia.</i>
Htōuk-kyān	<i>Terminalia alata and crenulata.</i>
Htōuk-mā	<i>Drepanocarpus reniformis</i> (Kurz).
Htonk-shā	<i>Vitex leucocylon.</i>
Htōuk-shā-mā	<i>Turpinia pomifera.</i>
Htōuk-tā	<i>Tacca pinnatifida.</i>
Htōuk-yat	<i>Putranjiva Roxburghii.</i>
Htwā-ni, see Dwā-ni.	
Htyn-yu	<i>Pinus khasya.</i>
In-jyn (or In-kyin)	<i>Aporosa macrophylla.</i>
Jio (or Jyo)	<i>Schleichera trijuga.</i>
Jio-bō	<i>Walsura villosa.</i>
Jio-hpyu	<i>W. robusta.</i>
Jok	<i>Diospyros cordifolia.</i>
Ka-byaing	<i>Cerriops Roxburghiana.</i>
Ka-dāt (or Ka-tāt)	<i>Cratara Roxburghii.</i>
Ka-dāt-gnān	<i>Cananga odorata.</i>
Ka-du	<i>Blumea</i> (Kurz).
Ka-dwē-u	<i>Dioscora fasciculata.</i>
Ka-dwōt	<i>Ficus hispida.</i>
Kaing-tha-hpo-gyi	<i>Symplocos.</i>
Ka-loug-lek-theh	<i>Phyllanthus columnaris.</i>
Ka-la-mat	<i>Cordia fragrantissima.</i>
Ka-lā-peh	<i>Cicer orietinum.</i>
Ka-lā-zoung	<i>Opuntia Dillenii.</i>
Ka-lā-zoung-let-wā	<i>O. cochinillifera</i> (Mason).
Ka-lēng (or Ka-lein).	<i>Cesalpinia bonduc.</i>
Ka-let	<i>Leca staphylea and sambucina.</i>
Ka-let-thaing	<i>L. crispa.</i>
Ka-long-lek-theh	<i>Phyllanthus columnaris</i> (Kurz).
Ka-lor	<i>Cassia occidentalis.</i>
Ka-lor-lisō	<i>Hydnocarpus heterophyllus.</i>
Ka-lwā	<i>Cerbera odallum.</i>
Ka-mā-khā	<i>Melia azadiracht</i> (Mason).
Kam-ba-lā	<i>Sonneratia apetala.</i>
Ka-mung (or Ka-mōn)	} <i>Kempferia.</i>
Ka-mung-kyet-lā	
Ka-mung-net	
Ka-mung-ni	
Ka-mung-taing-byā	} <i>Baccaurea sapida and parviflora.</i>
Ka-nā-zo	

Ka-nā-zo	<i>Heritiera</i> (see Pyn-lē-ka-nā-zo).
Kan-čk	<i>Zinziber barbatum</i> .
Kan-y-in-hōk	<i>Dipterocarpus obtusifolius</i> .
Kan-y-in-hpyu	<i>D. alatus</i> .
Kan-y-in-ni	<i>D. lavis</i> .
Kan-y-in-wet-toung	<i>D. turbinatus</i> (Gamble).
Ka-nweh	<i>Symphorema unguiculatum</i> (Kurz).
Ka-nyōt	<i>Asparagus acerosus</i> .
Kan-y-oung	<i>D. pterocarpus</i> .
Kan-zor	<i>Bassia longifolia</i> .
Ka-pa-li-thyt	<i>Mimusops littoralis</i> .
Ka-pwōt	<i>Coffea Arabica</i> .
Ka-byaing	<i>Cerriops decandra</i> (Mason).
Ka-ra-meh	<i>Santalum album</i> .
Ka-thē	<i>Samadera Indica</i> .
Ka-thyt-hsu	<i>Xanthoxylon budrunga</i> (Mason).
Ka-thyt-khā	<i>Pentace Burmanica</i> .
Kat-se-nē	<i>Trena macrocarpa</i> . <i>Sida</i> (Kurz).
Ka-ya	<i>Acanthus ilicifolius</i> .
Ka-yor	<i>Congea velutina</i> .
Ka-yor-ka-yō	<i>Aglaiā rohītuka</i> (Mason).
Ka-yu	<i>Pluchea Indica</i> .
Ka-zwōn	<i>Battatas edulis</i> .
Ken-bwōn	<i>Acacia rugata</i> .
Ken-khyōk-hpyu	<i>Plumbago Zeylanica</i> .
Ken-khyōk-ni	<i>P. rosea</i> .
Kha-boung	<i>Strychnos nux-vomica</i> .
Kha-boung-yē-gyi	<i>S. palatorum</i> .
Kha-ma-kha, see Ka-ma-khā	
Kha-moung-hpyu }	<i>Lagerstrœmia</i> .
Kha-moung-ni }	
Kha-moung-thwē }	
Kha-mung	<i>Kœmpferia galanga</i> (Mason).
Kha-na-khō	<i>Croton tiglium</i> .
Kha-ōng	<i>Ficus conglomerata</i> (Kurz).
Kha-ōng-gyi	<i>Clitodendron infortunatum</i> .
Kha-yā	<i>Acanthus ilicifolius</i> (Mason).
Kha-yā, Khya-yā or Kha-yā-gōng	<i>Mimusops clugi</i> (Mason).
Kha-yan, Khayan-chyn }	<i>Solanum melongena</i> .
Kha-yan-gywōt }	
Kha-yan-pa-meh }	
Kha-yen-wā	<i>Bambusa</i> .
Kha-yan-mye-hpōng	<i>Lycopersicum esculentum</i> .
Khoung-htch-wen	<i>Zinziber</i> .
Khoung-yan	<i>Hibiscus rosa-sinensis</i> .
Khu-tsau	<i>Hymenodictyon thyrsiflorum</i> .
Khwē-douk	<i>Kurrimia robusta</i> .
Khwē-la-bwōt-nweh	<i>Canavalia lucens</i> .
Khwē-lē-nweh	<i>Mucuna prurita</i> .
Khwē-tan-yen (see Tan-yen)	{ <i>Inga dulcis</i> (Kurz). <i>Arillaria robusta</i> (Kurz).
Khwē-tan-yen-ni . . . . .		Cnestis platantha.
Khwē-touk	<i>Connarus speciosa</i> (Mason).
Khyen-seing	<i>Zinziber officinale</i> .
Khyi-boung	<i>Loranthus</i> (generic).
Khyoung-ya-ben	<i>Oroxylum Indicum</i> .
Kio-pa-ben	<i>D-smodium litifolium</i> .
Kō-kō	<i>Albizzia lebbek</i> .

Kön-ka-thyt	<i>Erythrina ovalifolia.</i>
Köng-pyim-mā	<i>Lagerstræmia macrocarpa.</i>
Köng-nyin-nweh	<i>Entada scandens.</i>
Köng-tha-byē	<i>Eugenia, sp.</i>
Koung-hmu	{ <i>Parashorea stellata</i> (Kurz)? <i>Anisoptera glabra</i> (Kurz)?
Koung-khwā	<i>Capparis auricoma.</i>
Koung-yan	<i>Hibiscus furcatus.</i>
Ku-ku	<i>Smilax ovalifolia.</i>
Ku-wē-nweh (or Kyu-nweh)	<i>Colubrina pubescens and asiatica.</i>
Kwē (or Kywē)	<i>Spondias mangifera.</i>
Kwē-douk	<i>Kurrimia robusta.</i>
Kwē-leh-bwōt-nweh	<i>Canavalia lucens.</i>
Kwē-tan-y-ēn	{ <i>Inga dulcis</i> (Kurz). <i>Millettia atropurpurea</i> (Kurz).
Kwōn-thoung	} <i>Areca catechu</i> (Mason).
Kwōn-bōng	
Kwōn-the (or Kwān-the)	
Kwōn-lyn-hpyu	<i>Dracæna angustifolia.</i>
Kwōn-lyn-net	<i>D. atropurpurea.</i>
Kwōn-y-wet	<i>Piper betel.</i>
Kwōt-nē-nweh	<i>Calycopteris Roxburghii.</i>
Kya-bet-gyi	<i>Leca macrophylla.</i>
Kya-goung-loung	<i>Barclaya oblongata.</i>
Kyā-hen-ka-lē-nweh	<i>Ipomœa vitifolia.</i>
Kya-hpyu	<i>Nymphaea pubescens.</i>
Kya-ni	<i>N. rubra.</i>
Kya-nyo	<i>N. stellata.</i>
Kya-kat-wā	<i>Bambusa arundinacea.</i>
Kya-lo-wā	<i>B. Brandisii.</i>
Kyan	<i>Saccharum officinarum.</i>
Kyan-zā	{ <i>Castanea tribuloides and diversifolia</i> (Kurz). <i>Toddalia aculeata</i> (Kurz).
Kya-nā (or Kyat-hnān)	<i>Xylocarpus granatum</i> (Mason).
Kya-thoung-wā	<i>Bambusa polymorpha.</i>
Kyā-zu	<i>Terminalia chebula</i> (Mason).
Kyeh (or Kya-thā)	<i>Barringtonia racemosa and pterocarpa.</i>
Kyeh-gyi	<i>B. speciosa.</i>
Kyeh-ni	<i>B. acutangula.</i>
Kyeing-bōk	<i>Calamus.</i>
Kyeing-hpyu	<i>C. sp.</i>
Kyeing-khā	<i>C. fasciculatus and gracilis</i> (Kurz).
Kyeing-na-thā	<i>C. sp.</i>
Kyeing-ni	<i>C. Guruba</i> (Kurz).
Kyeing-ta-bonng	<i>C. sp.</i>
Kyeing-tor	<i>C. sp.</i>
Kyeh-than-ban	<i>Drosera Burmanni.</i>
Kyet-houng-hpyu	<i>Ayanosma acuminatum.</i>
Kyet-hen-khā	<i>Momordica.</i>
Kyet-bet-ya	<i>Bekmeria interrupta</i> (Mason).
Kyet-mā-ōk	<i>Ardisia Amherstiana.</i>
Kyet-mouk	<i>Nephelium litchi, longana and hypoleuca.</i>
Kyet-mouk-ni	<i>Cnestis platantha.</i>
Kyet-poung-hpyu	<i>Ayanosma acuminatum.</i>
Kyet-ta-yor	<i>Grewia hirsuta.</i>
Kyet-tet	<i>Randia uliginosa</i> (Mason).
Kyet-tet-nweh	<i>Combretum orale and squamosum.</i>
Kyet-tha-hen	<i>Antidesma paniculata.</i>

Kyet-thwōn hpyu	<i>Allium sativum</i> .
Kyet-thwōn-ni	<i>A. copa</i> .
Kyet-hsu	<i>Ricinus communis</i> .
Kyet-u-wā	<i>Dendrocalamus Brandisii</i> .
Kyet-yet	<i>Celosia cristata</i> .
Kyet-yō	<i>Vitex alata, limoniifolia, and pubescens</i> .
Kyi-ā	<i>Zamonia zehneria and sarcophylla</i> .
Kyi-boung or poung	<i>Loranthus</i> (generic).
Kyi-chi-nweh }	<i>Vitis lanceolaria</i> (Kurz).
Kyi-ni-nweh }	
Kyn-ba-lyn	<i>Antidesma diandrum and menasu</i> .
Kyo-ben	<i>Vitex peduncularis</i> (Kurz).
Kyo-ka-mung	<i>Kämpferia</i> .
Kyok-bān	<i>Vitex agnus-castus</i> .
Kyok-chyu-loung	<i>Begonia sinuata</i> .
Kyok-hpa-yung	<i>Bonicasa cecrifera</i> .
Kyok-ōk-hneh	<i>Euphorbia</i> (Mason).
Kyok-pu-cn	<i>Sphaerococcus lichenoides and Gigartina spinosa</i> .
Kyok-wā	<i>Bambusa, sp.</i>
Kyoung-thyt (or chet)	<i>Mezocurum cucullatum</i> .
Kyoung-gyet-nweh	<i>Pterolobium macropterum</i> (Kurz).
Kyoung-mi-ku	<i>Buddleia Asiatica</i> .
Kyoung-shā (or chā)	<i>Oroxylum Indicum</i> .
Kyoung-touk	<i>Paysonia multijuga</i> .
Kyu	<i>Arundo Madagascariensis</i> .
Kyu-na-byu	<i>A. Roxburghii</i> .
Kywch (or Ky-wai)	<i>Dioscorea dæmonum</i> .
Kywch-laik-thaby-ē	<i>Eugenia</i> .
Kywch-tha	<i>Bignonia</i> .
Kywch-thaby-ē	<i>Eugenia</i> .
Kywch-thweh	<i>Myristica</i> (Mason).
Kywōn (or Kynn)	<i>Tectona grandis</i> .
Kywōn-a-lyn	<i>Premna tomentosa</i> .
Kywōn-hpyu	<i>Gmelina arborea</i> (Mason).
Kywōt-nē-nweh	<i>Calyopteris Roxburghii and nutans</i> .
Lain-bha	<i>Bignonia</i> (Mason).
Lain-bō (or Lan-bō)	<i>Buchanania latifolia</i> (Kurz).
La-mu	<i>Sonneratia acida and Griffithii</i> .
La-mwōt	<i>Mangifera foetida</i> .
La-men	<i>Eurycles amboinensis</i> .
Lan-theh	<i>Hedichium coronarium</i> .
La-nyen-pwen	<i>Caryophyllus aromaticus</i> .
Leh-bwch	<i>Terminalia bialata?</i> (Mason).
Leh-lu	<i>Olax scandens</i> .
Leh-pa-douk	<i>Pouteria vaginalis</i> .
Leh-zā	<i>Lagerstromia tomentosa</i> .
Lē-lun-ben	<i>Excavaria baccata</i> (Kurz).
Lē-mē	<i>Calamus tigrinus</i> (Kurz).
Lēn (or Lēin)	<i>Terminalia pyrifolia and bialata</i> .
Leng-mor	<i>Citrus aurantium</i> .
Lē-pa-douk	<i>Monochoria vaginalis</i> .
Lep-pān (or Let-pān)	<i>Bombax insigne</i> .
Let-hitōk	<i>Alstonia scholaris</i> .
Let-khōk	<i>Streulia alata and foetida</i> .
Let-pet-byu	<i>Eleocharis orientalis</i> .
Let-tōk-gyi	<i>Holarrhina antidysenterica</i> (Kurz).
Let-tōk-thein	{ <i>H. codaga</i> (Kurz).
	{ <i>Wightia mollissima</i> (Kurz).

Let-touk	{ <i>Elæocarpus lanceaefolius</i> .
	{ <i>Holarrhena antidiysenterica</i> (Parish).
Li-lōng-ben	<i>Corumbium baccatum</i> .
Lyi-nya-shor	<i>Paritium tiliacum</i> .
Lyn-hē	<i>Acorus calamus</i> .
Lyn-kyor	<i>Dillenia parviflora</i> (Kurz).
Len-kyor	<i>Cinnamomum iners</i> (Mason).
Lē-pa-douk	<i>Pontedoria vaginalis</i> (Mason).
Lwōn-bō or hpō	<i>Buchanania latifolia</i> .
Lu	<i>Panicum paspalum</i> .
Lu-leng-kyor	<i>Cinnamomum Zeylanicum, obtusifolium, and iners</i> .
Ma-da-mā	<i>Dalbergia ovata and glauca</i> .
Ma-dor	<i>Garcinia xanthochymus</i> .
Mō-gywōt or kywōt	<i>Commelyna cæspitosa</i> .
Mā-hā-hlē-gā-hpyu	<i>Bauhinia acuminata</i> (Mason).
Mā-hā-hlē-gā-ni	<i>B. purpurca</i> (Mason).
Mā-hā-hlē-gā-wā	<i>B. tomentosa</i> (Mason).
Ma-hān	<i>Feronia elephantum</i> (Kurz).
Mā-hlaing	<i>Broussonetia papyrifera</i> .
Mā hnyo-ben	<i>Gomphrena globosa</i> .
Mai-za-li (or Meh-za-li)	<i>Cassia Siamca</i> .
Ma-ji	<i>Tamarindus Indica</i> .
Ma-ji-bouk	<i>Gardenia sessiflora</i> .
Ma-la-kā	<i>Psidium guyava</i> .
Ma-la-meh	<i>Cardiospermum</i> .
Ma-lein-pen	<i>Morus lævigata</i> (Kurz).
Ma-li	<i>Jasminum sambac</i> .
Ma-lwā	<i>Spathodea stipulata</i> .
Mā-ni-ōk-kā	<i>Corallia lucida</i> .
Mā-u	} <i>Sarcocephalus cadamba</i> .
Mā-u-ka-dun	
Mā-u-let-tan shwē	<i>Sarcocephalus cordatus</i> .
Ma-ya-nheng	<i>Acrocarpus fraxinifolius</i> .
Ma-yō	<i>Calotropis gigantea and procera</i> .
Meh (or Mai)	<i>Indigofera tinctoria</i> .
Meh-byoung	<i>Maba burifolia</i> .
Meh gyi	<i>Ruellia indigofera</i> .
Meh-keh	<i>Murraya exotica</i> .
Meh-ni	<i>Indigofera tinctoria</i> .
Men (or Ben)	<i>Amomum cardamomum</i> .
Men-gu (or Men-gwōt)	<i>Garcinia mangostana</i> .
Mi-joung-nweh	<i>Derris scandens</i> .
Mim-bō (or Mim-bu)	<i>Caryota urens</i> .
Min-gu	<i>Elæagnus arborca</i> (Kurz).
Mi-tha-len	<i>Zinziber barbatum</i> .
Mi-zi (or Mi-zu)	<i>Mirabilis jalapa</i> .
Mō-dwin-the	<i>Drosera Burmanni</i> .
Mō-jio-ban	<i>Sphenocarpus grandiflorus</i> .
Mōk	<i>Aloe socotrina</i> .
Mok-tsō hlan-mā	<i>Desmodium triquetrum</i> .
Mō-mā-khā	{ <i>Salix tetrasperma</i> .
	{ <i>Homanoya riparia</i> (Kurz).
Mo-mā-khā-nweh	<i>Combretum extensum</i> .
Mōng-lā	<i>Raphanus sativus</i> .
Mōng-lā-u-waing	<i>Brassica rapa</i> .
Mōng-nyin	<i>Sinapis dichotoma, Chincensis, alba, and nigra</i> .
Mōng-taing (or Mun-daing)	<i>Lophopetalum Wallichii</i> (Kurz).
Mu-daing	<i>Cycas circinalis, Rumphii, and Siamensis</i> .

Mu-yan	<i>Hordeum hexastichon.</i>
Mya-byit (or Myeh-byit)	<i>Portulaca oleracea.</i>
Myat-leh	<i>Jasminum grandiflorum.</i>
Myat-leh-ni	<i>Quamoelit pennatum.</i>
Myat-ya (or Myai-ya)	<i>Grewia microcus.</i>
Myeh-ban-touk	<i>Kemferia rotunda.</i>
Myet-hna-bān (or pān)	<i>Strobilanthes flava.</i>
Myeng-ka, see Myn-gā.	
Myeh-peh	<i>Arachis hypogæa.</i>
Myeh-zu-nweh	<i>Vitis erythroclada.</i>
Myet-yeh (or Myet wā)	<i>Polytocha heteroclitia.</i>
Myin-che-tan-yet	<i>Menceylon umbellatum.</i>
Myin-thwā	<i>Arca catechu.</i>
Myin-wā	<i>Dendrocalamus strictus.</i>
Myit-pyeh	<i>Melastoma Malabathricum.</i>
Myi-zu	<i>Mirabilis jalapa.</i>
Myn-gā	<i>Cynometra bijuga and ramiflora.</i>
Myouk-goung	<i>Artocarpus, sp.</i>
Myouk-hlē-gā	<i>Bauhinia ornata.</i>
Myouk-khā-bat	<i>Bauhinia, sp.</i>
Myouk-yōng-nyin	<i>Derris sinuata.</i>
Myouk-hpyu	<i>Dioscora globosa.</i>
Myouk-kyā	<i>D. crispata.</i>
Myouk-kyen	<i>Flagellaria Indica.</i>
Myouk-lōk	<i>Artocarpus lacucha.</i>
Myouk-lōk gyi }	<i>Artocarpus communis.</i>
Myouk-loung }	
Myouk-lōk-ngeh	<i>Artocarpus, sp.</i>
Myouk-ngō	<i>Duabanga Sonneratioides.</i>
Myouk-ni	<i>Dioscora atropurpurea.</i>
Myouk-o-shyt	<i>Siphonodon celsistrinus.</i>
Myouk-seit	<i>Ulmus integrifolius (Kurz).</i>
Myouk-shor	<i>Homalium tomentosum.</i>
Myouk-tan-yet	<i>Parkia leiophylla and insignis.</i>
Myouk-zi	<i>Zizyphus rugosa.</i>
Nāb-hē (or Nā-beh)	<i>Olinia wodier.</i>
Nā-bu-nweh	<i>Combrctum apetalum.</i>
Nā-ji	<i>Pterospermum semisagittatum.</i>
Nā-lyin-bō	<i>Mallotus repandus (Kurz).</i>
Nā-lyn-kyor	<i>Cinnamomum.</i>
Nā-ma-ni-tan-yet	<i>Capparis horrida (Kurz).</i>
Nān-lon-kyaing (or lmaing)	<i>Acacia Farnesiana.</i>
Nān-nān	<i>Coriandrum sativum.</i>
Nān-ta-yōk	<i>Altingia excelsa.</i>
Nā-shā-gyi	<i>Cryptolepis Buchanani.</i>
Nāt-chō	<i>Baliospermum montanum.</i>
Neh-meu	<i>Erycles amboinensis (Mason).</i>
Nē-n-weh	<i>Flacourtia sapida and cataphracta.</i>
Ngā-hpyu	<i>Pachygon odorifera (Kurz).</i> <i>Roydsia obtusifolia (Kurz).</i>
Ngā-mouk	
Ngā-tel	<i>Lœa squata.</i>
Ngā-ya-gyi	<i>Bambusa, sp.</i>
Ngā-yan-pa-đu	<i>Pothos giganteus.</i>
Ngā-yōk-koung	<i>Clerodendron nutans.</i>
Ngu-gyi	<i>Piper nigrum.</i>
Ngu-shwē	<i>Cassia fistula.</i>
Ngu-theing (or thēn)	<i>C. renigra.</i>
Ngung-myit	<i>C. nodosa.</i>
	<i>Chrysopogon aciculatus.</i>

Nheng (or Nhān-hen), see Hnān	
Ni-ba-tṣē (or Ni-pa-hsch)	<i>Morinda citrifolia</i> (Mason).
Nu-wā	<i>Gossypium Barbadense</i> and <i>arborescens</i> .
Nweh-han	<i>Graptophyllum hortense</i> .
Nweh-bouk (or bōk)	<i>Pedicularis lanuginosa</i> .
Nweh-chō	{ <i>Thunbergia laurifolia</i> (Kurz).
	{ <i>Acacia poppeah</i> (Mason).
Nweh-hnyo	<i>Thunbergia</i> (Mason).
Nweh-ka-zwōn-hpyu	{ <i>Ipomoea bona-nox</i> (Kurz).
	{ <i>Calonyction Roxburghii</i> .
Nweh-ni	<i>Lectsonia aggregata</i> .
Nweh-hpa-lān	<i>Bauhinia glauca</i> , <i>Fahlii</i> and <i>ferruginea</i> .
Nweh-sat-nweh	<i>Synphorema involucreatum</i> .
Nya	<i>Æschynomene paludosa</i> .
Nyā-gyi	<i>Morinda citrifolia</i> (Mason).
Nyan	<i>Desmodium reptans</i> .
Nyor (or Nyā)	<i>Morinda exserta</i> .
Nyong	<i>Ficus</i> (generic). <i>F. indica</i> and <i>laccifera</i> .
Nyong-bor-di	<i>F. religiosa</i> .
Nyong-chē-douk	<i>F. Benjamina</i> .
Nyong-chyn (or chin)	<i>F. infectoria</i> .
Nyong-hpyu	<i>F. Rumphii</i> .
Nyong-kyat	<i>F. obtusifolia</i> .
Nyong ōng	<i>F. Benjamina</i> .
Nyong-ōp (or ōk)	<i>F. retusa</i> .
Nyong-peī-nē	<i>F. nervosa</i> .
Nyong-tha-byē	<i>F. geniculata</i> and <i>excelsa</i> .
Ōk-hwōn-nweh	<i>Argyrea Zeylanica</i> and <i>barbigera</i> .
Ō-nā-kōk-nweh	<i>A. populifolia</i> .
Ōk-neh (or Ōp-neh)	<i>Streblus aspera</i> .
Ōng	<i>Cocos nucifera</i> .
Ōng-dong	<i>Tetranthera laurifolia</i> .
Ōng-meh-hpyu	<i>Clitoria ternatea</i> .
Ō-shyt	<i>Ægle marmelos</i> .
Ouk-chyn-zā	<i>Diospyros chretioides</i> .
Oung-meh-hpyu	<i>Clitoria ternatea</i> .
Pa-daing	<i>Crinum Herbertianum</i> and <i>Asiaticum</i> .
Pa-daing-kyet-thwōn	<i>Squilla Indica</i> .
Pa-daing-khat-tā }	<i>Datura alba</i> .
Pa-daing-hpyu }	
Pa-daing-ngō	<i>Globba Careyana</i> .
Pa-dāt-sā	<i>Kämpferia candida</i> .
Pa-dong-mē	<i>Nelumbium speciosum</i> .
Pa-douk	<i>Pterocarpus Indicus</i> and <i>macrocarpus</i> .
Pa-douk-gyi	<i>Pontederia dilatata</i> (Mason).
Pa-gā-nyet-su	<i>Pometia tomentosa</i> .
Pa-yor-thein	<i>Alpinia nutans</i> .
Pa-gyē-theing (or Pa-kyeh-thēn)	<i>Garcinia speciosa</i> (Mason).
Pa-lān, see Hpa-lān.	
Pa-lāng toung-weh	<i>Costus argyrophyllus</i> .
Pa-leu	<i>Casuarina equisetifolia</i> .
Pān (or Paik-hsān)	<i>Crotalaria juncea</i> .
Pān-ben-nweh	<i>Ancistrocladus Griffithii</i> .
Pān-kha-tat	<i>Tacca pinnatifida</i> .
Pān-mā	<i>Schinus Molle</i> and <i>Bancana</i> (Kurz).
Pān-na-thē	<i>Laurus nitida</i> (Mason).
Pān-sa-yeik	<i>Lora coccinea</i> (Mason).
Pān-shit	<i>Impatiens balsamina</i> .

Pān-ta-gā	<i>Calophyllum spectabile</i> (Kurz).
Pān-u-hpyu	<i>Kaempferia candida</i> .
Pān-yen (or yin)	<i>Andropogon muricatus</i> (Mason).
Pē (or Peh)	<i>Corypha umbraculifera</i> .
Pē-eh	<i>Citrullus vulgaris</i> and <i>cucurbita</i> .
Peh	<i>Lablab vulgare</i> .
Peh-lyn-mywē	<i>Trichosanthes anguina</i> .
Peh-myit (or Peh-hso-wā)	<i>Psophocarpus tetragonolobus</i> (Mason).
Peh-noung-ni	<i>Cuavalia gladiata</i> .
Peh-pa-swōn	<i>Cyanopsis psoraloides</i> .
Peh-yen-khyang	<i>Cajanus Indicus</i> (Mason).
Peik-khyen (or Pēk-chyn)	<i>Piper longum</i> .
Peing (or Pēng)	<i>Colocasia antiquorum</i> .
Peing-mā-hor-ya	<i>C. odorata</i> .
Peing-neh (or Pai-nē)	<i>Artocarpus integrifolia</i> .
Pen-bu	<i>Plectranthus aromaticus</i> .
Pen-zeing	<i>Ocimum villosum</i> (Mason).
Pong-ma-theing	<i>Blumea balsamifera</i> .
Pōng-nyet (or Pwoing-nyet)	<i>Calophyllum inophyllum</i> .
Pō-sā	<i>Morus Indica</i> .
Pouk	{ <i>Eschynomene paludosa</i> (Mason). <i>Butea frondosa</i> .
Pouk-hpyu	<i>Sesbania grandiflora</i> .
Pouk-nweh	<i>Butea superba</i> and <i>parviflora</i> .
Pu-lor-pinān-myouk	<i>Manihot utilisima</i> .
Pu-lor-pinān-wā	<i>Bambusa nana</i> .
Pung-ben	<i>Physalis peruviana</i> .
Pu-zyn-swā	<i>Thea bohea</i> .
Pwōt-chē-ben (or Pwōt-shor-pen)	<i>Macropus longifolius</i> .
Pyen-dan-ngā-len	<i>Sida</i> (generic).
Pyen-ka-do	<i>Xylocarpus</i> .
Pyen-mā	<i>Lagerstrœmia flos-regina</i> .
Pyen-mā-hpyu	<i>L. calyculata</i> and <i>floribunda</i> .
Pyin-dor-thein	<i>Clausena heptaphylla</i> .
Pyi-nyoung (or Pyn-mong)	<i>Ficus Bengulensis</i> .
Pyi-zyn	<i>Antidesma ghaesomilla</i> .
Pyn-bū	<i>Plectranthus aromaticus</i> .
Pyn-bwā	<i>Maranta arundinacea</i> .
Pyn-leh-ltān (or tor)	<i>Scorvola Kœnigii</i> .
Pyn-ley-ka-nā-zo	{ <i>Carapa obovata</i> (Kurz). <i>Horitiera minor</i> and <i>littoralis</i> (Kurz).
Pyn-leh-ka-thyt	<i>Erythrina Indica</i> (Mason).
Pyn-leh-ka-zwōn	<i>Ipomœa pes-capra</i> .
Pyn-leh-kyoung	<i>Crocodendron inerve</i> .
Pyn-leh-ōng (or oung)	<i>Carapa obovata</i> and <i>moluccensis</i> .
Pyn-leh-thyt-kouk	<i>Gyrocarpus Jacquini</i> .
Pyn-leh-tsi	} <i>Ximnia Americana</i>
Pyn-leh-ku-yin	
Pyn-tē-yō	<i>Grewia clastica</i> (Kurz).
Pyn-zeing	<i>Ocimum villosum</i> .
Pyn-zeing-zi	<i>O. sanctum</i> .
Pyor-men	<i>Musa glauca</i> .
Pyoung	<i>Sorghum vulgare</i> .
Pyoung-bi	<i>Zea mays</i> .
Pyoung-lē kouk	<i>Panicum</i> .
Pyu (see Hpyu)	
Sa-bā	<i>Oriza sativa</i> .
Sa-lā-len	<i>Andropogon esculentus</i> .
Sa-byet	<i>Momordica dioica</i> .

Sa-byit	<i>Vitis vinifera</i> .
Sa-gā	<i>Michelia champaca</i> and <i>aurantiaca</i> .
Sā-hpyu	<i>Xanthophyllum</i> .
Sā-ka-ōng	<i>Ficus</i> .
Sa-kwā (or Sa-kwē)	<i>Webera oppositifolia</i> (Kurz).
Sa-lāt	<i>Calpicarpum Roxburghii</i> .
Sa-lāt-ni	<i>Graptophyllum lurido-sanguineum</i> .
Sā-lu (or Tsā-lu-ben)	<i>Licuala peltata</i> .
Sa-mung-net	<i>Nigella sativa</i> .
Sa-mung-ni	<i>Lepidium sativum</i> .
Sa-mung-sa-bā	<i>Pimpinella anisum</i> and <i>involueratum</i> .
Sa-mwōt	{ <i>Carum carui</i> .
	{ <i>Anethum graveolens</i> .
Sa-my-cik	<i>Anethum sowa</i> .
San-dā-ku	<i>Santalum album</i> .
San-let-thch	<i>Cesalpinia digyna</i> .
Sa-pch	<i>Jasminum sambac</i> .
Sat-shā-ben	<i>Sponia orientalis</i> .
Sat-jō-yit	<i>Narrelia Ceylanica</i> .
Sat-shā (or Sap-shā)	{ <i>Bahmeria Hamiltoniana</i> (Kurz).
	{ <i>Sarcochlamys pulcherrima</i> (Kurz).
Sē-than-yā	<i>Gelonium multiflorum</i> .
Sa-the-khwā	<i>Cucumis sativus</i> .
Sen-thē-khwā	<i>Citrullus vulgaris</i> .
Shā	<i>Acacia catechu</i> .
Shā-hpyu	<i>Cicca emblica</i> and <i>macrocarpa</i> .
Shā-mā	<i>C. albizzoides</i> .
Shān-nch	<i>Indigofera tinctoria</i> .
Shā-zoung	<i>Euphorbia neriifolia</i> and <i>nirulia</i> .
Shā-zoung-gyi	<i>E. Jacquiniflora</i> .
Shā-zoung-lek-hnyo	<i>E. tirucalla</i> .
Shā-zoung-pya-that	<i>E. antiquorum</i> .
Shor-hpyu	<i>Sterculia versicolor</i> .
Shor-ltu-pen	<i>Beilschmiedia Roxburghiana</i> (Kurz).
Shor-ni	<i>Sterculia villosa</i> .
Shor-wā	<i>S. ornata</i> .
Shouk	<i>Citrus bergamia</i> .
Shouk-chō (or khyō)	<i>C. limetta</i> .
Shouk-khā	<i>C. sp.</i>
Shouk-leng-mor	<i>C. limetta</i> .
Shouk-pōk	<i>C. hystrix</i> .
Shouk-to-khwā	<i>C. medica</i> .
Shouk-tōng-ō (or tung-ō)	<i>C. decumana</i> .
Shyn-byat	<i>Bauhinia ferruginea</i> .
Shyt-ma-tet	<i>Asparagus acerosus</i> .
Shwē-nweh-pān	<i>Cassytha filiformis</i> .
Shwē-hpē-ōng	{ <i>Cucurbita maxima</i> .
Shwē-hpē-ōng-khā	
Sin-tha-hpān	<i>Ficus Roxburghii</i> .
Sō-kā (Kurz), see A-thor-kā	
Soung (or Zoung)	<i>Bruguiera parviflora</i> .
Soung-ga-lē	<i>Ancistrolobus carnea</i> .
Soung-ya (or Zoung-ga)	<i>Acerrhoa carambola</i> .
Sow-pein-nweh	<i>Combretum trifoliatum</i> and <i>tetragonocarpum</i> .
Su-kouk	<i>Cesalpinia nuga</i> .
Su-kyin-bō	<i>C. septaria</i> .
Su-pwōt-ka-lā-nweh	<i>Acacia glaucescens</i> .
Su-pwōt nweh	<i>A. concinna</i> .
Su-yit	<i>A. pennata</i> .

Swch-tan	<i>Bauhinia monandra</i> (Kurz).
Swōn-pa-lwōn	<i>Phoenix dactylifera</i> (Mason).
Syn-tha-lpān	<i>Ficus Roxburghii</i> (Kurz).
Syt	<i>Albizia procera</i> .
Ta-bwōt-gyi	<i>Meliusa velutina</i> .
Ta-chan-sō	<i>Heteropanax fragrans</i> (Kurz).
Ta-hāt (or Ta-nāt)	<i>Tectona Hamiltoniana</i> .
Ta-kyet	<i>Pandanus foetidus and furcatus</i> .
Ta-la-ku-wā	<i>Gigantochloa auriculata</i> .
Ta-la-lpi	<i>Ocrocarpus Siamensis</i> .
Ta-li-en-nwe	<i>Gynocardia odorata</i> (Balfour).
Ta-li-tē	<i>Rourea sookurthoontee</i> (Mason).
Ta-ma-youk	<i>Rondeletia tinctoria</i> (Mason).
Ta-ma-seing	{ <i>Panicum acariferum</i> .
Ta-myn-sein-ben	
Ta-mā-zōk	<i>Glochidion multiloculare</i> .
Ta-nāt-sā	<i>Unona discolor</i> .
Ta-noung	<i>Acacia leucophora</i> .
Ta-nyen	{ <i>Pithecolobium angulatum and lobatum</i> (Kurz).
Ta-nyen-ni	{ <i>Inga dulcis</i> (Mason).
Ta-nyen-tha-ri-kyen	<i>Millettia atropurpurea</i> (Kurz).
Ta-pouk-ben	<i>Calamus</i> , sp. (Mason).
Ta-pu-ben	<i>Dalbergia paniculata</i> .
Ta-shā	<i>Harrisonia Bennettii</i> .
Ta-tayū-nweh	<i>Emblia officinalis</i> (Kurz).
Ta-yōk sa-gā	<i>Buettneria pilosa</i> (Kurz).
Ta-yor	<i>Plumiera acutifolia</i> .
Ta-yor-nyo-nweh	<i>Excacaria agallocha</i> .
Ta-zin-ban	<i>Gouania leptostachya</i> .
Tē	<i>Bulbophyllum auricomum</i> (Parish).
Te-hpyu (or Ta-hpyu)	<i>Diospyros Burmanica</i> .
Tē-tha-byē	<i>Sonneratia Griffithii</i> (Kurz).
Tein, see Htein	<i>Eugenia operculata</i> .
Teing-nyet	<i>Casalpinia sappan</i> .
Tek-ka-dwōn	<i>Cratava Roxburghii</i> .
Tha-beik	<i>Quercus velutina</i> (Mason).
Tha-bor	<i>Pandanus furcatus</i> .
Tha-bwōt	<i>Luffa pentandra</i> .
Tha-bwōt-gyi	<i>Meliusa velutina</i> .
Tha-bwōt-khā	{ <i>Trichosanthes cucumerina</i> .
Tha-bwōt-klia-nweh }	{ <i>Makia seabrella</i> .
Tha-bwōt-khā-hmwch }	<i>Luffa fetida</i> .
Tha-bwōt-nweh	<i>Uraria macrophylla and ptychocalyx</i> (Kurz).
Tha-byē	<i>Eugenia</i> (generic).
Tha-byē-chyn	<i>E. cerusoides</i> .
Tha-byē-gyi	<i>E. grandis</i> .
Tha-byē-hpyu	<i>E. jumbolana</i> .
Tha-byē-htāu-shyt	<i>E. sp.</i>
Tha-byē-khā	<i>E. venusta</i> .
Tha-byē-ni	<i>E. oblata and fruticosa</i> .
Tha-byē-pouk	<i>E. Zeylanica</i> .
Tha-byē-ta-ō-kyeh	<i>E. sp.</i>
Tha-byē-tsat-chē	<i>E. sp.</i>
Tha-byē-tsat-ga-lē	<i>E. sp.</i>
Tha-dī (or Ta-dī)	<i>Bursora serrata</i> .
Tha-dī-wā	<i>Croton polyandra</i> .
Tha-lpān	<i>Ficus Chittagonga</i> .

Tha-hpyu-tha-lyē	<i>Eugenia Malaccensis</i> (Kurz).
Thaik-wā	<i>Bambusa affinis</i> and <i>tulda</i> .
Thaik-tu-hmyin-tu-wa	<i>Bambusa</i> , sp.
Tha-khwā-hmweh	} <i>Cucumis melo</i> .
Tha-khwā-khyen	
Tha-khwā-kyouk-yen	
Tha-khwā-lat	
Tha-khwā-mi-joung-u	
Tha-khwōt-hpyu	<i>Stercospermum chelonoides</i> .
Tha-khwōt-mā	<i>Spathodea Rheedei</i> .
Tha-kyā-nweh	<i>Leca aspera</i> .
Tha-kyet	<i>Pandanus foetidus</i> .
Tha-lē	<i>Panicum granatum</i> (Mason).
Tha-leh	<i>Ulmus lancifolia</i> (Kurz).
Tha-ma-jök	<i>Abutilon Indicum</i> .
Tha-ma-kā	<i>Combretum Roxburghii</i> .
Tha-ma-kā-nweh	{ <i>C. decandrum</i> .
	{ <i>Congea tomentosa</i> .
Tha-mē	<i>Arcecnia officinalis</i> .
Tha-men-sā	<i>Gardenia</i> , sp.
Tha-men-sā-hpyu	<i>G. sessiflora</i> .
Tha-men-sā-ni	<i>G. turgida</i> .
Tha-nat	<i>Cordia myxa</i> and <i>grandis</i> .
Tha-nat-khā	<i>Marraya exotica</i> .
Tha-nat-tor	<i>Garcinia elliptica</i> .
Tha-na-wā	<i>Bambusa</i> , sp.
Tha-na-yā-shouk	<i>Citrus bergamota</i>
Tha-n-dē	<i>Stercospermum neuranthum</i> .
Tha-kyā-pen (or ben)	<i>Chrysophyllum Roxburghii</i> .
Tha-that	{ <i>Stercospermum fimbriatum</i> (Kurz).
	{ <i>Albizzia lucida</i> (Kurz).
Tha-thit	<i>Bignonia crispa</i> (Mason).
Tha-yit	<i>Capparis spinosa</i> .
Tha-ya-pu-wā	<i>Gigantochloa auriculata</i> .
Tha-yet	<i>Mangifera Indica</i> .
Tha-yet-san	<i>Sacintonia Schwenkii</i> .
Tha-yet-thi-ni	<i>Mangifera longipes</i> (Kurz).
Tha-yet-thyt-si	<i>Gluta Taroyana</i> (Kurz).
The-hpyu	<i>Dillenia Indica</i> .
Thek-ē-gyi	<i>Saccharum spontaneum</i> .
Thek-kē-nyen	<i>Imperata cylindrica</i> .
Thēn (or Theing)	{ <i>Muranta dichotoma</i> (Mason).
	{ <i>Calamus crectus</i> (Kurz).
Then-bō-ma-ji	<i>Sophora tomentosa</i> (Kurz).
Then-ban-chyn-boung	<i>Hibiscus subdariffa</i> .
Then-bor-ka-ma-kha	<i>Melia azadirachta</i> .
Then-bor-kyet-tsu	<i>Jatropha curcus</i> .
Then-bor-leh	<i>Gossypium Rumphii</i> .
Then-bor-ma-hnyo-ban	<i>Finea rosca</i> .
Then-bor-ma-li	<i>Jasminum</i> .
Then-bor-mong-lā	<i>Brassica oleracea</i> .
Then-bor-myouk	<i>Batatus edulis</i> .
Then-bor-thi	<i>Carica papaya</i> .
Then-bor-zī-hpyu	<i>Cicca disticha</i> .
Then-boung (or Thyn-boung)	<i>Phanix paludosa</i> and <i>acaulis</i> .
Then-khwē	<i>Jasminum</i> .
Thet-yen-ni	<i>Croton malvaefolium</i> .
Thet-yen-ka-dor	'Rangoon croton' (Mason).
Thi	<i>Feronia elephantum</i> .

Thi-dyn	<i>Bixa orellana</i> .
Thi-hay-a-zā	<i>Limonia acidissima</i> (Kurz).
Thi-hō-tha-yet	<i>Anacardium occidentale</i> .
Thi-wyn (or Thyn-wyn)	<i>Pongamia glabra</i> .
Thi-yā	<i>Shorea obtusa</i> .
Thōng-tsyn-pān	<i>Gardenia florida</i> .
Thu-ket-nī	<i>Bignonia</i> .
Thu-ngeh-chē	<i>Helicteres izora</i> .
Thwōn-khyen	<i>Calamus</i> , sp.
Thwon-ta-bat	<i>Achras sapota</i> .
Thym-bān (or Theng-ban)	<i>Hibiscus tiliaceus</i> .
Thyn-ga-du	{ <i>Anisoptera glabra</i> (Kurz)? <i>Parashorea stellata</i> (Kurz)?
Thyn-gān	<i>Hopsea odorata</i> .
Thyn-pen	<i>Phrynium dichotomum</i> .
Thyt-chē	<i>Castanea javanica</i> .
Thyt-chō	<i>Sideroxylon tomentosum</i> .
Thyt-hpyu	{ <i>Sterculia scaphigera</i> (Kurz). <i>Xanthophyllum flavescens</i> and <i>glaucum</i> . <i>Lagerstramia</i> , sp. (Mason).
Thyt-hsouk-yō	<i>Dalbergia</i> , sp. (Mason).
Thyt-hsw ē-lē	<i>Schrebera swietenioides</i> .
Thyt-kā (or khā)	<i>Pentace Burmanica</i> .
Thyt-ka-dō	<i>Cedrela toona</i> .
Thyt-khet-lan-thē	<i>Hedychium coronarium</i> .
Thyt-kyā	<i>Quercus</i> (generic).
Thyt-kyān-bo	<i>Cinnamomum iners</i> .
Thyt-kyouk-nweh	<i>Willughbeia Martabanica</i> .
Thyt-lōng (or loung)	<i>Viscum moniliforme</i> .
Thyt-lyn-dā	<i>Heterophragma sulphurea</i> .
Thyt-ma-ji	<i>Albizzia odoratissima</i> .
Thyt-myn	<i>Nageia bracteata</i> and <i>polystachya</i> .
Thyt-nī	<i>Amoora rohituka</i> and <i>cucullata</i> .
Thyt-pa-gān	<i>Millettia Brandisii</i> and <i>pulchra</i> .
Thyt-pa-young	<i>Naravelia sessifolia</i> .
Thyt-pōk	<i>Dalbergia purpurea</i> .
Thyt-pouk	<i>Tetrameles nudiflora</i> .
Thyt-sā	<i>Pardanthus chinensis</i> .
Thyt-tse-nweng	<i>Dalbergia nigrescens</i> .
Thyt-sat	<i>Aporosa villosula</i> .
Thyt-sēn	<i>Terminalia helirica</i> .
Thyt-sī	<i>Melanorrhca usitata</i> and <i>glabra</i> .
Thyt-tan	<i>Myristica corticosa</i> (Kurz).
Thyt-tō	<i>Sandoricum Indicum</i> (Kurz).
Thyt-wā-gyi	<i>Sophora robusta</i> (Mason).
Thyt-wyn	<i>Millettia pendula</i> .
Thyt-yā (or Thi-yā)	<i>Shorea obtusa</i> .
Thyt-yin (or ya)	<i>Croton oblongifolius</i> .
Ti-thī	<i>Ficus carica</i> (Mason).
Tor-bōk	<i>Diospyros</i> , sp.
Tor-chyn-boung	<i>Hibiscus</i> .
Tor-htan	<i>Livistona speciosa</i> .
Tor-ka-dat-ngān	<i>Craria</i> , sp.
Tor-ka-ma-klā	<i>Melia Burmanica</i> .
Tor-kwōn	<i>Piper ribesoides</i> (Mason).
Tor-kwōn-thū	<i>Arcei triandra</i> .
Tor-ma-ji	<i>Elaeocarpus Wallichii</i> .
Tor-mong-tsi	<i>Cassia</i> , sp. (Mason).
Tor-peh	<i>Dolichos pilosus</i> .

Tor-pyor	<i>Musa rubra</i> .
Tor-sa-lat	{ <i>Justicia dentata</i> (Mason). <i>Tabernaemontana recurva</i> (Kurz).
Tor-sa-peh	{ <i>Jasminum scandens</i> (Kurz). <i>Ichnocarpus frutescens</i> (Kurz).
Tor-shouk	<i>Glycosmis cyanocarpa</i> (Kurz).
Tor-ta-kyet	<i>Pandanus foetidus</i> .
Tor-tha-byē	<i>Eugenia thumra</i> .
Tor-tha-pwōt	<i>Sideroxylon grandifolium</i> .
Tor-that-hpyu	<i>Albizzia lucida</i> .
Tor-thi-ben	<i>Rottlera tinctoria</i> .
Tor-thi-dyn	<i>Mallotus philippinensis</i> .
Tor-yē-nyo-nweh	<i>Gouania leptostachya</i> .
Tor-zi-nweh	<i>Zizyphus anoplia</i> .
Touk-tā	<i>Tacca pinnatifida</i> .
Toung-phē-wan	{ <i>Pterospermum acrifolium</i> (Mason). <i>Macaranga denticulata</i> and <i>gummiflua</i> (Kurz).
Toung-ka-thyt	<i>Erythrina stricta</i> .
Toung-ka-zor	<i>Millettia glaucescens</i> .
Toung-ka-zwōn	<i>Argyrea capitata</i> .
Toung-ka-zwōn-gyi	<i>A. tiliifolia</i> .
Toung-khē-yeh	<i>Pterocarpus</i> , sp. (Mason).
Toung-let-hpet	<i>Eurya japonica</i> and <i>serrata</i> .
Toung-meh-sain	<i>Indigofera Brunoniana</i> .
Toung-meh-za-li	<i>Cassia Timoriensis</i> .
Toung-ōng	<i>Arenga saccharifera</i> .
Toung-peing-neh	<i>Artocarpus chaplasha</i> and <i>rigida</i> .
Toung-sa-gā	<i>Myristica</i> , sp. (Mason).
Toung-su-ka-pān	<i>Hiptage candicans</i> .
Toung-ta-mā	<i>Cedrela multijuga</i> .
Toung-ta-mya	<i>Desmodium pulchellum</i> .
Toung-tha-leh	<i>Garcinia Kydia</i> .
Toung-thau-gyi	<i>Premna integrifolia</i> .
Tsat-tha-pu	<i>Pandanus odoratissimus</i> (Kurz).
Tsa-tha-khwā	<i>Coccinea grandis</i> .
Tseik-chē	<i>Pancoria rubiginosa</i> .
Tseik-gyi	<i>Briedelia retusa</i> .
Twōt-ta-bat	<i>Achras sapota</i> .
Tyn-wā	<i>Cephalostachyum pergracile</i> .
Tyn-yu	<i>Pinus Khasya</i> .
U-myn	<i>Ipomœa xanthantha</i> .
Wā	Generic for Bamboos.
Wā-bō	<i>Dendrocalamus Brandisii</i> and <i>giganteus</i> .
Wā-hpyu-ga-lē	<i>Gigantochloa albociliata</i> .
Wā-net	<i>G. macrostachya</i> .
Wā-ni	<i>Bambusa marginata</i> .
Wā-nweh	<i>Dinochloa MacClellandii</i> .
Wā-tha-hpwōt	<i>Pseudostachyum Helferi</i> .
Wā-thaing	<i>Phrynium macrostachyum</i> .
Wā-tsō-ban	<i>Elæocarpus</i> , sp. (Mason).
Wā-yā	<i>Dendrocalamus longispathus</i> .
Wā yeh	<i>D. membranaceus</i> .
Weh	<i>Amorphophallus campanulatus</i> .
Wet-che-pa-neh	<i>Urena</i> , sp.
Wet-kyōt-pen	<i>Zollingria macrocarpa</i> .
Wet-shor	<i>Stereulia colorata</i> .
Wet-thyt-chē (or khyā)	<i>Castanea tribuloides</i> .
Wun-u-nweh	<i>Vitis erythroclada</i> .
Yan-ma-hēt (or htā)	<i>Calamus latifolius</i> .

Yau-wa-htē-kyen	<i>C. paradoxus.</i>
Yē-chyn (or Yē-ga'n)	<i>Hymenocardia Wallichii</i> and <i>plicata.</i>
Yē-chyn-yā	<i>Dalbergia spinosa.</i>
Ye-hmy-ōk.	<i>Treoria nudiflora.</i>
Yē-ka-dāt	<i>Cratara hygrophila.</i>
Yē-ka-thyt	<i>Erythrina lithosperma.</i>
Ye-kha-ōng	<i>Ficus cumia.</i>
Yem-a-nē	<i>Gmelina arborea</i> (Kurz).
Yem-a-nen?	} <i>Aporosa villosa.</i>
Yē-mein	
Yen-byā	<i>Ancistrolobus mollis.</i>
Yen-daik	<i>Dalbergia cultrata.</i>
Yen-doung	<i>Vitis Indica.</i>
Yeng-yē	<i>Tumitzera racemosa.</i>
Yen-hnoung-nweh	<i>Vitis Linnæi.</i>
Yen-hnoung-peing-nweh	<i>V. auriculata.</i>
Yen-kān	<i>Zalacca Wallichii</i> (Kurz).
Yen-gan-khyo }	} <i>Zalacca edulis</i> Sweet (Mason).
Yen-kan-chō }	
Yen-kan-chyn	<i>Z. edulis</i> Sour (Mason).
Yen-mā (or Yi-mā)	<i>Chickrassia velutina</i> and <i>tabularis.</i>
Yen-yē-myok-myi	<i>Ehretia</i> , sp.
Yē-pa-daing	<i>Crinum</i> , sp.
Yē-tha-byē	<i>Eugenia operculata.</i>
Ye-thē-pau	<i>Ficus glomerata</i> and <i>lancoolata.</i>
Ye-thu-gyi	<i>Sesbania Ægyptica.</i>
Yē-wun	<i>Hibiscus macrophyllus.</i>
Yē-yō	<i>Morinda angustifolia.</i>
Yin-gāt (or Yen-khāt)	<i>Gardenia obtusifolia</i> and <i>coronaria.</i>
Yim-hnoung-nweh	<i>Vitis auriculata</i> and <i>vitiginea.</i>
Yō-da-yā	<i>Ocoba Wallichii</i> (Kurz).
Yō-ka-dāt	<i>Cratara hygrophila</i> (Kurz).
Yō-mā-hon-yō	<i>Sauropus albicans.</i>
Yōn	<i>Phrygium.</i>
Yōng	<i>Anogriasis acuminatus.</i>
Yōng-ma-di	<i>Abelmoschus esculentus.</i>
Yūē-wun	<i>Hibiscus macrophyllum.</i>
Yu-ē-gyi	<i>Adinantha pasonina.</i>
Yu-ē-ngeh	<i>Abrus precatorius.</i>
Ywet-kyā-byu-pouk	<i>Sempervivum tectorum.</i>
Ywē-ti-thi	<i>Ficus.</i>
Za-deip-hpyu }	} <i>Myristica longifolia.</i>
Za-dēk-hpyu }	
Za-noung	(<i>Wallichia caryotoides.</i>
Za-yat . . . . .	) <i>W. Yomæ.</i>
Zi	<i>Lasia.</i>
Zi-hpyu	<i>Zizyphus jujuba.</i>
Zi-yā	<i>Cicca macrocarpa.</i>
Zoung-ga-lē	<i>Cuminum cyminum.</i>
Zoung-ka-lā	<i>Ancistrolobus carnea.</i>
Zoung-yā	<i>Lagerstrœmia villosa</i> (Kurz).
Zym-byun (or by-wōn)	<i>Avicennia carambola.</i>
	<i>Dillenia pentagyna.</i>

APPENDIX C.

A SHORT GLOSSARY OF BOTANICAL TERMS.

- Acerose. Needle-shaped.
 Achlamydeous. A flower which has neither *calyx* nor *corolla*.
 Achene. A dry indehiscent fruit, with a single free seed not adhering to the *pericarp*, such as in the strawberry (seeds) and rose.
 Aëni. Small fleshy drupes, as the fruit of the raspberry.
 Acotyledonous. Cryptogamous plants, which produce no cotyledons in germinating.
 Acrogens. Cryptogams, which grow at the extremity only, as ferns and mosses.
 Aculeate. Prickly.
 Aculci. Prickles.
 Adnate. The *anther* is so, when its cells are confluent with the connective throughout their length.
 Æstivation. The arrangement of the floral organs in the bud.
 Alate. Winged.
 Albumen. A vegetable product, tinged yellow or brown by iodine.
 Ale. See Papilionaceous.
 Alternate. See Leaf.
 Amphigens. Thallogens, which see.
 Anatropous. See Ovule.
 Anisogynous. See Isogynous.
 Anisostemonous. A plant with more or fewer *stamens* than *petals*.
 Annulus. In mosses, the separable border of the peristome of the fruit.
 Andrœcium. The whorl within or above the *corolla*.
 Anther. The blade of a stamen containing the pollen.
 Antheridium. }
 Antheridia. } { Microscopic closed sacs, which when ripe open at some point and discharge a cloud of flattened thread-like bodies, very active, and the essential elements of fertilization.
 Antherozoa. }
 Antherozoids. } { The active filamentous bodies discharged from the *antheridium*.
 Apiculate. Ending in a point.
 Apocarpous. See Fruit.
 Apetalous. A flower when it has a *monochlamydeous perianth*.
 Apothecia. The organs of fructification in Lichens. Composed of *sporangia* or sacs containing spores.
 Archegonia. Microscopic sacs, open at one end, and containing a vesicle, which is fertilized by contact with one or more *antherozoa*.
 Arillus. An accessory development which covers the seed, generally after fertilization, without adhering to the *testa*.

- Awn. The beard or bristle of grasses.
- Bark. The external layer of woody plants, the inner portion of which is known as the *liber* or fibrous layer.
- Basidia. Rounded cells in *Fungi*, which terminate in *sterigmata*, which support the spores. Basidia may be either external or inclosed.
- Basifixed. An *anther* when attached to the filament by its base.
- Braets. Altered leaves, whence the flower axes spring.
- Calyceoid. A dichlamydeous flower, when both whorls are green or foliaceous.
- Calyenle. *Braets* simulating an accessory calyx.
- Calyx. The outer or lower whorl of the *flower*.
- Calyx-tube. The receptacular cup enveloping the carpels.
- Capsule. A syncarpous fruit.
- Carpel. One of the floral leaves constituting the pistil, and on the edges of which the ovules are developed.
- Caryopsis. A dry indehiscent fruit with a single seed adhering to the pericarp, as rice, wheat, maize, etc.
- Catkin. A *spica*, in which the flowers are incomplete, wanting either *stamen* or *pistil*.
- Caudex. The rhizome of an *aerogen* when enveloped by fronds. The stem of a tree-fern.
- Cambium. The growing layer, in Exogonous woody plants, interposed between the bark and the wood, and which is structurally related to both, the cambium layer of one year becoming the annal ring of wood in the next.
- Campanulate. Bell-shaped.
- Carpel. A leaf of the central or last whorl of the flower forming the pistil, and which bears on its edge the ovules.
- Cellulose. An insoluble substance, the common basis of the cell-walls, fibres, vessels, and wood.
- Chalaza. The thickened or discoloured part of the seed marking the place where the nutrient juices penetrate the internal coat.
- Chlorophyll. The vegetable substance to which the green colour of plants is due.
- Clavate. Club-shaped.
- Clinode. The fructiferous layer on the inner wall of a *conceptacle* in *Fungi*, analogous to the *Hymenium*.
- Circinate. Curled round.
- Circumsciss. A capsule is so, when it dehisces transversely, as though fitted with a lid.
- Conceptacle. A closed spore-bearing cavity.
- Conc. A catkin shielded by thick scales, usually woody, but occasionally membranous, as in the hop.
- Conidia. Simple cells in *Fungi*, probably connected with the reproductive function.
- Cortina. In fungi the membranous veil, extending from the margin of the pileus, and protecting, when young, the organ of fructification, as in the common mushroom.
- Corolla. The inner whorl next to the *calyx*.
- Corpuscule. A microscopic cell-like body in either animals or plants.
- Corymb. A raceme of which the lower *pedicels* are so long that the flowers are nearly on a level. In the *Stock* the inflorescence is at first a *corymb*, changing to a *raceme* as the primary axis lengthens.
- Cotyledon. The leaf of the *embryo*.
- Culm. The stem of the *Gramineæ*.
- Cyme. In a cyme the primary axis terminates in a flower, and the flower-pedicels are nearly equal in length.

- Cytoblast. The granular nucleus of a cell, which acts as a cell-germ in producing a new cell, becoming less distinct as the cell develops.
- Decussate. See Leaf.
- Definite inflorescence. A *cyme*.
- Dehiscient. Fruits whose ripe pericarp gapes to permit the escape of the mature seeds.
- Dextrine. A vegetable product, analogous to starch, but soluble in cold water, and not turned blue by iodine.
- Di- or Triadelphous. *Stamens* are so when united into two or three bundles or columns.
- Dichlamydeous. A flower with a *double perianth*.
- Didynamous. *Stamens* are so when, of four, two are largest.
- Diclinous. A comprehensive term for monœcious, dicecious, and polygamous flowers.
- Diplostemonous. A plant with more than twice as many *stamens* as *petals*.
- Disk. A tumid ring, which in hypogynous flowers surrounds the base of the ovary, and the thickening round the base of the style.
- Dissepiments. The *septa* or partitions of a compound *ovary*.
- Distichous. Leaves which spring from alternate nodes, placed on two lines to right and left.
- Dicecious. A plant on which flowers of one sex only grow.
- Dorsifixed. An anther when attached to the filament by its back.
- Drupe. An indehiscient, usually one-seeded fruit, with a fleshy *mesocarp*, and usually a bony *endocarp*, as a cherry or peach.
- Duramen. The inner, denser, and more deeply coloured heart-wood.
- Elaters. Filiform appendages to the spores of *Equisetacea*, dilated at each end into a spirally coiled blade, very hygrometic, and which uncoils when subjected to moisture. Before expansion the *elaters* are coiled round the spore, their common point of attachment being on its equator, and the spatulate ends on its poles.
- Embryo. A very young and miniature plant composed of stem, root, bud, and one or two leaves.
- Endocarp. The inner layer of the pericarp.
- Endosmosis. The current of any fluid through a membrane from without, in opposition to *exosmosis*, which is a passage of a fluid from within.
- Endospore. The inner layer of the spore-wall of a *Lichen*.
- Epicarp. The outer layer of the *pericarp*.
- Epigynous. The *stamens* and *corolla* are so when inserted on the *pistil* itself.
- Epispore. The outer layer of the spore-wall of a *Lichen*.
- Epithallus. The superficial crust of *Lichens*.
- Exalbuminous. Without albumen.
- Extrose. The *anther* is so called when the sutures are turned towards the circumference of the flower.
- Exosmosis. See *Endosmosis*.
- Falcate. Curved like a scythe or sickle.
- Fasciculate, Fascieled. See Leaf.
- Faux. The throat; a point of junction of the *tube* and free *limb* of a monosepalous calyx.
- Fecula. Starch. A vegetable product insoluble in cold water and coloured blue by iodine. It occurs in the form of grains, which vary in shape with the species, furnishing thereby valuable evidence to the analyst and microscopist.
- Female. A flower possessing a *pistil*, but no *andracium*.
- Fertilization. The effect produced on the *ovules* by the deposition of pollen grains on the *stigma*.
- Filament. The petiole or stalk of a stamen.

- Flower. That part of a plant which shelters the reproductive organs.
- Follicle. A dry many-seeded fruit, opening along its ventral suture.
- Fovilla. The matter inclosed in the pollen-grains and the essential element in fertilization.
- Free. *Stamens* are so when completely separated.
- Fruit. The fertilized and ripe pistil, inclosing the seeds. It is *apocarpous* :
1. when its carpels are separate, as in the rose, in which each carpel is a fruit ; 2. the pistil forms a single carpel, as in the pea, wheat, or apricot. It is *syncarpous* when its carpels are united, as in the poppy. The ripe ovary is the *pericarp*, and it is composed of three layers, the *epicarp*, *endocarp*, and *mesocarp* or *sarcocarp*.
- Funicle. The cord uniting the ovule to the placenta, the homologue of the umbilicus in animals.
- Gamopetalous. See Monopetalous.
- Glucose. Grape sugar ; differs from cane sugar in containing three more molecules of water.
- Glumelles. The sub-opposite bracts of the fertile flowers of grasses, whereof the lower and outer is largest, and sheathes the upper, and is either armed with an awn or muticous.
- Glumes, or empty glume. The involucre of the sterile flowers of grasses, composed of two scaly, opposite bracts.
- Gluten. A vegetable product, present in most seeds, analogous to *albumen*, *fibrine*, and *casein*, but devoid of sulphur and phosphorus. It is obtained by washing flour in water, till the water ceases to be rendered turbid by the starch.
- Gonidia. Olive-green granules present in Lichens, and which distinguish these from *Fungi*, in which they are absent.
- Goniotheca. See *Micro-sporangia*.
- Gymnosperms. Plants with naked ovules, as in Conifers and Cycads.
- Gynæcium. The *pistil*.
- Gynandrous. *Stamens* are so when united for their entire length with the *pistil*.
- Gynobase. The dilated base of several confluent styles extending below the ovaries and surface of the receptacle.
- Gynophore. An elongated support to the *pistil*.
- Head. In a head the primary axis is vertically contracted, so as to gain in thickness what is lost in length.
- Herbaceous. Soft, like herbs.
- Hermaphrodite. A flower possessing both *andræcium* and *pistil*.
- Hilum. That part of the *testa* homologous to the 'navel' of animals, whereby the seed was attached by its *funicle* to the *placenta*.
- Hymenium. The proligerous layer of *Fungi*.
- Hypogynous. The *stamens* and *corolla* are so when they do not adhere to the *pistil* or *calyx*, but to the receptacle below the base of the *pistil*.
- Hypothallus. See *Thallus*.
- Incomplete. A flower deficient in either *calyx*, *corolla*, *andræcium*, or *pistil*.
- Indehiscent. Fruits which liberate their seeds by decaying, as the apple, or whose pericarp is pierced by the embryo, as in grasses.
- Indefinite inflorescence. Embraces *raceme*, *corymb*, *umbel*, *spike*, and *head*.
- Indusium. The involucre or pellicle investing the *sori* of Ferns.
- Inflorescence. A flowering branch complete.
- Introrse. The *anther* is so called when the sutures are turned towards the centre of the flower.
- Involucre. The *bracts* at the base of the *umbel*.
- Isogynous. A flower in which the *carpels* of the *pistil* equal the *sepals* in number ; *anisogynous* when the *carpels* are fewer ; and *polygynous* when they are more numerous than the *sepals*.

- Isostemonous. A plant whose *stamens* equal the *petals*.
 Lacinate. A leaf when cut up into numerous acute divisions, called *lacinie*.
 Lageniform. Shaped like a flask.
 Lanceolate. Leaves are lanceolate when broadest at the centre and gradually tapering each way.
 Leaf. A leaf is *opposite* when two spring from the same node or opposite sides of the stem; *whorled* or *verticillate*, when several proceed from the same node; *alternate*, when but one proceeds from a node, and the next leaf is on the opposite side of the stem; *decussate*, when in opposite pairs, each pair at right angles to the next; *secund*, when all start from, or are turned to one side of the stem; *peltate*, when the petiole is not centrally or non-marginally attached below.
 Legume. A follicle which opens along both its ventral and dorsal sutures into two valves.
 Liber. See Bark.
 Linear. Leaves are linear when with nearly parallel sides and more than five times longer than broad.
 Lodicules. Minute scales surrounding the reproductive organs of some grasses.
 Macro-sporangia. The true germinating spores of *Lycopodiacee*, termed also *oophoridia* and *spherotheca*.
 Male. A flower which has an *andræcium*, but no *pistil*.
 Mesocarp. The middle layer of the pericarp.
 Micropyle. The minute hole whereby the pollen gains access to the ovule and effects its fertilization.
 Micro-sporangia. The *goniotheca* of *Lycopodiacee*, containing the *antheridia*.
 Monadelphous, Didelphous, etc. *Stamens* are so termed when united into one or more clusters.
 Monandrous. See Polyandrous.
 Monœcious. A plant on which grow both male and female flowers.
 Monogynous, Digynous, etc. A flower is so called when the *pistil* consists of one or more parts.
 Monosepalous. A *calyx* whose *sepals* more or less cohere.
 Monopetalous or Gamopetalous. The corolla whose leaves unite to form a single piece.
 Mucous. Unarmed, as the glumelle of a grass unprovided with an awn.
 Mycelium. That portion of a fungus from which under favourable conditions the reproductive organs are developed. It is tenacious of vitality and can remain dormant for long periods, till stimulated into vigorous growth by light and moisture. It may exist in a filamentous, membranous, pulpy, or tubercular form, and is comparable with the *sarcode* of the *Protozoa*.
 Neuter. A flower devoid of *pistil* and *andræcium*.
 Orthotropous. See Ovule.
 Obovate. Leaves are obovate when egg-shaped, with the broader end towards the apex.
 Opposite. See Leaf.
 Oogonia. Globose bodies wherein are developed the reproductive globules termed *oospores*.
 Oophoridia. See Macro-sporangia.
 Ovary. The blade of the carpel which protects the *ovules*.
 Ovate. Leaves are ovate when egg-shaped, with the broader end towards the base.
 Ovule. Small bodies (eggs) produced on the *carpels*. An ovule is *straight* or *orthotropous* when it is uniformly developed, and the *micropyle* remains opposite to the *hilum*. Should, however, the ovule be developed unequally, and the *micropyle* curve round in the direction of the *hilum*, it is then termed *reversed anatroplus*. When the *hilum* and *chalaza* are united, and the

- micropyle* bent round to them, then the ovule is termed *campylotropous*.
- Papilionaceous. A flower when composed of 5 *petals*, of which the upper is next the axis, and incloses in bud the other 4, whereof the lateral pair, or *ale*, inclose the lower, which are often adherent by their lower margins.
- Pappus. The calyx-limb, when reduced to a tuft of bristles or silky hairs, as in the *Dandelion*.
- Panicle. A compound *raceme* with branched secondary axes.
- Parenchyma. The cellular tissue of plants.
- Peduncle. }
 Pedicel. } The supports of the flowers.
- Peltate. See Leaf.
- Perianth. The single or double whorl surrounding the *androeium* and *pistil*.
- Pericarp. The ripe ovary.
- Perigynous. The *stamens* and *corolla* are so when they are inserted on the calyx above the base of the *pistil*.
- Petaloid. A dichlamydeous flower when both whorls are coloured.
- Phyllode. A dilated petiole, which may replace the true blade.
- Petals. The leaves or segments which go to form the *corolla*.
- Petiole. The stalk of a *leaf*.
- Pileus. The dilated portion of *fungus*, bearing beneath it the organs of fructification in the form of gills, tubes, or processes.
- Pistil. The ovuligerous whorl within or above the *androeium*.
- Placenta. The fibro-vascular attachment between the *ovule* and *carpel*.
- Pollen. The dusty or granular parenchyma contained in the *anther*. The pollen-grains are the receptacles of the *Forilla*, which is the fertilizing agent.
- Polyandrous. A flower with more stamens than ten. Mon, di, tri, tetr, pent, hex, oct, enne, dec(androus), when the stamens are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, respectively.
- Polygamous. A plant which has *hermaphrodite* flowers scattered among *male* or *female* ones.
- Polygynous. See Isogynous.
- Polysepalous. A calyx whose *sepals* are wholly separate.
- Prothallus. The first stage of cellular development of the spore, on the lower surface of which (*prothallus*) are further developed the *antheridia* and *archegonia*.
- Protein. The basic constituent of all substances designated *albuminous*.
- Putamen. The stone or bony endocarp of a succulent fruit, as a peach.
- Pyrenidia. Small conceptacles in Lichens, of obscure origin and function, perhaps supplementary to reproduction.
- Raceme. An inflorescence of which the nearly equal secondary axes rise along the primary axis.
- Rachis. The petiole or stalk; also the axis bearing the inflorescence of grasses.
- Radical. Leaves are so called, which spring from the root, and not, as is usually the case, the stem of a plant.
- Receptacle. In *Phanerogams* the swollen extremity of a branch, wherein the whorls of a flower are grouped. In the strawberry it forms the (so-called) fruit. In *Cryptogams* the *pileus* of a mushroom, or like fungus, being the dilated portion, on the under surface of which the reproductive organs are developed.
- Regular. When the parts of a whorl are equal and similar.
- Retinacula. Viscous bodies connected with the *stamens* of *Asclepias*, which secrete a viscid fluid which cements together the pollen-masses of two adjacent *anthers*.
- Rhizome. The root-stock or subterranean prolongation of the stem.

- Ruminate. When the *albumen* of a seed is traversed by septa or folds of the *testa*, simulating the folds in the stomach of a ruminant.
- Runcinate. A leaf when the points of its *laciniæ* are directed downwards.
- Samara. A dry one- or two-seeded fruit, of which the pericarp forms a membranous wing above or round the cell.
- Sap. The blood of plants. A colourless fluid holding in solution all materials of plant-growth.
- Sap-wood. The newest or outer layers of wood in Exogenous trees.
- Sarcocarp. The *mesocarp*.
- Scape. A leafless peduncle attached to the stem.
- Secund. See Leaf.
- Seed. An ovule which has been fertilized by the pollen, and made capable of germination.
- Sepals. The leaves or segments which go to form the *calyx*.
- Sessile. With a broad base. A leaf is so called when it is directly attached without the intervention of a *stalk*.
- Silicle. A fruit or pod, whose length is less than three times its breadth.
- Siliquose. Pod-shaped, when the fruit or pod is more than three times as long as broad.
- Sori. A group of *sporangia*.
- Spadix. A spike of incomplete flowers, which, when young, is enveloped in a large bract or spathe.
- Spathe. A large bract enveloping the young *spadix*.
- Spatulate. Leaves are spatulate when narrow at the base and broader at the tip.
- Spermatia. See Spermogonia.
- Spermogonia. The organs of fertilization of Lichens, composed of conceptacles, immersed in the *thallus*, containing jointed filaments termed *sterigmata*, which produces minute corpuscles, or *spermatia*, the supposed fertilizing agents.
- Spherotheca. See Macro-sporangia.
- Spika. In a *spika* the flowers are sessile on the primary axis or spike.
- Sporangium. An organ or cavity wherein *spores* are developed, within the cellular mass constituting the organ.
- Spores. Minute membranous sacs, full of liquid from which a miniature plant is produced. They are developed freely within the sporangium, and never adhere to its walls.
- Squarrose. Leaves or bracts, with tips pointed and much spread or recurved.
- Stamens. The leaves or segments of the *androcium*.
- Staminodes. Rudimentary organs, which in female flowers represent analogically the stamens in male flowers.
- Standard or *Vexillum*. In a papilionaceous flower, the upper petal, which incloses the four others in bud.
- Starch. A vegetable product, tinged blue in solution by iodine, and whose component grains are of different shapes and sizes in different species.
- Stem. That portion of the vegetable axis which grows in an opposite direction to the root. It may be annual, biennial or perennial, as it lasts one, two, or many years.
- Sterigmata. See Spermogonia.
- Sterile. A flower which is *neuter*.
- Stigma. The apical and spongy termination of the *style*.
- Stipe. The stalk of a *fungus*.
- Stipules. Appendages at the base of a *leaf*. Also its *tendrils*.
- Stoloniferous. A stem is so termed when creeping shoots are produced from the axils of its lower leaves, which give rise to tufts of leaves with corresponding roots to each tuft.
- Strobilus. A fir cone.

- Strophiole (Strophiolate). } Excreescences of the *testa*, independent of the *panicle* or *micropyle*.
 Style. } The terminal prolongation of a *carpel*.
 Suber. A layer of the bark interposed between the *epidermis* and the *liber*.
 Suffruticose. Having a persistent stem, but the leaves and twigs renewed annually.
 Sugar. A vegetable product analogous to starch, but containing one more molecule of water.
 Symmetrical. When the parts of successive whorls are isometric or equal in number.
 Syncarpous. See Fruit.
 Testa. The external coat of a seed.
 Tetradynamous. Stamens are so, when, of six, four are large and paired.
 Thallogeus. Cryptogams, whose growth is at the periphery, as Fungi and Lichens.
 Thallus. The vegetative apparatus of a Lichen, usually composed of three layers, the *cortical*, *gonidial*, and *medullary*, and sometimes a basal one, termed the *hypothallus*.
 Theca. See Urn.
 Tigellus. The caudicle or stem of the embryo.
 Tomentum. The downy covering of some plants.
 Torus. The part whereon the *corolla* and *andracium* are inserted.
 Trichogyne. A tubular organ of fertilization in certain *Alge* (*Floridæe*).
 Tuber. The dilated extremities of underground roots, usually containing starch.
 Umbel. A *raceme* with the primary axis reduced to a point, and the secondary axis equal and radiating. When the secondary axes bear others, it is called compound.
 Umbilicus. The hilum.
 Urecolate. Pitcher-shaped.
 Urn or Theca. The capsular fruit of mosses (inclosing the *sporangium*) borne on a pedicel (*seta*), usually furnished with cover (*operculum*); a central axis (*columella*); the margin (*peristome*); sometimes encircled by a separable border (*annulus*).
 Utricle. An *achene* with a thin and almost membranous *pericarp*.
 Valves. The segments of the ripe pistil which dehisce to allow the seeds to escape.
 Vernation. The arrangement of the petals and sepals in bud.
 Verticillate. See Leaf.
 Volva. In fungi the pouch enveloping the young plant.
 Whorled. See Leaf.
 Zoospore. A spore furnished with vibrating hairs and gifted with motion.

ERRATA.

VOL. I.

Page 280, line 27, *for or, read but rather.*

VOL. II.

- Page 6, lines 3 and 4 from bottom, *for Myoung read Nyoung.*
 ,, 104, line 15, *for PULCHILLA read PULCHELLA.*
 ,, 111, Erase line 14.
 ,, 119, 8 lines from bottom, *for SUBULALUS read SUBULATUS.*
 ,, 142, line 40, *for Tan- read Tor-.*
 ,, 143, lines 3 and 7, *for Kwam read Kwōn. Kamorta. Kar Nicobar.*
 ,, 221, 8 lines from bottom, *insert C. GNETOCARPA, Kz.*
 ,, 234, line 6, *for FUGIFOLIUM read FAGIFOLIUM.*
 ,, 269, line 8, *for Pyu-moung read Pyi-nyoung.*
 ,, 274, To end of note at bottom, *add pure.*
 ,, 290, lines 27 and 31, *for BASILLEÆ and BASILLI read BASELLEÆ and
 BASELLA.*
 ,, 304, *Below V. PUBESCENS add V. arborea, Roxb.*
 ,, 305, line 15 from bottom, *for LONGIPLA read LONGIFOLIA.*
 ,, 335, line 27, *for CAUSCORA read CANSORA.*
 ,, 405, 4 lines from bottom, *for PARVIFLORA read PARVIFOLIA.*
 ,, 425, 14 lines from bottom *for SESSIFOLIA read SESSIFLORA.*
 ,, 501, *for GEISSASPIS read GEISAPSIS.*
 ,, 532, line 24 from bottom, *for MIMUSOIDES read MIMOSOIDES.*
 ,, 560, line 7, *for GLABRATUS read GLABRATA.*
 ,, 578, *remove LEPIONURUS and CHAMPEREIA to SANTALACEÆ, p. 221.*
 ,, 605, line 22, *for JAVANICUM read JAVANICUS.*
 ,, 627, line 10, *for G. read D.*
 ,, 638, 6 lines from bottom, *for JAPONIA read JAPONICA.*
 ,, 639, line 21, *before OLERACEA insert PORTULACA.*
 ,, 641, line 15, *for TELEPHIODES read TELEPHOIDES.*
 ,, 676, Order SAMYDACEÆ *transfer to page 675.*

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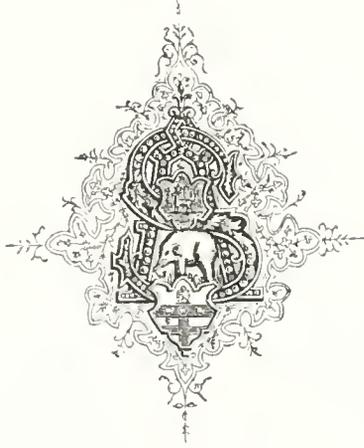
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