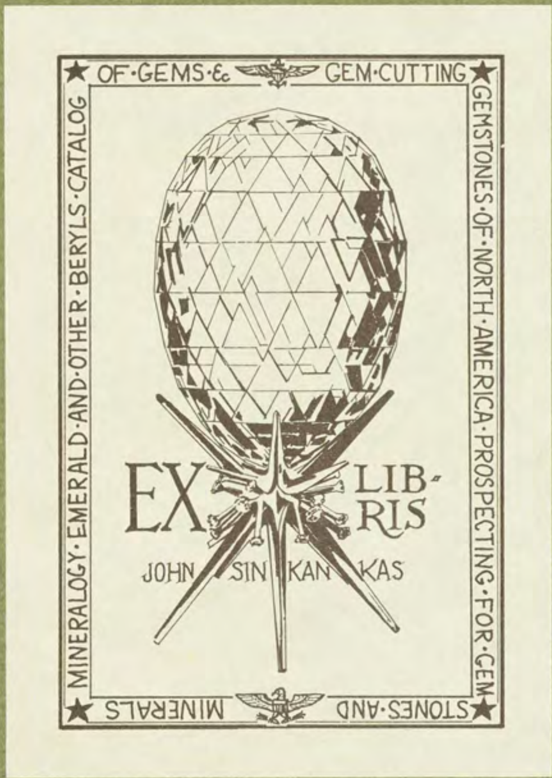
OF·GEMS·&c
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GEMSTONES·OF·NORTH·AMERICA·PROSPECTING·FOR·GEM
STONES·AND
MINERALS
MINERALOGY·EMERALD·AND·OTHER·BERYLS·CATALOG
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BRITISH MINERALOGY:

OR

COLOURED FIGURES

INTENDED TO ELUCIDATE

THE MINERALOGY

OF

Great Britain.

BY JAMES SOWERBY, F.L.S. G.S. W.S.

HONORARY MEMBER OF THE PHYSICAL SOCIETY OF GÖTTINGEN,
AND OF THE MINERALOGICAL SOCIETY OF JENA, ETC.
DESIGNER OF ENGLISH BOTANY, AUTHOR OF ENGLISH FUNGI,
BRITISH MISCELLANY, EXOTIC MINERALOGY, ETC.

(With Assistance.)

As for the Earth, out of it cometh Bread, and under it is turned up as it were Fire. The Stones of it are the Places of Sapphires; and it hath Dust of Gold. Job. xxviii. 5, 6.

VOL. V.

LONDON:

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MDCCCXVII.

PREFACE.

After what has been said in the Preface to the First Volume, the truth of which is evident, we can have but little to add here. The improvements in the study of Mineralogy are however, apparent, since the first volume; and not only Chemistry has added much to our knowledge, but Geology has been more generally studied, and many essential additions to the more common subjects have been made; and thus much useful knowledge has been interwoven with what was only termed Mineralogy. The component parts of rocks must needs be comprehended to distinguish them, and the various combinations in different states identify the age of, and the transition to the flœtz rocks, while the upper strata may be either volcanic or alluvial: these are not forgotten; and the mineralized animal remains are shewn, whether in Limestone, siliceous or metallic masses. There are some things unique, or that are not found in sufficient quantities for cabinets,—here a reference to a figure is of much consequence, as it is less likely to mislead in after times.

British Mineralogy, perhaps, like other subjects in natural history, can never be perfectly complete; yet in the present instance, I think, this work will prove more so than might have been expected; and it certainly contains, besides most of the known British Minerals, and much interesting and instructive variety, many useful and curious subjects not before published to the world; and what has been thought remarkable is, that it should include so many subjects previously considered as foreign, that a small number only remain to complete the general list of Minerals; for which reason, having completed five volumes of British Minerals, and finding one would pretty well include the rest, I have been about it in a separate work, as a kind of appendix, that those who wish it may have the whole complete. I presume this will, altogether, be found a convenient second to English Botany, which, with it, has been the employment of 25 years, while they have much facilitated study; filled up their respective desiderata, and will prove lasting monuments of the assiduity of my friends, who have been zealous in the cause. Should any thing essentially proper remain to be added, by new discovery or otherwise, I request a continuation of that advice and assistance hitherto so generously afforded me by my friends, and also, that strangers will not be backward, as I shall be attentive to add any necessary supplement.

The Systematic Index will be found to differ in many cases, from the arrangement adopted in the body of the work, and also to exhibit some variation in the nomenclature: these changes have been rendered necessary by the rapid improvements that have taken place both in Chemistry and Mineralogy, during the last few years. I have endeavoured to make it as uniform with the rest of the work as the present state of science will allow, and by it to correct some errors that have been accidentally committed. I feel pleased in observing, that the encouragement I have met with, is a proof of a general desire of improvement in natural history, that must eventually lead to an enlargement of the understanding, hardly otherwise to be obtained, than by looking "through Nature up to Nature's God." The limited time we are allowed to improve in the knowledge of the works of the Creation we shall more truly value, and more highly appreciate those labours which tend to facilitate the attainment of that knowledge. Hoping this work will be found useful for this purpose, I feel much gratified that it is thus far done.

JAMES SOWERBY.

Lambeth, Feb. 1, 1817.

Apl 1 1811 published by Jas Sowerby Lond

TAB. CCCCI.

CALX carbonata.

Filamentose Carbonate of Lime.

Div. 2. Imitative.

THE specimen here figured is part of the cliff that lately fell down at Brighton. It was rightly considered by the generality of observers to be Pebble Stones cemented by Spar, and was brought me by the Rev. J. T. Barret. The largeness of the spaces for the cementing Carbonate of Lime is such that it crystallizes and has a remarkable appearance, and is a novelty to most mineralogists of the present day. Besides this, there is in some marly parts a substance which has nearly the appearance of the remains of Shells, that is remarkable for its filamentose form and satiny lustre: sometimes this is in contact with the usually crystallized Carbonate of Lime, and occasionally much resembles the Asbestus found in the Serpentine rocks of North Wales and some parts of Scotland. It is extremely tender, and, when white, appears to be very pure Carbonate of Lime. The colouring substance in some giving rather a crimson hue, may indicate Oxide of Iron with a trifle of Manganese. The filaments easily crumble, therefore the little flexibility is but difficultly discernible. The substance is often placed in three or more layers above each other. The silky or satiny lustre soon distinguishes it when turned to the light. It perhaps is not only a new appearance, but, as in a mass of two or three hundred weight very little was to be found, it seems to be rather rare.

402.

TAB. CCCCII.

CALX carbonata, magnesiata.

Class 2. Earths.	*Order* 1. Homogeneous.
Gen. 3. Lime.	*Spec.* 5. Carbonate.
Sect. 4. Magnesian.	*Div.* 2. Amorphous.

AMONG the building-stones used by masons, is that called Roach Abbey Stone, from Roach Abbey, Yorkshire. This seems peculiarly adapted for building; as it may be chosen of excellent quality to work, is of a neat small granular structure, (being partly in minute granular crystals and partly chalky,) and is nearly white; and holding a tolerable quantity of Magnesia, the agriculturist will not grudge it to the builder, because it will not make good manure; nor will the lime-burner feel the loss of it, as it will not by burning make good Lime; and in building it does not promise to get stained by vegetation, like some other stones. *The Stone figured behind* is called by the masons, Burrell, from the place where it is found. It is of a dull colour, nearly the same hardness, and may be so regularly worked, that it is often used by the masons for practice in carving. It is occasionally used for building in the neighbourhood of Cambridge and Newmarket, where it is quarried. It is less brittle, but about as hard as common Chalk; it much resembles the common Fire-stone of the next plate in general appearance, but seldom has Mica or Chlorite, though it contains much Silex.

403.

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TAB. CCCCIII.

*Fire-Stone**.

Class 2. Earths. *Order* 2. Aggregate.

Fire-stone, commonly so called by all the masons, especially in the neighbourhood of London, is very little known to mineralogists, nor do I know it to be described in any scientific work. Its peculiarities and particularly useful qualities render it of great consequence; and although it is not rare, yet we know of only one place where it is to be found of the most perfect quality: it forms a stratum in the quarries in the neighbourhood of Godstone, where there is some attention paid to the proper quarrying and seasoning of it. It is truly a domestic stone, being the only one used, when it can be got, for the insides of chimneys, &c. nearest the stoves or fire. It is somewhat granular, of a softish texture, (rubs off with a touch of the finger,) being a mixture of Lime (about 22 per cent.), Sand, grains of dark green Chlorite or Talc, and shining particles of Mica, with a little Alumine coloured grayish with a trace of Iron; but this is only the most chosen sort: sometimes it may be impure, with Pyrites and Flinty masses; the former most commonly in the stone above the best bed or stratum, and the latter generally underneath. It is occasionally used in building without such particular choice, but, being soft,

* It must not be confounded with common Flints, which are sometimes called Fire-stones, *Pierres à Feu*, &c.

allows of Confervæ, Byssi, &c. growing on it, which soon discolour it if in a damp situation. The Fire-stone is used by the notable housewife for cleaning and whitening Portland Stone steps and platforms, and occasionally by masons for practice in carving; but Burrell is more generally used for the latter purpose. It is somewhat related to the Mulatto-stone of Ireland and that of Cambridge.

Sir Robert Pocklington broke a cast of a shell from a piece in one of the older quarries in Surry, in the neighbourhood of Meestham. There seems but little difference in some of the Limestone of Maidstone in Kent, which they there call Cork; but it is more hard and compact than the Fire-stone, and is used for flooring in malthouses. Is its qualification in this particular owing to the Chlorite or Talc, as it has little or no Mica in it? It is figured in the form of a Trochus.

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TAB. CCCCIV.

CALX carbonata.
Shell-formed Carbonate of Lime.

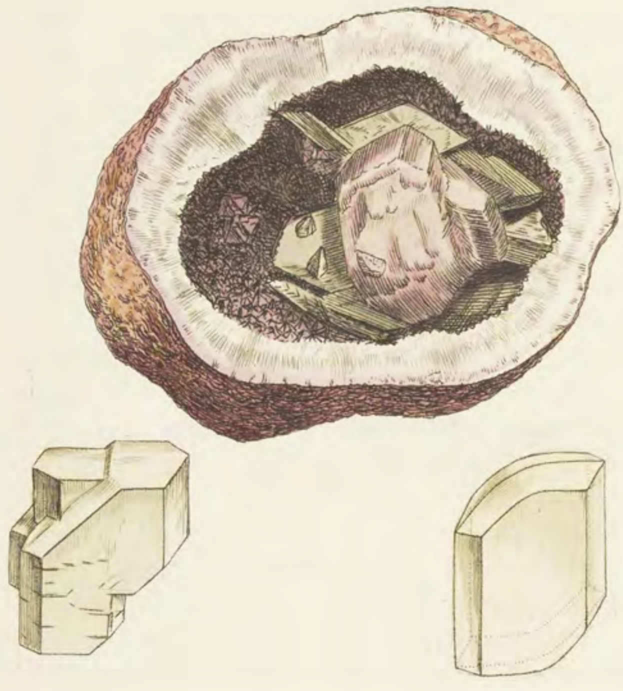
Div. 2. Imitative.

Our travellers, Mr. Cripps and Dr. Clarke of Cambridge, found that the Limestone at the foot of the Pyramids of Egypt, at Djiza, was of a peculiar structure, and that Strabo had described it as composed of lentils (which were the food of the workmen employed in these vast structures) become petrified. This helps us towards the knowledge the ancients had of these things. Pallas, as Dr. Clarke observes, took them for fishes' bones, and indeed they have some resemblance to the plates between the vertebræ of the Porpesse; but in the present day they are determined to be the petrified remains of Nautili, of the species called Nummulariæ from their resemblance to flat pieces of money. Their readily splitting, or being found in halves, might give rise to the ludicrous idea of their having been the pea-like food of the workmen at the Pyramids; and their having no apparent avenue answerable to the opening of a shell, with the minuteness of the chambers looking like pores in bones, &c. might be the cause of the latter opinion.

Thus much we have learned, which gives significance to the present subject, and I am of opinion properly so; and by the trouble and expense of travelling, we shall learn the value of curiosities at home. Independent of this, the formation is now perhaps first made known as belo g-ing to our own country.

The upper specimen is from Bracklesham Bay in Sussex, and is similar, in regard to the substance, to common Limestone. I have some specimens separate, and some in a greenish sandy mixture. The aggregate *right hand specimen* is from Kettering, and has, I believe, always been considered as the flatter variety of that stone commonly called Roe-stone. *See tab.* 8. The specimen before us, however small, shows the chambered structure of the Nautili of Linnæus with the help of a magnifying-glass; and among my specimens from these different places, I am enabled to show them of the sizes as in the plate. Their volutions are so numerous that they are not easily distinguished from concentric circles, especially in the smaller ones; and they fold over each other so closely, to the very centre, that no umbilicus is apparent; and we are not able to discover the vestige of an opening: nor have I seen the Siphunculus; which is less a wonder, as those of the larger species are often very small; but comparison with specimens of recent species proves them to belong to the same genus: and it is peculiarly remarkable that we have of this genus only minute recent shells remaining in the sea-shore sand, as a proof of such living beings. It however appears that they may be found petrified in Great Britain, from the size of the smallest in these specimens to two or three feet in diameter, which would include an animal of nine or twelve feet long. I have them of these dimensions, and have been told of them much bigger, while we know of no recent ones above half an inch in diameter.

The figure and description of these as mineralogical subjects are the more instructive, as externally they much resemble the lenticular Carbonate of Lime, or Magnesian mixtures including those called White Iron Ores. I have curious specimens from Gerona in Spain, by favour of —— Danby, esq., which are less flat, but the parts are not more distinct; also one found in the Crimea, very flat.



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TAB. CCCCV.

CALX sulphatum.

Sulphate of Lime.

Div. 1. Crystallized.

THE situations in which substances are found are not only geologically instructive, but chemically:—thus the present specimen answers many purposes. Gypsum, as I have before mentioned, is rather peculiar in certain places in the form of its crystallization. There are two or three varieties included in this example: the most remarkable is the large one, which is rather a rough and thick specimen, and conforms to *the outline below*. Such is sometimes found among the many varieties at Shotover Hill, Oxfordshire. It is beginning to form a flat apex by roundish faces on the acute angle, part of the first advance towards the peculiar lenticular crystal, one of the rarest of this substance—(of which hereafter). It is of a pretty pink colour in *the upper specimen*, not common to Hyaline Gypsum. It is peculiarly situated, being suspended and supported by other crystals, and again supporting Carbonate of Lime in whole metastatic crystals, and also Quartz. *See figs.* 1 and 2. Now it has happened that Carbonate of Lime, such as these figured (of which I have specimens), and Quartz crystallized on all sides in great numbers, loose and independent of each other, have been found included in these nodules *, which

* Of which my friend Mr. Johnson of Bristol has specimens.

are impervious to water. The query then is, Could they be formed included in the Sulphate of Lime, and the latter become dissolved again by water, and evaporate previous to the covering (which is partly Agate lined with Quartz crystals) becoming imperviable? or, Could any thing else have held them in solution, so that they might become so independent as to seem as if they were put in in separate crystals?

The two lower figures are examples of the flattened apex, and its tendency towards another figure, showing the opposite ends, and the curious manner in which the crystals mix while forming, and yet show a constant tendency in its progress from its usual shape to that of a new appearance, by little else than the loss of the column.

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TAB. CCCCVI.

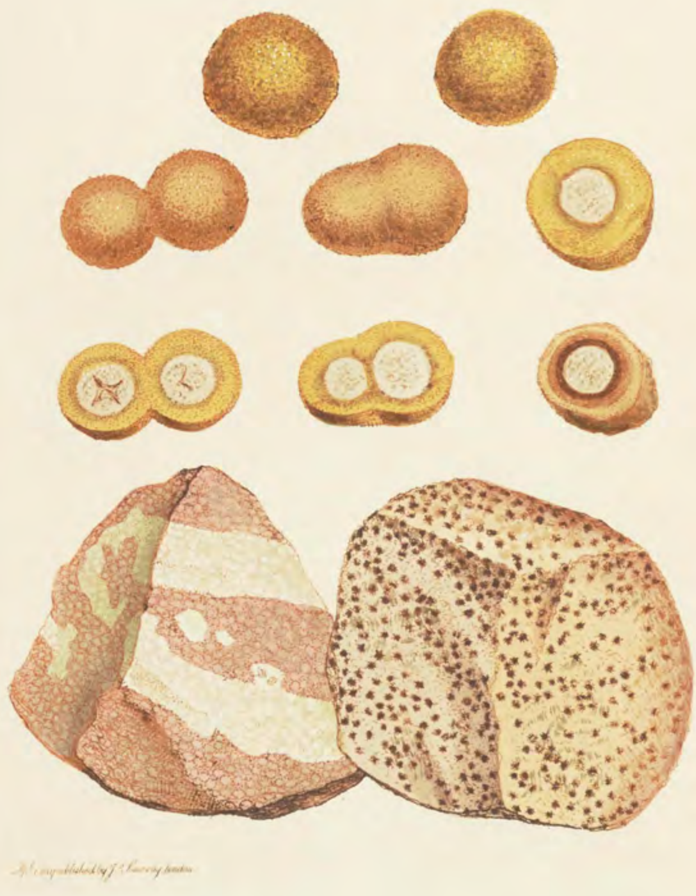
C A L X sulphata.

Sulphate of Lime, or *Acuminated* or *Spiculated Gypsum.*

Div. 1. Crystallized.

THIS Gypsum is some of it remarkable for the acuteness of the angles, being more so than any described by Haüy or any other author: the oblique or inclining side being as it were elongated in a sort of accumulated steps, as in *the upper left hand figure*, is a new form with regard to the acute angle, and a facet at *fig.* 1, making it a seven-sided column. *The two middle figures* are varieties without that facet, and show some marks of the rising accumulation.

The upper specimen has varieties elongated, which are in the hollows of a small mass of chiefly granular Fluate of Lime of various tints. *The right hand figure below* has transparent spiculæ, with varieties of similar forms on the snowy white Gypsum. This is from Matlock, and the above from some other part of Derbyshire. The small spiculæ are nearly of the same nature, sticking on metastatic Carbonate of Lime. It is curious to see how distinct one substance may be from another, although in contact with it. Gypsum is also found in some parts of Derbyshire, &c. in loose spiculæ, as *the bottom figure*. *Tab.* 405. is related to these figures, but is much less acute. The manner of accumulation and smallness prevented our measuring these.



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TAB. CCCCVII.

SILEX quartzum, arenaceum.
Sandstone.

THE beautifully eyed Sandstone, which will be figured hereafter, is in a great measure elucidated by these small globular ball-like Sandstones from Charlton Sand-pits, with which I am favoured by Lady Wilson. They appear to be caused by the oxidation of Iron, perhaps from Sulphuret of Iron, being spread by means of moisture among the particles of Sand in certain proportions. There is, however, something remarkable, that the centres of most of these specimens are nearly pure sand-form white Silex with a narrow deep-coloured margin; a sandy ochraceous crust succeeds, which is covered by a broader one very uniformly spherical, and sometimes two or more spheres coalesce or are in contact.

The lower right hand figure is from Yorkshire, by favour of Mr. Danby, and shows the Oxide of Iron in small spots; and I have such from North Wales, &c. *The lower left hand figure* shows another variety, where the small spots are not ochraceous but surrounded by the Red Oxide of Iron. Beautifully striped Sandstones also often occur. Something like this, much indurated and nearly allied to Jasper, is found at Salisbury Craig near Edinburgh.

408

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TAB. CCCCVIII.

MANGANESIUM oxygenizatum.
Oxide of Manganese.

Div. Crystallized.

Manganese is found in the neighbourhood of the Mendip Hills in Somersetshire, and about Bristol; also hollow stones of various sizes which include various substances as well as Manganese. *See tab.* 405. The present specimen is a hollow nodule of Quartz inclosing spiculæ of a mixture of Oxide of Iron with a little Manganese. I have seen some that show by the form of the crystal that they are chiefly Manganese. These, however, are more of an ochraceous or yellow brown colour, something like the usual Oxide of Iron. The form of these spiculæ is mostly flattish four-sided columns; they are laminated in their structure, the laminæ formed as it were of still smaller laminæ; two opposite edges are sometimes replaced by little truncating planes. The pyramids depend upon the spiculated crystals protruding in various lengths pyramidally. The vacancy between the quartzose crystals allowed some of them to shoot more or less regularly, and the more solid Quartz and Carbonate of Lime do not seem to interrupt them: we therefore see the beautiful ordering of Nature is such that neither interrupts the other. Manganese is generally present where there is a crimsonish hue given to substances. The outside is chiefly Quartz approaching Chalcedony. Sometimes these stones are nearly of a vermilion red colour outside.

June 1 [illegible] published by Jas. Sowerby London

TAB. CCCCIX.

HYDROGEN Bitumen.

Bitumen, or *Petroleum*.

Class 1. Combustibles. *Order* 1. Primary Combinations.
Gen. 8. Carbon. *Spec.* 2. Bitumen.
Div. 1. Amorphous.

SYN. Inspissated Petroleum. *Sowerby's Catalogue of British Minerals, part* 1. *p.* 8.
Bitume liquide, brun ou noiratre. *Haüy*, 3. 312.
Petroleum. *Kirw.* 2. 43.

MINERAL Oil or Petroleum, which seems in arrangement to precede the Elastic Bitumens, is found in turf near Ormskirk in Lancashire, and in the debris of broken rocks at Pitchford in Warwickshire. I have it also from Colebrook Dale in Shropshire, and from Derbyshire among the Elastic Bitumens; but this latter may not strictly be the same as the others: for although found in the hollows, &c. of Carbonate of Lime, it seems in that district to belong to the Elastic sort accompanying it, although no difference is otherwise perceptible.

The present variety becomes rather darker and apparently less limpid on exposure to the air, is of a brown black colour, not elastic, soils very much, sticking worse than common Tar, and requires much grease to expel it. It runs slowly in a warm temperature. Its odour is stronger than the other Mineral Bitumens, but of the same nature. It is the origin of the famous British Oil said to be of such wonderful efficacy in the bills of the Patentee of Shrewsbury.

The upper figure represents a piece of sandy rock impregnated with Petroleum, with fragments of Schist or Slate. *The lower figure* represents a mass of Sandstone, with the Petroleum also; and the few dark splashes are small points of common bituminous Coal. By heating these the Petroleum may be made to run out in a perfect state, or it may be obtained by distillation.

410.

June 1 1811 published by Jas. Sowerby London.

TAB. CCCCX.

CARBO fragilis*.

Stone Coal.

Class 1. Combustibles. *Order* 1. Primary Combinations.
Gen. 8. Carbon. *Spec.* 1. *Sect.* 2. Soft Carbon.
Div. 1. Crystallized.

KILKENNY Coal and some of the Swansea Coal (as formerly observed) are of that species vulgarly called Stone Coal; as they burn only when in contact with Bituminous Coal, and then burn a long while, giving a strong heat. The present *upper specimen* is from Queen's County, Ireland, and was brought up from the depth of four hundred feet by Mr. Ryan's patent boring machine †, which is so conveniently constructed to perforate the earth to a very great depth, through any species of rock that it may be desirable to examine, and thus show the contents solid and undisturbed. It is a neat specimen to show the order of the backs and cutters, which agree with the crystallization, and which should be more attended to in mining for Coal of all sorts: but as the Stone Coal of Wales seldom, or

* We are obliged to alter the name *Carbo oxygenizatus*, in consequence of Messrs. Allen and Pepys's Experiments.

† It was employed by the Grand Canal Company, and ought to be more used.

perhaps never, shows these forms so plain as this, I exhibit this as a distinct and curious example. The marking on the *upper piece* shows signs of the rhombs and hexaëdrons, &c., almost as if laid down from my *Plate* 2 of Part. I. of Crystallography.

The figure beneath is a specimen broken from an old mine in the same county, showing a similar construction in the rhombs, &c.; and the fragment on *the left hand* shows the eight-sided figure which happened to break from it at the corner under which it is placed. In it the four rhombic and the four diagonal fractures are very distinct and accurate. These examples show that the smooth Carbonaceous particles of Coal form sometimes as regularly as the Bituminous.

The duller parts are still like fibrous Charcoal, and the brighter partly resemble the bituminous parts of the Newcastle Coal, and can scarcely be distinguished from it without trying its want of inflammability.

411

[illegible] published by Jas. Sowerby London

TAB. CCCCXI.

CALX fluata.

Fluor.

Div. 2. Imitative, radiating.

FLUOR is perhaps best known to mineralogists in general when crystallized in cubes; in which form it is found in most places, except at Beer Alstone in Devonshire, St. Agnes in Cornwall, &c. where it is chiefly in octaëdrons. In Scotland it is rarely known as crystallized (but in octaëdrons, as mentioned *tab.* 26), and consequently is best known in the amorphous state; but yet the fracture helps its identity. Among those who use it for turning in lathes into vases, candlesticks, and ornaments, it is best understood in radiating masses, in which state it is not thought of sufficient consequence by some mineralogists to claim attention, and is seldom collected.

This substance is so apt to crystallize, that it always shows a tendency to it, and seldom forms (but when it covers other substances) other than lumps or parts of veins, rarely of larger extent than two or three feet in diameter; nor do we hear of rocks or mountains of Fluor, as we do of Limestone.

The upper specimen is probably part of a roundish mass radiating as from a centre; and every concentric circle partly betrays the cubic crystals, and the extremity some determined small ones; while the sides have pressed as it were upon each other so as to give various angles, although the fracture will easily betray the octaëdron. *The lower figure* is part of a small mass that crystallized in the inner circle as well as the outer, and formed a hollow ball.

Analysis of Fluor Spar by Thomson.

Lime . . .	67·34
Fluoric Acid .	32·66
	100·00

By Klaproth.

Lime . . .	67¾
Fluoric Acid .	32¼
	100·0

TAB. CCCCXII.

This beautiful substance is sometimes cut and polished for various ornamental purposes, as before mentioned, *tab.* 411, &c. It is also occasionally cut into little slabs showing the beautiful and very instructive varieties. Thus, while we see the radiating or diverging structure, we see how much it does or does not interrupt the crystallization; we see also its tendency to crystallize under every circumstance: and these specimens mark it more or less distinctly by the colour, at every period or effort in extending the radii; marking the right angles of the cubes, which are sometimes extremely sharp and conspicuous, and are so softly blended at others as only to be distinguishable by faint dots. The whole being so compact is the more remarkable, because the state of fluidity in which it formed would from this appear to have been equal; which makes it difficult to theorize upon.

The square slab below is a transverse section of the radii, and exhibits an admirably reticulated structure, from the opacity of the division of the radii in different proportions.

412.

[illegible] published by Jas. Sowerby London.

413

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TAB. CCCCXIII.

SILEX quartzum, *var.* arenaceum.

Eyed Sandstone.

ONE substance explains another. The present Micaceous Sandstone is by favour of R. Ferguson, esq. (gathered in Dumfriesshire). The peculiarity and beauty of it are indisputable, and I think it highly instructive in a geological point of view; the forming of the circles depending upon circumstances that may help to account for those in the Eyed Agate, (*tab.* 160,) and for other similar constructions. It may appear that substances that give changes of colour by different degrees of oxidizement, are more or less affected by the quantity or spreading of the moisture producing these circles, such as, in more familiar cases, coloured or dirty water on a plaster wall, &c.

The Sand is occasionally mingled with small particles of Mica that give somewhat the appearanee of Avanturine or Lepidolite. However, the shining particle-like appearance is in the latter said by some to be occasioned by two facets meeting, and allowing of minute reflections of the light:—(But of this hereafter in Exotic Mineralogy.) The circles, &c. in the Corsican Orbicular Sienite, figured in that work, tab. 2, probably depend upon this formation in a coarser and on a larger scale, which would best agree with the substances that compose it.

414

[illegible] published by Jas. Sowerby London

TAB. CCCCXIV.

SILEX Chabasius.

Chabasie.

Class 2. Earths.	*Order* 1. Homogeneous.
Gen. 4. Silex.	*Spec.* 18. Chabasié.

SYN. Zeolithes en cubes. *De Lisle,* 2. 40.
Wurfel Zeolith? *Emmerl.* 1. 205.
Chabasie. *Haüy,* 3. 176. *Sowerby's Catalogue of British Minerals, part* 1. *p.* 53.

This species of Zeolite (formerly mentioned as found at Oberstein in Germany) is now figured with permission from a specimen in the cabinet of the Royal Institution, which H. Davy, esq. procured from Portrush in Ireland. It is in a hollow of a coarsish Siliceous Basalt, and is the primitive form, which differs little more than three degrees from the cube, being $93\frac{1}{4}°$ at the obtuse summit. The crystals form more or less crowded groups in the hollows of the rock, and are irregularly-sized and placed. In their lustre they have lightish illinitions, that give them a flawed appearance: they are nearly white and shining. It is sufficiently hard to scratch glass. Spec. Grav. 2·7176. It melts before the blow-pipe into a white spongy mass.

This specimen is very valuable, on account of the crystals of Chabasie being very perfect; and it has the inverse Carbonate of Lime in the hollow, very distinctly placed, and of a larger size and yellowish colour, which, not betraying in the least the effect of fire, may help in geological inquiries as to the dispute regarding Basaltic formations.

TAB. CCCCXV.

The Chabasie here figured belongs also to the Royal Institution. It shows the acute angles of the rhomb truncated, which is sometimes one of the characters, and also the lateral edges;—see *the left hand figure*. Occasionally the other edges are truncated. *The right hand figure* is one half of this repeated in the same direction, and the other half turned upon it till the truncations meet. The striæ pointing to the obtuse angles may denote the summits; and by directing the eye so as to view it in that direction, it may be understood as well as when viewed in the usual position of the plate. The crystals vary much in their position in the group, and the lustre so peculiar to them gives them an indistinct appearance, making them less easily understood.

415

June 1 18[illegible] published by Jas Sowerby London

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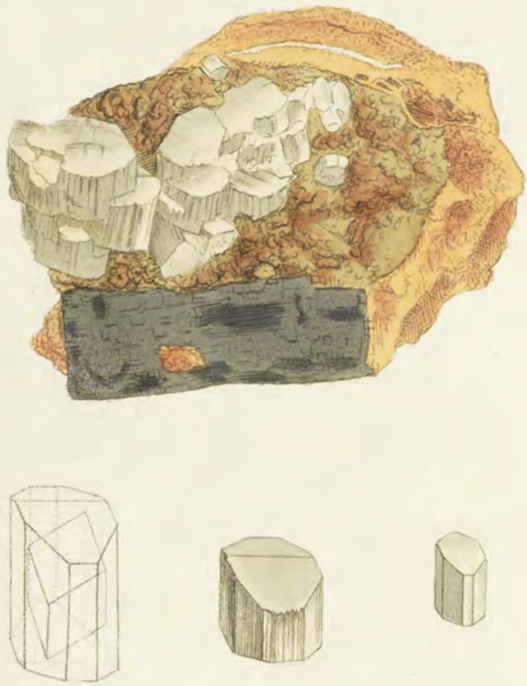
TAB. CCCCXVI.

TALCUM schistosum.
Schistose Talc.

Class 2. Earths.	*Order* 2.
Gen.	*Spec.*

To the remarkable Sandstones figured at *tab.* 413, I now add a curious and strange Chlorite Slate or Schistus, which is equally remarkable, or perhaps more so, as the concentric rings and striæ apparently depend upon some more unaccountable action, which, from the appearance of the specimens, spread largely, and continue making their formal progress to an uncommon extent. *The two upper figures* are from the well-known Slate quarry at Ingleborough in Yorkshire, by favour of the friendly Mr. Danby. They do not ill represent the kind of markings and knots of a deal board where the harder and turpentine part is most distinct in form. The markings on *the other figure* curiously represent the old-fashioned marble paper.

The lowest delicate *specimen* is of a looser and more sandy texture. This and some odd varieties were found in digging the foundation of the Infirmary at Bristol. It is worthy of observation, that these figurative lines are generally placed so as to be contrary to the lamellar structure of the Slate, and therefore are not interrupted by the divisions or lamellar fracture. Such appearances may be found in some more or less perfectly formed Sandstones, with a similar laminated fracture, and especially when near or accompanying the common Slate.



TAB. CCCCXVII.

C A L X sulphata.

Sulphate of Lime, or *Gypsum*.

Class 2. Earths.	*Order* 1. Homogeneous.
Gen. 3. Lime.	*Spec.* 4. Sulphate of Lime.
Sect. 2.	*Div.* 1. Crystallized.

SYN. Chaux sulfatée prominule. *Haüy* 2. 272.

I HAVE two reasons for making my readers acquainted with this variety of Gypsum,—its peculiar situation, and its form. It is from a Lead mine in Westmoreland, is accompanied by Galæna, and is formed in a hollow of Limestone, which is very ochraceous, has a little Pyrites, and is lined with small bubbled Calamine.

Whether the Sulphate of Lime be of late formation from the Sulphur in the Pyrites and the ochraceous Lime, or is as old as Galæna, may be a geological question; but if not known at present, a hint of this kind may cause observation, and, with other subjects, if newly formed, teach us the utility of exposing some parts of a mine to the air, as mentioned in the description of *tab.* 23; and at other times endeavour to prevent decomposition or loss, by excluding the air: thus exerting judiciously our chemical and other faculties (allowed us for these pursuits,) to use the many agents which Providence has prepared for us.

I believe finer examples of this are in the hands of Mr. Walker, who kindly promises to lend me any thing. I, however, sometimes think that moderate examples should be employed in preference for instruction, because they help us to overcome difficulties that we ought to be accustomed to, as all substances cannot be equally favourable. Its modification belongs to the *prominule* mackle of Haüy, *tab.* 34, *fig.* 99; which latter he had not seen in its simple form, *fig.* 102; I believe it is therefore the greater curiosity. I have placed the nucleus *within the geometrical outline*, to make it the more perfectly understood.

The columns vary in the number of their sides, from six to a much greater number, formed by many striæ. The base and apex are nearly flat. *The right hand figure* is that of a small one selected from the group, and is extremely clear and neat. The larger ones are chiefly many-sided columns, being multiplied by striæ on the narrower face on the right hand, which is the same as the broad faces in *tab.* 405, and is one of the primitive faces, P of Haüy.

418.

TAB. CCCCXVIII.

C A L X carbonata.

Carbonate of Lime.

Div. 2. Crystallized.

Llandidno in Denbighshire, North Wales, affords crystallized Carbonate of Lime in great abundance, which is remarkable for being in the inverse rhomboidal form, and in the early part of this work was sufficient to attract attention, and the more so as being coloured with Red Oxide of Iron. *See tab.* 4.

The present specimen shows a gradation with a distinct appearance of the facets, so placed as to commence a rounding form, more peculiar to this than any other place; and which may be very gradually traced to lose their sharpness, and to be as it were obliterated by passing imperceptibly nearly into a sphere. It is sufficient here to show the corners with the bevillings at the alternate acute angles; and the three faces at the apex belonging to the obtuse rhomb, called *Cuboide* by Haüy, *v.* 2, *p.* 138.

The crystals in this specimen are beautifully iridescent upon their surfaces, and there is a nearly octaëdral rusty Pyrites, Mountain Blue Copper, or Carbonate of Copper like Smalt, and some Green Carbonate of Copper, which gives the whole a handsome appearance for a picture.

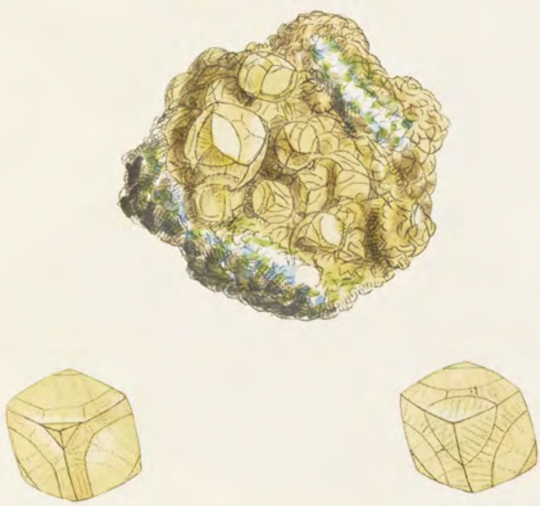
TAB. CCCCXIX.

There seems two modes of rounding, as if from the *zonaire* of Haüy, *v. 2. p.* 154, and simply modifying from the inverse rhomb. The former being shown in the last plate, 418, I now proceed to show specimens of the latter. This, perhaps, is also the most perfect, but, having occasionally the modifications and facets belonging to the former, required to be more particularly noticed. *The upper specimen*, from Llandidno, is the inverse rhomb beginning to round. *The specimen below* shows it nearly as round as can be to discover the rhombic formation.

TAB. CCCCXX.

This shows specimens with the facets common to both the preceding ones, and their relations to both; to the former, from retaining the original six flat tables and the bevilling with sharper angles, while those of the latter are rounding into the whole form. In speaking of these, it would seem convenient for instruction to suppose the molecules about to place themselves in due order, but interrupted by something like a thickness in the fluid, yet to be accounted for, and which leaves a desideratum to be filled up by physical and chemical investigation. The form of the Pearl-spar, *tab.* 19, might seem to me to be the mechanical effect of Iron in the solvent; yet we find those that are apparently

419.



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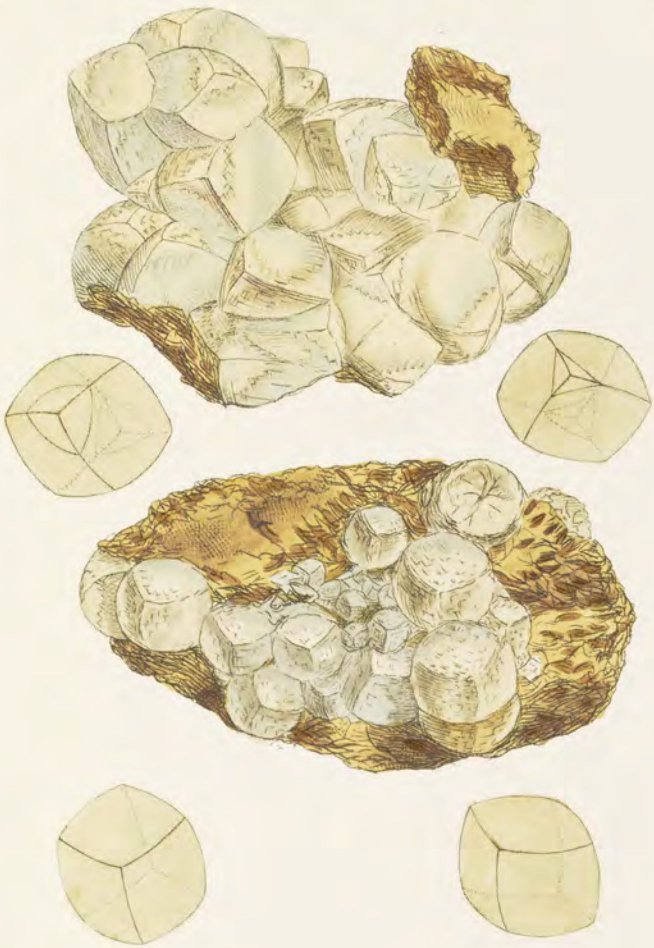
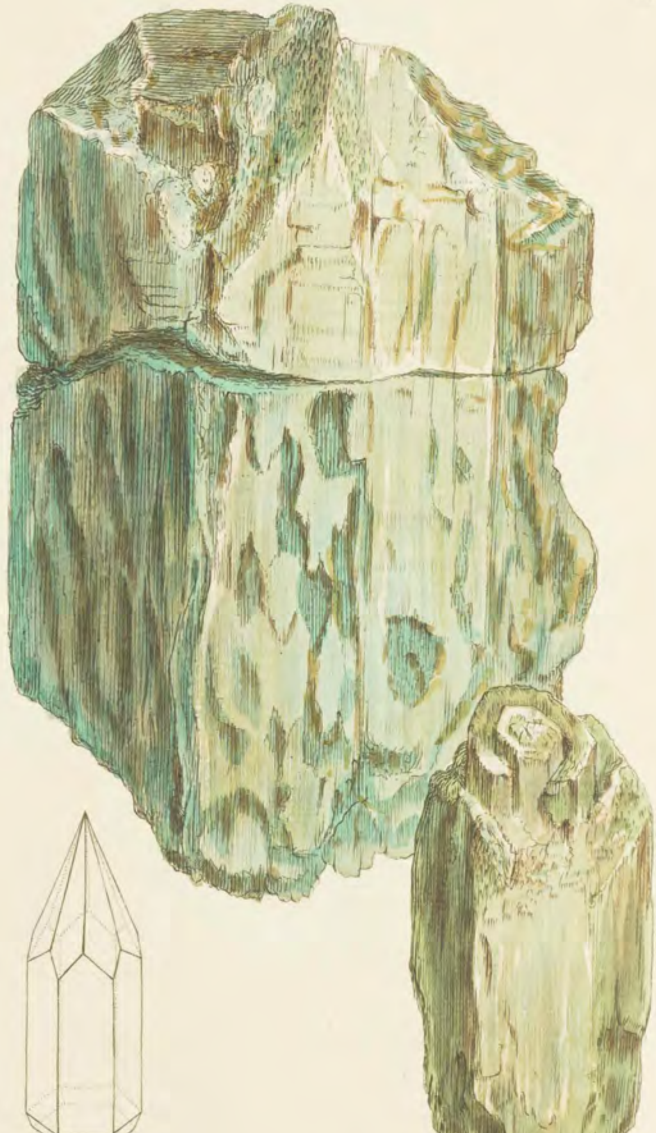
426



without Iron forming those curving modifications:—may it be when they are more suddenly left by the solvent that they become sharpest, and *vice versa*? for we find that Magnesian Crystals are often sharp, although frequently somewhat less so than the common Carbonate of Lime.

It is somewhat remarkable, that this Carbonate of Lime is on a brownish crystallized Pearlspar that seems Magnesian, similar in substance to *tab.* 217.



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TAB. CCCCXXI.

SILEX smaragdus.

Beryl.

Class 2. Earths. *Order* 1. Homogeneous.
Gen. 4. Silex. *Spec.* 19. Beryl.

SYN. Smaragdus. *Waller* 1. 253.
Edler, ou Gemeiner Berill. *Emmerl.* 1. 85.
Aigue marine. *Sciagr. Daubenton.*
Emeraude. *Haüy,* 2. 516.
Beryl. *Kirw.* 2. 248.

FROM time to time there have been reports of Beryl being found in Scotland*, and it has as frequently been doubted. The late Hon. Charles Greville, in his collection now in the British Museum, had may years ago a specimen which he used to say was found in Scotland, which may apparently be identified from its similarity; as although the specimens from Siberia nearest resemble these, yet they have some peculiarities.

The grand specimen here figured shows a certain ruggedness in the crystal, that to an unaccustomed observer would scarcely seem to belong to any regular form; yet when observed, it is a very instructive and pleasing example of the strict laws of crystallization under so rude an aspect. It is columnar, with six sides in three opposite parallel pairs, which conform with the most regular crystals. There are also at the upper end the facets belonging to the pyramid extended nearly to a point, and at the opposite end forming merely a bevilling. *See the geometrical outline.* The

* See Jameson.

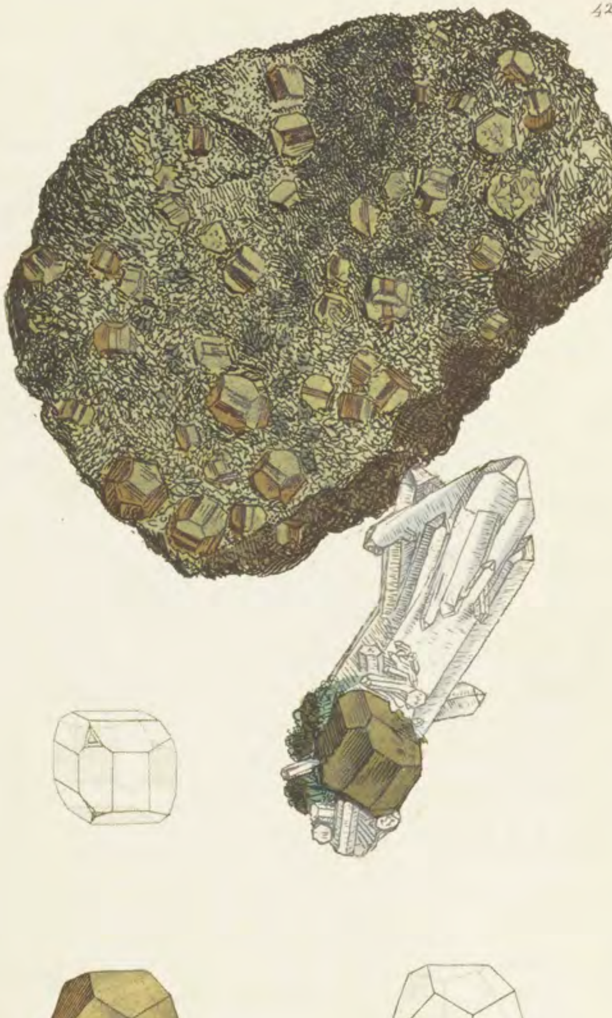
smaller specimen shows one of the circumstances that usually attend the Siberian Crystals: viz. that of the column in the centre being cased or surrounded and thickened in a manner by hexaëdral tubes, giving it a strange appearance. The colour is not so bright as the foreign ones in general, but we may suppose that their being more plentiful in so large an extent of country as Siberia, the East and West Indies, when compared to our little island, they must have greater choice. Ours have, however, a rather peculiar pearly, milky, or glaucous colour in some parts that is worthy of notice.

We may be proud to boast of another new mineral added to indigenous mineralogy since this work has been publishing. The people who search the Cairn Gorum mountains, bring Beryls, Topazes, and the usual Crystals found in that district, to Aberdeen to sell to the lapidaries, and do not wish to lose the little supply this trade procures them, by betraying the places where they are found: and indeed it appears that it would be difficult, as they must depend much on chance, otherwise they would be more common.

These valuable specimens were lent me by Robert Ferguson and T. Allan, esqrs., whose cabinets they enrich. The weight of the *upper specimen* is 1 lb. 11 oz. 6 dwt. that of *the lower one*, 3 oz. 2 dwt. Spec. Grav. 2·650 to 2·759.

Analyses by Vauquelin.

Silica	69·00	68·0
Alumine	14·00	15·0
Glucine	14·00	14·0
Lime		2·0
Oxide of Iron	11·00	1·0
	98·00	100·0



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TAB. CCCCXXII.

FERRUM sulphureum.

Sulphuret of Iron, Pyrites.

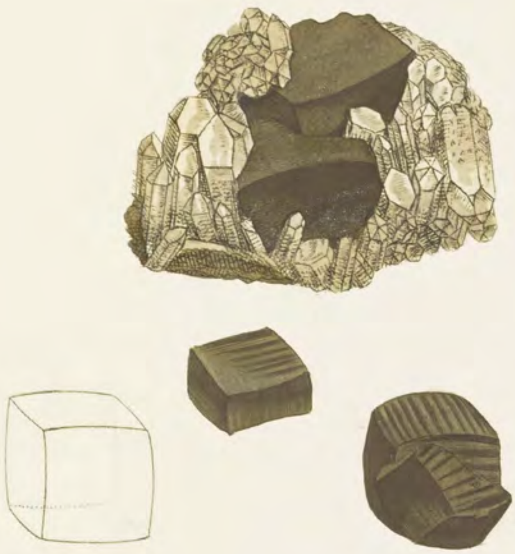
Div. 1. Crystallized.

PYRITES, so called from the facility with which sparks may be stricken from it, is very universal in this and all parts of the world; consequently, we are not surprised to find numerous varieties. Some, however, claim more particularly our attention, because they deviate from the more common order or appearance, even so as to become curious to the experienced, and much more so to the novice; and as they are more or less to be traced by orderly and beautiful gradations, they are the more necessary to be observed, being very instructive, and clearing our way to comprehend those varieties that would otherwise be difficult. I am obliged to His Grace the Duke of Bedford for the *upper specimen*, who with great liberality presented me with a valuable box of specimens from his mines at Tavistock in Devonshire, where there are most beautiful specimens of this substance found in great variety. *The middle specimen* is from some part of Cornwall, and was in Mr. Day's collection. *The lower specimen* is from Tavistock.

It is admirable to see, if we trace these crystals from the primitive cube, that the twelve edges are alternately bevilled as it were, making two hexangular faces on the opposite sides of each original cubic face, and in the whole eighteen faces. These hexangular faces, were they deeper, so as to efface the square or parallelogramic faces, would become twelve pentagonal faces. *See the figure.* Thus is produced the dodecaëdron with pentagonal faces. The alternate striæ on these facets appear to indicate the arrangement of the minute cubic molecules; and as they aggregate to form larger figures, from the occurrence of particular circumstances, they are either formed into very perfect cubes, or more striated, or deviating towards the pentagonal dodecaëdron, in which many gradations occur.

TAB. CCCCXXIII.

This form seems to belong to the cubo-pentagonal dodecaëdron, and the substance is rarely found not to partake somewhat of the modification that indicates it. *See the last plate. The upper figure in this plate* has the edges of those faces as much obliterated by rounding as any I have seen, and is nearly a congeries of minute striated cubes, some of which are tolerably distinct about it. It is from Cornwall. Crystals of this substance are occasionally found at different places, detached, and are flattish like the *middle figure*, or square and somewhat grouped like the *right hand figure*, or solitary and very regular like the *other figure*. Rounder specimens are not unfrequent, in which numerous other figures are formed into a round bundle, either octaëdrons, cubes, or cubo-octaëdrons, &c.; but that seems to depend upon some other laws, and is as it were a pile of crystals. There are also some that are formed in plates, not much unlike Sulphate of Barytes or *Cawk* of the miners. *See tab. 96.*



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424

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TAB. CCCCXXIV.

FERRUM sulphureum.

Pyrites in Septaria.

Div. 2. Amorphous.

THE opening of the tunnel at Highgate has been a source of much information to the metropolis, with regard to extraneous fossils more particularly, and will extend information much more than could have been expected.

In many respects the hill resembles the cliffs of Shepey in soil and contents. The upper soil is loamy for a few yards, and below is a dark clay. There are septaria in the inner part of the more ochraceous clayey loam, which partake of the ochraceous appearance, and others which are more abundant, and lay more or less level with each other in rows in the dark clay; the most compressed and regular ones uppermost. They vary in size, from that of a small round tennis-ball to two or three feet in length and breadth, often nearly one foot in thickness. Those in the dark clay are more indurated than those in the stratum above; the divisions or septa darker, in general varying from yellowish to bright reddish brown *. The Tali vary, but are mostly of a darkish gray or brown colour, lighter when dry. The open parts of the divisions frequently contain water, nearly resembling rain water; they are rather remarkable for containing indiscriminately in their structure many shells of different species, and some, I believe, new to us at present; some that belong to distant climates, and some very rarely found at Shepey, Hordwell Cliffs, &c. These are also more or less dispersed in the dark clay. Remains of various fishes, crabs, teeth, &c., are also mingled occasionally in the ludi, and, like those from Shepey, they have the stellated Sulphate of Barytes (*see tabs.* 172 *and* 173,) upon some of them, but very rarely.

* Argilliferous Marlite, *Kirw.* 1. 99.

Although these septaria abound more or less in all clay pits, wells, &c. in and about London, as well as other clay soils, they have, from the novelty of a tunnel, been ardently gathered by all sorts of people, and claimed extraordinary attention.

The rarest of the Septaria, according to Sir John Hill, is the Pyriteria, by which appellation he calls those Septaria or his Secomia that are divided by Pyrites or Sulphuret of Iron. I have therefore figured a fragment of one, found about the middle of the tunnel, about 90 feet from the surface, as an example in this work. It is not only divided by the neat brilliant septa of Sulphuret of Iron, but that is again divided by a portion of Carbonate of Lime, and it also happens to have a transverse section of a shell, and a specimen of Murex Trapezium? upon it; (*see Linn. Syst. ed.* 13. *p.* 3552 *and* 3553. *Rumph.* 29. *fig.* C. is perhaps the best figure,) a shell not uncommonly found in the East Indian ocean and at Amboyna: but there seems much confusion in the description and references, and the foreign shell has a plicated column, which the Highgate one has not:—but more of this in its proper place, if I should treat of the other Highgate shells.

The many varieties of Septaria mentioned by Hill are superfluous, being about 30: the above descriptions, with our figures *tab.* 61, and the Septarium of Quartz, *tab.* 207, will nearly include all. The former often contain remains of wood in various states of decomposition, perforated by the Teredo navalis, *Linn.* partly like the *upper figure, tab.* 200. This terrible animal is said to have been imported from India!

The common Septaria are used as stucco for ornaments on houses, out-door walls, &c., and is called Parker's cement, (at which I hinted in the description of *tab.* 14.) when prepared by baking; and, if well prepared, is very durable.

The finding a species of resinous Bitumen at Highgate is a curious circumstance; it has been found attached to these Septaria. I shall not fail to insert a further account of this substance, as another feature in the British catalogue.

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TAB. CCCCXXV.

C A L X sulphata.

Sulphate of Lime—Gypsum.

Div. 1. Crystallized. *Var.* Lenticular.

Shotover Hill in Oxfordshire in particular, and all similar formations where soft Marle and Limestone predominate, also the more clayey formations resembling those of Shepey, Brentford, and even Highgate (which has been exposed by digging the Archway), present the crystallized varieties of Selenite in abundance, and show occasionally specimens that lead to the more solid and fibrous varieties.

The upper specimen is from Oxford, and shows how the crystals cross each other, which they often do, and are heaped in bundles more or less crowded and confused. These crystals are frequently very large, in some places from six to ten inches in diameter. *The next specimen* is from Highgate: it also shows the nature of the arrow-headed mackle commonly called French Gypsum, which is sometimes found very distinct and large. The coloured face gives the shape as if done on purpose to explain it, *The lower specimen,* from Oxfordshire, is destitute of all the lateral faces, or nearly so: perhaps it may scarcely ever be found without some vestige of those that are shown coloured in the Highgate specimen.

This formation sometimes finishes the congeries of veins in Marle; *see the lowest specimen,* from Purbeck, the sides of which resemble the striated Gypsum; *see tabs. 335 and 336.*

426.

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TAB. CCCCXXVI.

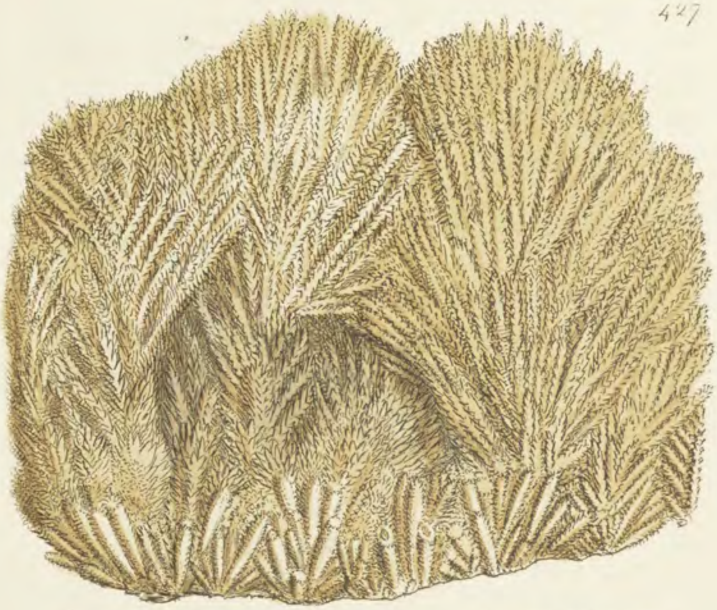
CALX carbonata ferrifera.

CARBONATE of Lime in lenticular rounding crystals has long since been shown in *tabs.* 62 and 63, and the many varieties otherwise rounding, either crystallized as those of *tabs.* 418, 419, and 420, or in roünded grains, or globose, but not apparently depending upon the laws of crystallization, as in *tabs.* 8, 38, and 284. The present variety, consisting of granules formed by an assemblage of crystals, seems to be peculiar to the Coal formation, and remarkable for having long escaped the notice of mineralogists. I have it as small nearly as Ketton-stone, in Coal from South Wales; and when the mass contains a hollow, as it sometimes does, we see the surface of the grains, and discover them to be little groups of nearly lenticular crystals, more or less mingled with Oxide of Iron, and almost every side covered with the Coal, or seemingly cemented by it: they are rather ovate than rounded (otherwise they would compare with Sulphate of Barytes, *tab.* 96); but sometimes compress each other a little, forming flattish faces where they meet, often having a brassy iridescence, giving them a metallic appearance. It is rather curious that they should form a stratum in the midst of a thick stratum of Coal in the neighbourhood of Dudley in Staffordshire, where they are called Brazils or Brasses by the miners. They lay in a nearly regular series, of three or four inches in thickness. I have a specimen four feet long and two feet wide, with these regularly passing from one end to the other. The miners consider their presence as a sign of good Coal. They bring blocks up from the pits to make posts with, and find them very durable. Pyrites is sometimes near them: but the specimen I have, which had been out of the ground some years, seems not likely to decay. It should seem from *the lower figure* of *tab.* 105, that in certain cases the Sulphuret of Iron keeps together, and in others it effloresces, and is used in the manufacture of common vitriol.

Coals have most of the varieties of Sulphuret of Iron, both of crystallization and durability. Mr. Farey seems to understand the durable sort to be the Brazils, and the other the Brasses of some of the miners. See Farey's Derbyshire Index, &c.—I do not know of these but as miners' terms.

This sort of Oolithus (or Pea-stone as some would call it,) demanded illustration somewhere, and may lead to some useful theory.

427



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TAB. CCCCXXVII.

C A L X carbonata.

Arborescent Carbonate of Lime.

Div. 2. Imitative.

THE peculiar appearance of these specimens of Carbonate of Lime, from Alstone Moor in the county of Durham, is particularly interesting. Specimens were in Mr. Day's collection; and I have received large ones from the late Hon. Charles Greville. My worthy friend Philip Rashleigh, esq. considered it as representing feathers: see his *plate* 25, *f.* 2. The rather pinnate appearance certainly gives it an apt resemblance; but it is frequently more arborescent, yet flattish; something like the Juniper. It is rather peculiar to itself, and requires to be seen to be understood: the figure, however, will give a tolerable idea of it; and it cannot fail to be recognized from the singularity of its structure, although it varies a little. The lower parts are crystallized in a sort of spiculæ, not unaptly resembling a barley-corn, but somewhat triangular; sometimes smaller, sometimes larger; the larger ones covered laterally with evidently three-sided pyramids a little rounded; such as these more or less flattened, grouping, spreading and inosculating, produce the shrub-like form; and often, from the lower part spreading least and the upper part most, produce a sort of Gothic arch. The top of the shrub, as it were, is surmounted by a new series, more or less confused, but depending upon a similar structure. It is found in large masses of a foot or more in diameter and six or eight inches high.

These elegancies of Nature may be very instructive in decorative architecture, and produce some originality; as it must be owned that, however high the present age stands in that science, it is more borrowed from our ancestors' borrowings than from Nature herself.

by Jas. Sowerby London

TAB. CCCCXXVIII.

BARYTES sulphata.

Sulphate of Barytes.

Div. 2. Imitative.

I HAVE received this as a Derbyshire production, from my late friend Mr. Martyn, and from Mr. White Watson of Bakewell, &c. Its peculiar structure requires that it should not go unnoticed. That they have been parts of veins is very evident; and the manner of the crystals shooting (if I may so term it) into a loose matter, accounts for the arborescent ramifications; and they seem to pass from either side more or less freely, according to the opposition they meet with.

The upper specimen appears to ramify from the two opposite sides, and nearly meet; but a concrete hardish earthy Oxide of Iron interposes, at which they seem to recoil. *The upper part of this specimen* has a more porous and mixed Oxide of Iron among the gangue, which has the appearance of lava; but I presume is not. *The lower specimen* is part of a narrow vein with smaller ramifications, which, relieved by the loose darkish earthy Oxide of Iron, &c. has a pretty appearance.

TAB. CCCCXXIX.

This specimen has so much the appearance of moss, that it is very likely to be taken for a moss covered with or replaced by Carbonate of Lime, like *plate* 346; but is really crystals of Sulphate of Barytes, mostly of the primitive form, piled like foliage, sometimes a little rounded, and as it were accidentally disposed in more or less regular branches, and may be compared to the quadrangular imbrication of *Erica vulgaris*, the Common Heath, *Eng. Bot. tab.* 1013, especially when bushy and before flowering, and is found in rather dense masses like it. I find Woodward had a similar comparison, but have not the work to quote.

This substance affords much variety. Perhaps this with what has been already done will be sufficient examples in this work, except the remainder of the modifications of its crystals in one plate.

It was of consequence to have such a specimen as this, to instruct us not too freely to take these resemblances for petrifactions, *i. e.* organized bodies, whether animal or vegetable, wholly or in part displaced by stony substances. The knowledge of crystallization shows that the form depends upon the aggregate of crystals accumulating in peculiar order.

429

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TAB. CCCCXXX.

SILEX quartzum.

Coloured or *Amethystine Quartz. Amethyst.*

Div. 1. Crystallized.

Few would have thought that the Amethyst, so long well known as a precious stone, was Quartz or Rock-crystal coloured by Manganese.

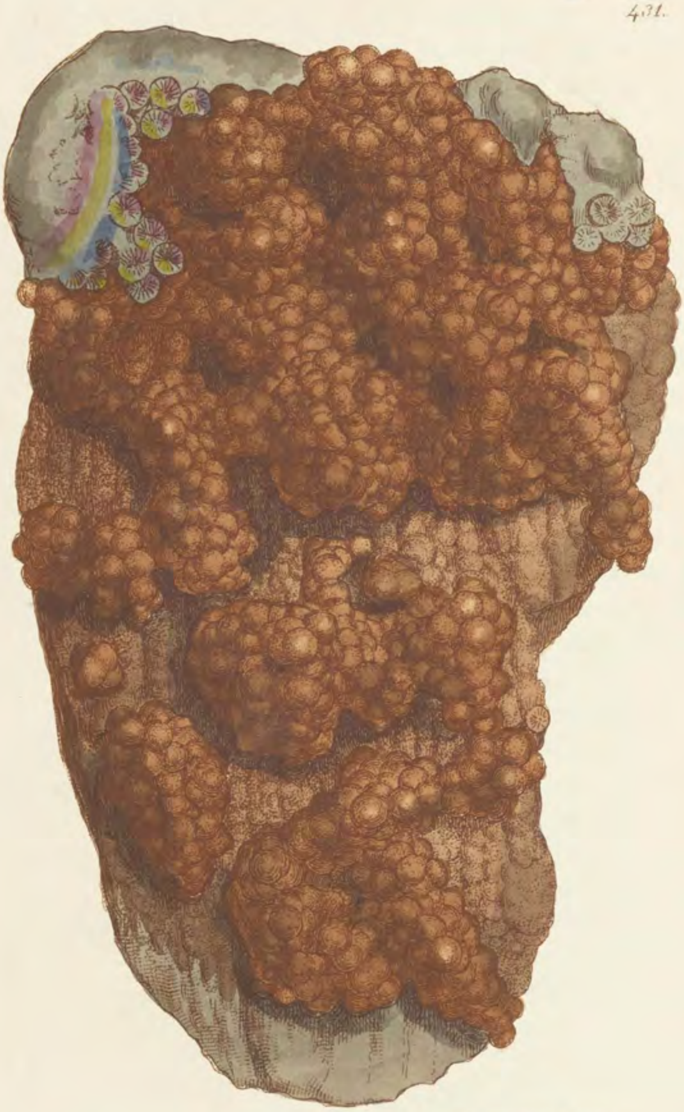
It is occasionally found where other Quartz is found, but is more peculiar to some places. Those used by the lapidaries are generally from abroad, and are often brought in small polished pieces. Of ours, *the upper specimen* is from North Wales, and *the lower one* from Cornwall. Fine Quartz of any colour has always been esteemed and used in jewellery, and its hardness makes it wear well. The yellow when set is often valued as Topaz; and although Topaz is hard enough to stratch it, yet, as it is not so fissile or so ready to split, may sometimes give it a superiority; and it is a free cutting stone to the lapidaries, being less liable to interrupt their operation and polishing, in which the grain, as they call it, must be attended to. I have before said that they are called St. David's and St. Patrick's, or Welsh and Irish Diamonds, and accordingly fine ones have lately become as fashionable as the better Bristol stones used to be formerly; and they frequently say, as a proof of their near approach to

Diamond, that they will cut glass like it, to enhance their value: but Quartz will only scratch glass, and will not produce a perfect separation in windows or plates of glass, like the Diamond. The colour of Amethystine Quartz is supposed to depend upon an Oxide of Manganese, as the yellow and ochraceous ones do upon Oxide of Iron.

Large and well-coloured specimens fetch a high price, even uncut and in their natural state, according to their richness and beauty.

Lord Compton found primitive Quartz, like *tab.* 41, in coloured Flint in a gravel pit near Cambridge, last year, (1810); and Miss Codrington, about the same time, at Eastbourne in Kent. Haüy, in his *Tableau Comparatif*, p. 152, says that it has been found in the environs of Liege in small crystals, occupying the cavities of Gray Quartz; probably like ours above-mentioned: but in April, this year, my persevering and kind friend W. Danby, esq. sent me a specimen in which the rhombs are relieved so as to show all sides, and are of the most transparent kind, perhaps unique. It is from Clifton Hill, near Bristol, where millions of specimens are gathered annually without finding such.

431.



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TAB. CCCCXXXI.

FERRUM oxygenizatum.

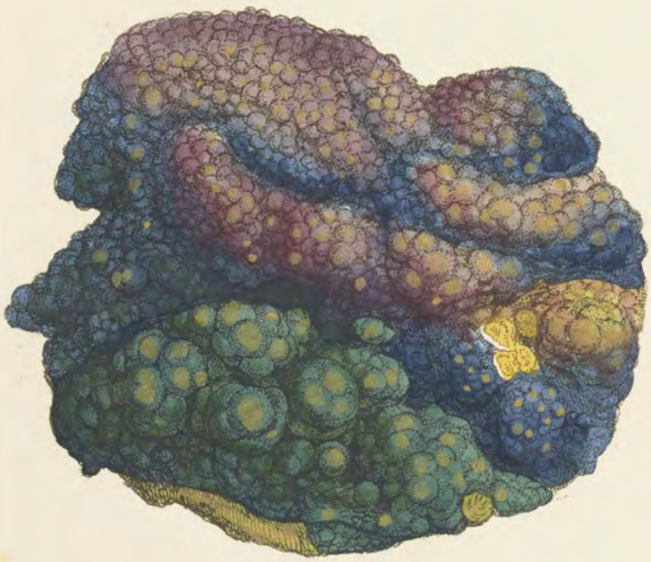
Botryoidal Oxide of Iron. Hæmatites.

Div. 2. Imitative.

Nothing but specimens or figures can give an idea of some of the works of creation; and the former are often entirely out of the reach of many, either from local rarity, expense, room, and many other reasons. Who indeed would have guessed, from the best or most elaborate description, the absolute form of this Iron Ore, that had not seen the like? I therefore consider the specimen, although a variety, as of some consequence; and it is even geologically instructive. That the rounding form is so usual is a subject to speculate upon; and the manner of radiation in every Hæmatite, from the smallest to the largest, is undoubtedly characteristic, as well as crystallization; although perhaps somewhat inferior, as not being so distinctly understood. Observation and experience will, however, by degrees, enable us to comprehend it as a leading character of some substances, in a specific way.

The Pisolites, Oolites, &c., as they are sometimes called, are as yet but vaguely understood, and cause much confusion. It is therefore necessary that we should be guarded against deception in rounded forms, particularly as there is perhaps scarcely one substance that has not a variety partaking of it.

Mr. Herbert is to be thanked for this specimen, who brought it from Downsend, near Bristol, and was so good as to present it to me in 1808. The green iridescence on *the left hand upper corner*, he observed, was beautifully striking in some specimens.



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TAB. CCCCXXXII.

CUPRUM sulphureum.

Blistered Sulphuret of Copper.

Div. 2. Imitative.

This often very superb variety of Copper Pyrites occurred chiefly in Cook's Kitchen mine, and in other places in Cornwall. It may be said to occur of all colours, viz., yellow, red, and blue, in binary varieties, such as orange violet and green; also the ternaries, or all varieties of brown; but this variety of colour is only superficial. Sulphate of Copper is often found in solution in water, as I have elsewhere observed, and that it was said to be discovered by its precipitating on an Iron instrument or spade used in digging, as the solvent had a greater affinity for Iron than for Copper: thus there will be but little difficulty (as it may have been in a soluble state) in presuming these formations, at first sight so aptly resembling the bubbling of boiling metal by great heat, to have been formed or subsided from watery solutions: indeed the formations could not, when duly considered, have been otherwise: yet, prepossessed with common appearances, we should not think so; and the notice of it in this manner is therefore the more necessary, and may perhaps be useful to attend to in forming conclusions regarding different substances. The whole may be as variable inside and in its component parts as it is in colour outwardly; but commonly consists of Copper in the greatest proportion, Sulphur next, and Iron least. Sometimes Gray Sulphuret of Copper in hexaëdral crystals or spiculæ surmounts the bubbles, or is found among them. The somewhat brassy appearance on being rubbed is in this figure represented by aurum musivum, a preparation of Tin with Sulphur. Mr. John Davey has made the best I have seen, and expects to improve on the certainty of producing it in perfection, which is rather difficult.

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TAB. CCCCXXXIII.

ARGILLA hydrata.

Hydrargillite.

Class 2. Earths. *Oder.* 2. Homogeneous.
Gen. 1. Argilla. *Spec.* Hydrata.
Div. 2. Imitative.

IN *tabs.* 134 and 142 I have shown this substance as from Devonshire and Cornwall, nor was it then supposed to exist elsewhere. I have, however, been favoured with extraordinary specimens by S. Wright, esq. of Dublin, found on Spring Hill near Tracton Abbey, about ten miles S. E. of Dublin, when digging a foundation for a building. *The upper figure* is part of a large, apparently separate, botryoidal fragment, of which the radii are three quarters of an inch long, and greener than I had before seen; and where it has been broken and exposed, passes from an ochrey yellow to a black. *The left hand mass* is somewhat crowded together, resembling dark hæmatites, with a vein of the lighter sort passing in an elegant curve through it. There is also a somewhat stalactitical specimen: *See the right hand figure.* Below this, there are a few coalesced spherical forms with dark shining radii. Some of the external parts of the above exhibit ends of the crystals, giving it some resemblance to the Sulphate of Barytes figured in *tab.* 96, and not unaptly resembling Prehnite, *tab.* 194, but the crystals certainly being of the same form with those in *tab.* 134.

It is rather singular that this substance was not found many years ago, when it might have been confounded with Prehnite; but I do not know that it has even entered any cabinet under that title, nor has the Irish variety even been called a Zeolite as that from Devonshire was. Dr. Fetton observes that the best specimen he has seen, (procured from the Rev. Mr. Hincks of the Cork Institution,) has diëdral terminations on the external surface; and the Spec. Grav. of the purest part was 2·34.

The figure at the back is from a specimen presented to me by Miss E. Hill, whose ardent desire to prove the fame of the first discovery of this mineral to be due to her brother, the late Mr. John Hill, has prompted her to use every endeavour to show it. He discovered it some time before the year 1785: *see my short Catalogue of Minerals*, p. 23. This is a magnificent specimen, and may be compared to the sun. The radii are an inch and a quarter in length; of course the circle is two inches and a half in diameter, and nearly eight inches in circumference, being wonderfully regular, and the largest ever seen: the smaller contiguous circles may be compared to planets; and their satellites; and those near the disk may be considered as analogous to comets, appearing to borrow their light from touching its rays; and they lay so curiously oblique as to show their radii, diverging chiefly in a lateral direction. The opposite side of this specimen has very small hemispheres, of a waxy appearance, semitransparent, and greenish, nearly smooth, less than a common pin's-head, and on a sable ground.

It is not a little extraordinary that this substance seems not to have fallen into the hands of any of the continental writers. It has, however, been found in Spain; but the specimens are destitute of Fluoric Acid, of which the British has a trace.

TAB. CCCCXXXIV.

Hydrargillite.

Dr. Turton some time ago gave me a specimen from the Barnstaple Quarry, that had rough balls which were much relieved and of peculiar specific lightness; externally resembling Rotten-stone, but harsher, though easily rubbed off, and soiling the fingers. *The upper specimens* here figured were from Miss Hill, and are not compressed, as is most usual, but nearly spherical and almost detached, having formed in a hollow in the Schist; and it may be possible that the decomposing specimen figured *on the left hand* has rested in such a cavity, being a flattish congeries of spheres, rather more solid on the under side. The four middle ones were wholly detached. These all show the Brown Oxide of Iron about them.

The lower left hand figure has some segments that have become nearly opaque and whitish, scarcely showing the radii, but retaining something of the concentric stains in a circular manner, which are not so distinct when the fresh lustre is remaining. They lie in a very irregular mass, probably of the same substance as the rock, but in such a state of decomposition as somewhat to resemble the running cinder of volcanic Basalt or Trap.

Miss Hill also sent me some Spiculæ on small and thin schistose fragments, that were gathered from a soft common clay-like Shale. They are dull, and easily spoiled by touching: in some the fibres are arranged in all directions, as if separated by decomposition and fallen into irregular masses.

The Schist Rock in which these are found is, I presume, nearly the same as the Irish, a dark flinty Schist (*Kiesel schieffer* of some), and is remarkable for dividing neatly, not only into broad laminæ, but often into columnar pieces mostly rhomboidal, partly resembling some Coal. The Hydrargillite filling the external parts appears to be liable to decomposition.—I understand there is good Slate quarried at the place.

I should not forget to mention a mass of fragments of the rock, lying extremely irregularly, with crystallized but rusty Hydrargillite about the size of a pea, scattered among and holding them together, which I received with these.

435.

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TAB. CCCCXXXV.

C A L X carbonata.

Carbonate of Lime.

Div. 1. Crystallized. *Var.* Inverse rhomb.

Bournon Traité de Mineralogie, p. 34. t. 10. f. 152.

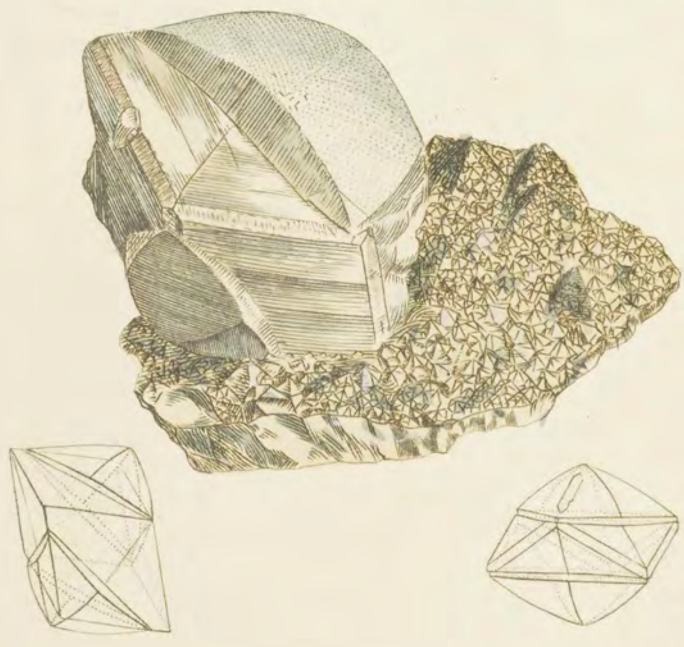
I KNOW of no one who notices this form of crystallization excepting the Count de Bournon, who, in his work of great labour, observes that Sir John St. Aubyn's valuable collection possesses it. Its peculiarity made me think it of too much consequence to be passed over here. It should appear no less so, when we find that the crystals are formed in the division of a septarium. They are a little rounding in the general outline, so that the angles cannot be positively measured; but such as are conversant in crystallized Carbonate of Lime immediately recognise the inverse modification, more or less elongated by a continual aggregation upon one of the faces, so as to form a four-sided column*; and it seems that this crystallization took place while it was yet in a softish state, as they become as it were curved from weakness.

The terminal faces of the crystals are often rounded;

* The perfect rhomb of this modification is not very rare: I have it from the same place. The crystals are, however, fixed in general upon one of the points.

sometimes the longer diagonal being the most elevated, and sometimes the shorter. They have a waxy and peculiarly shining lustre, and are from nearly white to a yellowish and greenish colour. The Tali of which they become Septæ are irregular, and composed of dark gray Marle coated with Brown Carbonate of Lime, and occasionally holding shells. *The upper specimen* shows part of three spires,—of which I shall speak in my EXTRANEOUS FOSSILS.

The specimens were presented to me by Miss Codrington: they were collected by her upon the Beach at Weymouth.



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TAB. CCCCXXXVI.

CALX carbonata.

Carbonate of Lime.

Div. 1. Crystallized.

So early as *tab.* 20 I introduced to observation the primitive variety of Carbonate of Lime with the beginning of the metastatic bevillings, (if I may so term them to make them familiar,) and the rounding faces leading to the equiaxe, or those rounding faces which replace the terminal edges. It will now be convenient to refer to them to understand the present crystals, the faces of which are so enlarged as to become more difficult for the beginner to comprehend.

The figure is from a large and rare specimen, brought among others long since from Dufton in Westmoreland. So large a crystal without modifications has, perhaps, never been observed*. This, like the above-mentioned much smaller specimens, has the rounding equiaxe so extravagant as to disguise it, and the other faces also much broader, and even additional truncations on the lateral edges. Another circumstance which gives it a more remarkable appearance is, that the superimposed nuclei which form the rounding faces have extended them, so as to occupy the parts of the rhomb between the apex and longer diagonals, forming a considerable elevation; and this has happened in several specimens,—*see the right hand geometrical figure.* The whole seems a trio composed of a rhomb and two equiaxed crystals regularly coalesced. *The upper specimen*, however, has a large rounding equiaxed crystal on

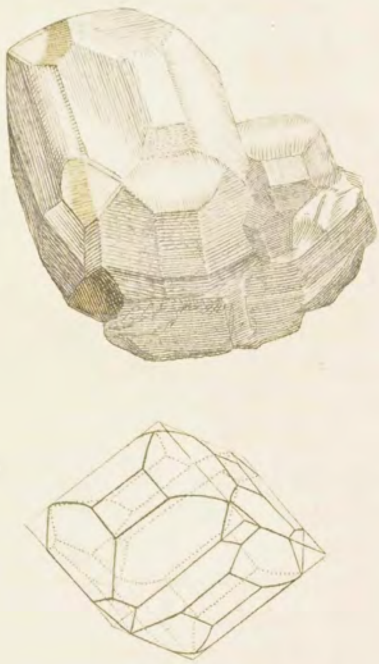
* Since my first figure, *tab.* 3, I have got more sizeable specimens.

the upper obtuse end, and on the lower termination a smaller one, with nearly the proper flatter faces. The faces on which the equiaxed crystal terminates, are joined to it curiously by three sides of a prism, irregularly and raggedly rounding, placed upon the diagonal above mentioned. The outline is naturally confused, but I hope will be understood, as it is a curious instance of the regularity attending crystallization, however irregular it at first appears.

TAB. CCCCXXXVII.

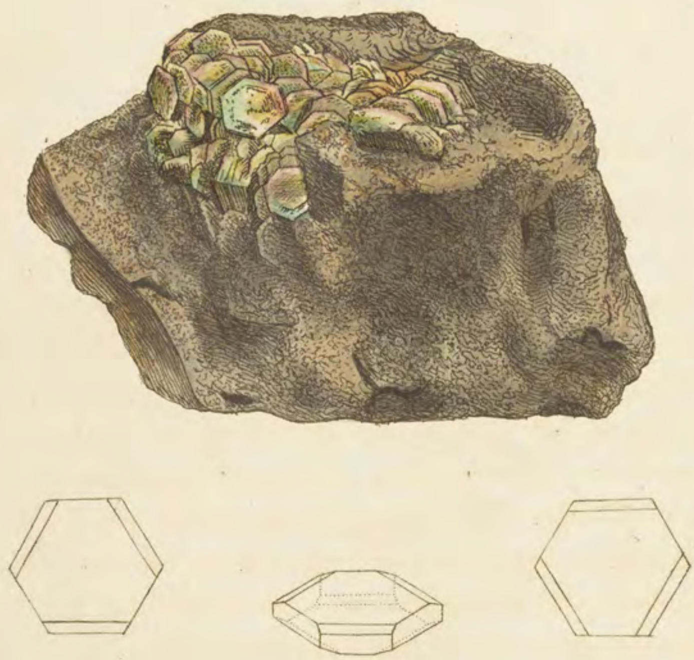
The last plate showed the coalesced crystals yet distinctly marked with the remains of the usual column of Carbonate of Lime. The present specimen, not having this column on the diagonals of the rhomboidal faces, but at their acute angles, has so different an appearance, that it would be scarcely recognisable but to the more experienced. This specimen has rounding faces on all the edges; but on the terminal ones they are, as in the last, much the broadest; but they do not extend over the primitive faces, which are still distinct in the centre of each of the six sides, forming more or less of an elongated rhomboid. We may here count thirty-six faces. The obtuse rounding ones passing round the six edges of the crystal, unite as it were two into one; and each is crossed by the outline of the primitive rhomb. The acute corner faces belonging to the column have signs of the faces that round a little in *tab.* 306. The whole is somewhat elongated, and accompanied by other irregular ones; and we cannot always see them in the best position to show the axis as might be desirable, and as in the outline below. There are a series of these crystals; but an attention to these two will probably make them less difficult to comprehend when we light on them.

437



Dec. 1 [illegible] published by Jas. Sowerby London

438.



Dec 1 18[illegible] published by Jas Sowerby London.

TAB. CCCCXXXVIII.

CALX carbonata.

Carbonate of Lime.

Div. 1. Crystallized. *Var.* In hexaëdral plates.

Bournon Traité, p. 14. tab. 4. fig. 52.

CARBONATE of Lime of this form is of very rare occurrence; nor do I know of it from any place but Dinas Mouddy in Merionethshire. Although it is nearly allied in form to *tab.* 198, yet they have the more general appearance of mere hexaëdral plates, and if green they would not be much unlike the Arseniate of Copper, *tab.* 36; but that has inclined edges, as explained in that figure. The present has the six sides of the column as in *tabs.* 305 and 306, but extremely short, and the truncated ends are alternately bevilled, and the bevilling is nearly the same as the equiaxe modification. Although a dull specimen, yet some crystals have an iridescence about them. The gangue is a mixed Carbonate of Lime with Pearl-spar and some small crystals of Quartz and Galæna.

This specimen was long a favourite of Mr. Day's.

439

Dec 1 [illegible] published by Jas Sowerby London

TAB. CCCCXXXIX.

SILEX quartzum.

Decomposing Flint.

Class 2. Earths. *Ord.* 1. Homogeneous.
Gen. 4. Silex. *Spec.* 1. Quartz.
Div. 3. Amorphous.

This decomposing state of Flint very much resembles, and is probably the same as, *Quartz nectique* of Haüy, the *Schwimmstein* of Werner, and the *Float-stone* of Jameson, said to be found only at St. Omer, near Paris. The specimens that I have seen in the intermediate state from thence are more approaching to Hornstone or Jasper, of a yellowish or reddish tinge as also of the grayer tinges. This soft state is not common, although far from so rare as might be expected. The outsides and even insides of Flints in Chalk are sometimes of the same nature, and pass more or less gradually into Chalk, or *vice versâ*; and this has given rise to the idea of the earths passing into each other even chemically.

The present specimen is from near the surface of the dark clay commonly called Blue Clay on the north side of Highgate-hill, and was found with many others in a remarkable and curious situation, *viz.*, adhering to the outside of some of the Septaria. Scarcely one Flint besides has been found in the same dark clay: and geologists consider Flints, especially Pebbles or tuberose Flints, as not belonging to it.

Their being attached to some of the Septaria, which are so common without them, makes them the more extraordinary. At the same time shells are attached to this Float-stone, frequently oyster-shells, which I have not met with in other parts of the Clay, and those contorted or adapted to the shape of the stone, and having merely the edges and hinge a little protuberating, so that the stone itself is part of the animal's case towards the middle. The shell might, if it did not seem too nearly allied to *Ostrea edulis*, be called *perforata* or *parasitica*. I have had soft flint pebbles from a well dug in Richmond park, that were apparently found loose among the same kind of clay. They all incline to the common gray appearance of pebbles; see *plate* 88, *lower left hand figure*;—being very soft, the coat differing but little as to colour, sometimes it is a little paler, and it is less shining. They all feel light in the hand *, and differ according to the quantity of the softened or decomposed part. These of Highgate are, however, more largely conspicuous, and were observed by my attentive friend B. G. Snow, esq. who has so kindly assisted me with specimens to elucidate the natural history of the mineral productions of that little but remarkable hill, the productions of which will be a memorial of it to future generations, when otherwise it might have been forgotten.

These stones have evident marks upon them of having been rolled.—Besides the specimen with an oyster-shell attached, I have one with a sharp impression of an Echinus' spine.

* I think, however, that they absorb the water too quickly to deserve the name of Float-stone.

440

Dec 1 1823 published by Jas. Sowerby London.

TAB. CCCCXL.

ANTIMONIUM oxygenizatum.

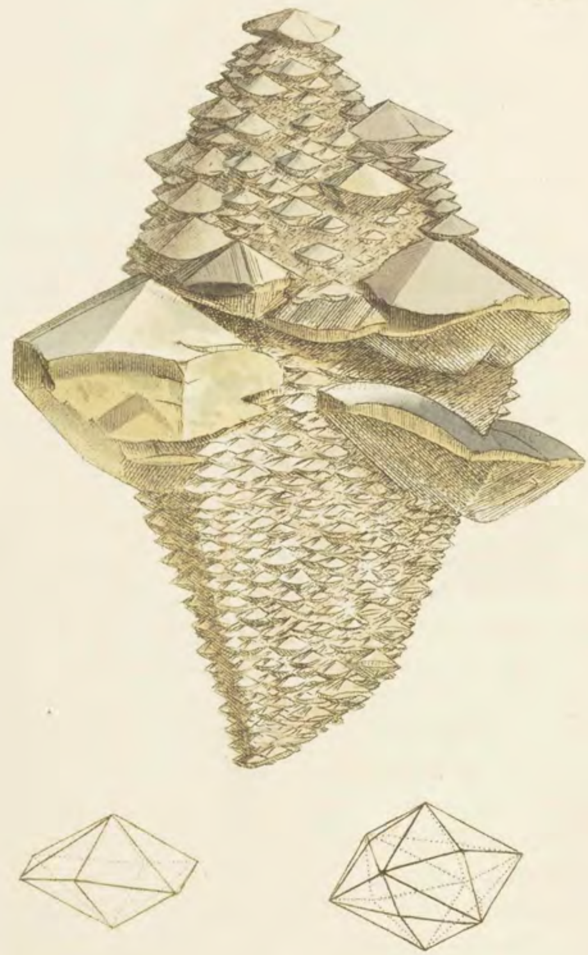
Oxide of Antimony.

Class 3. Metals. *Ord.* 2. Homogeneous.
Gen. Antimony. *Spec.* Peroxide of

SNY. Antimonial Ochre. *Kirwan* 2. 252.
Oxide d'antimoine et de plomb combiné avec l'acide muriatique. *De Born Catal.* 2. 149?
Antimoine oxydé épigène. *Haüy Tabl.* 113 et 298.

Among other specimens in the valuable mineral collection of Mr. Day, was the present, from Endellion Mine in Cornwall. It is a rare mineral, and is also found at Brandsdorf near Freyberg in Hungary. I have not hitherto seen crystallized British specimens, nor do I suppose any were ever found. Ours is produced apparently by the gradual decomposition of the Sulphuret; and, where nearest to it, partakes of the fibrous form, and thence passes to somewhat flaky, and finally earthy; and is also softer in proportion as it is further from the gray ore. Sometimes it forms laminæ in the cracks or divisions of the gray ore. It is of a light or deeper yellow in proportion to its degree of purity. The specimen has Quartz about it, both opaque and transparent.

This Oxide, which is the Peroxide, is difficultly fusible; but upon Charcoal with the blowpipe it gives out a white smoke and is volatilized, leaving a globule of Lead with the oxide of which it was coloured. It froths with Borax, and partly resumes the gray metallic cast.



Feb. 1. 1812 published by Jas. Sowerby London

TAB. CCCCXLI.

CALX carbonata.

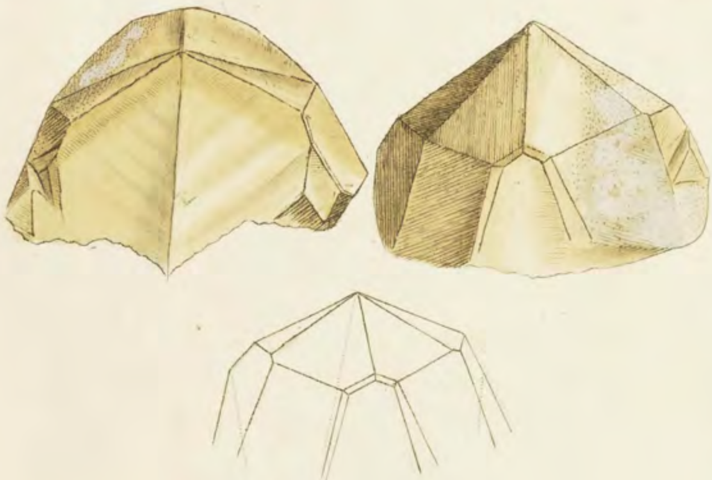
Crystallized Carbonate of Lime.

Syn. Chaux carbonatée à cassure lamelleuse, 27me modification. *Bournon, Traité de Mineralogie,* ii. 50.

After having figured the modifications at *tab.* 436, I was highly pleased at finding this singular specimen from the same neighbourhood, in the collection of the Count de Bournon, who so readily lends his assistance to the advancement of a science in which he eminently excels. I have specimens of the equiaxed modification accumulated in parcels forming the metastatic: this present is an accumulation of crystals of the twenty-seventh modification of the Count de Bournon's work, also forming a compressed metastatic crystal with two of its opposite faces, very broad, and is curiously surmounted with one, and covered with more crystals which are nearly simple dodecaëdrons (being two obtuse six-sided pyramids joined base to base) passing to those distinctly divided by, or forming the apexes to, six-sided prisms or columns longest at the middle of the specimen. I have represented the dodecaëdron in *the left hand figure*; and the other figure shows these faces in conjunction with faces nearly approaching the metastatic or thirty-sixth modification of the Count de Bournon; and it may be observed that the series of obtuse dodecaëdrons begins with the twenty-fourth, and continuing eleven modifications ends at the thirty-fifth, which is here shown in conjunction with the twenty-seventh, upon the primitive rhomb.

The present specimen is admirably instructive in a geological point of view, as the same neighbourhood produces many similar varieties of these specimens, and shows that certain modes of crystallization are somewhat local.

442



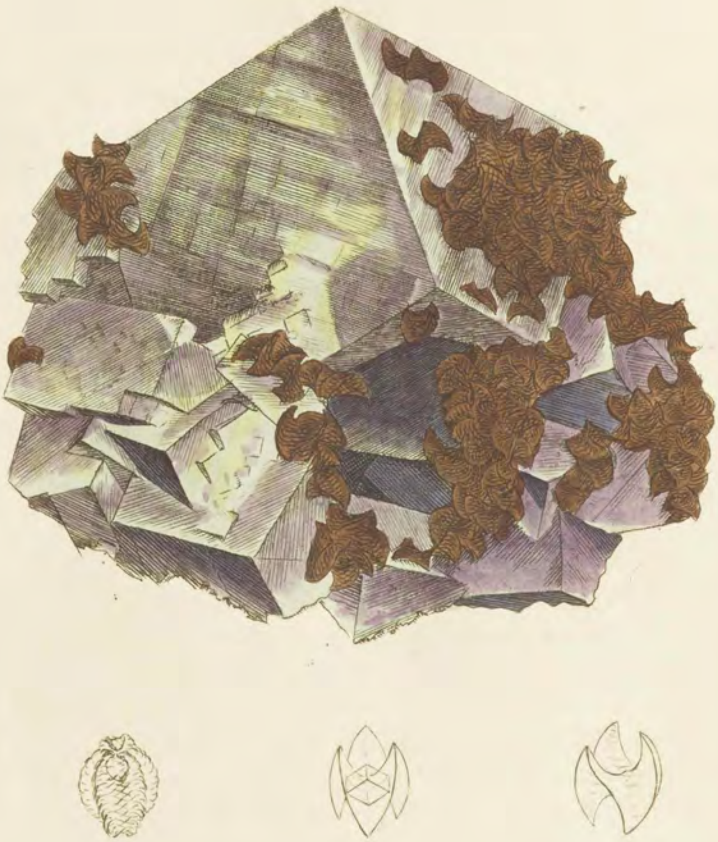
Feb 1 1812 published by Jas Sowerby London

TAB. CCCCXLII.

CALX carbonata.

Crystallized Carbonate of Lime.

This crystal is from the same county as *tab.* 436, and is terminated by one of the dodecaëdral modifications of Count de Bournon. It is remarkable for being nearly halved by two adjoining faces of the metastatic modification being very deeply cut. Thus we find that the crystals of Carbonate of Lime not only have many modifications, but they are so placed, and more or less enlarged, as to be much disguised, and even exhibit mere halves of a modification, the four faces of the pyramid being two of them perfect, and the other two only equal to a third, form a quarter of a dodecaëdron or half the six-sided pyramid.



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TAB. CCCCXLIII.

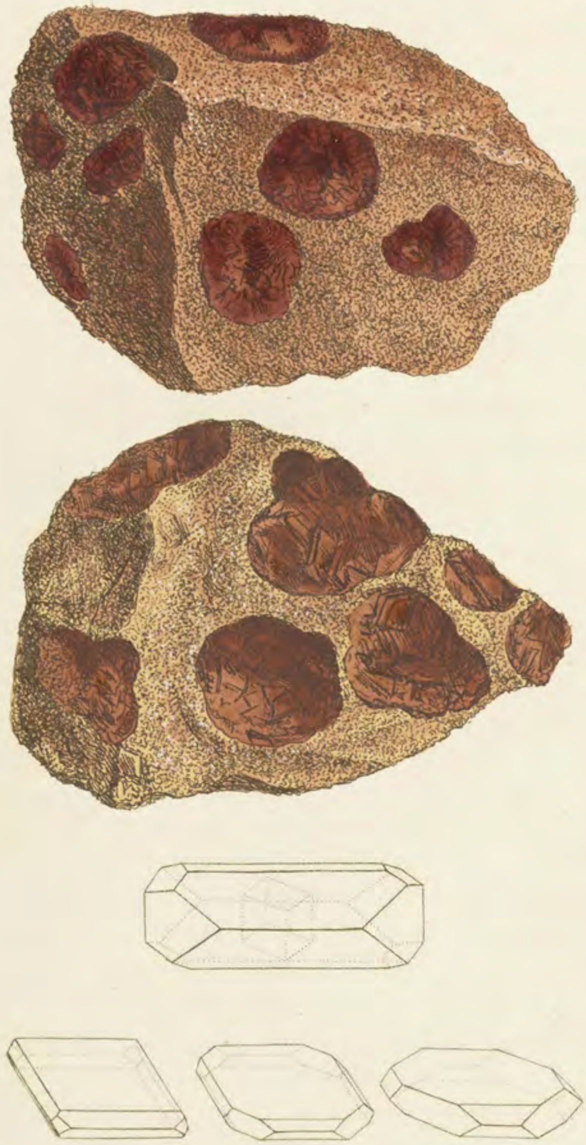
CALX carbonata ferrifera.

Bronzed Pearlspar.

SINCE I published the Pearlspar, (*tab.* 19) this substance seems somewhat better known; and it appears according to some authors, that Mr. Bergman considered Manganese as a component part instead of Magnesia. I believe, however, that the former may sometimes accidentally enter into the combination, although I think it is in a great measure beholden to the Magnesia for its pearly and often metallic lustre, and to the degree of oxygenization of the Iron it contains for its colour; and it may be proper here to observe, that most of the lenticular crystals of what is commonly called Spathose Iron Ore are very nearly related to it in these peculiarities.

The rich bronzed appearance of this specimen, and the curvature of the crystals being nearly in the last state, tempted me to figure it as another lesson on the curvature of crystals: *tab.* 423 showing a curvature of the cube, this a curvature of the rhomb, the lateral angles of which being alternately curved, make a strange figure: *see the lower outlines. The right hand figure* shows the complete crystal, but little more than half is formed in the groups upon the specimen. *The middle crystal* shows the six lateral angles lengthened out in a front view, with the rhomb as a nucleus to show its place. *The left hand figure* (almost the extreme of this mode of curvature) is from another specimen. I have a specimen where these are combined in threes and fours, and almost plumose in appearance. These crystals are whiter within, and therefore show their relation to Magnesian Carbonate of Lime; and I have some from Tavistock by favour of my ingenious friend Mr. John Taylor, that have a very golden hue and metallic lustre.— The difference of the aggregation of the nuclei, &c. to form the crystals, may depend upon the quick or slow evaporation of the menstruum in which they formed, depending upon the temperature.

The description and figures of *tab.* 19, I found from examining more perfect specimens are incorrect, being taken from views of only parts of crystals.



Feb. 1 1820 published by Jas. Sowerby London.

TAB. CCCCXLIV.

STRONTIA sulphata.

Sulphate of Strontian.

It is not every where that opportunities offer of examining rocks, but geology will be much facilitated by the knowledge of such as are most minutely explored, while others are only partially so. Thus, the Carbonate of Strontian was first discovered at Strontian in Scotland, by examining the rock for metals; and afterwards Sulphate of Strontian was discovered near Bristol in rocks exposed for other purposes, and now continuing to be useful. The continued researches cause a variety of discoveries;—and while the general substance of the rock is known*, the contents of other rocks not yet examined may, in a great measure, be presumed. Thus my highly esteemed and ingenious friend Dr. Murray of Harrowgate, in company with Sir Thomas Slingsby, bart., discovered Sulphate of Strontian similar to that of Bristol, on the banks of the river Nidd, near Knaresborough, in an apparently similar rock; and our diligent President of the Geological Society met with Sulphate of Barytes about fourteen miles to the eastward, in apparently the same kind of rock as the Sulphate of Strontian from Aust passage near Bristol. It is thus that the same deposit or formation of rock may be known by a

* This rock, generally speaking, is understood to be the Red Sand formation holding Gypsum, sometimes nearly similar in appearance: see *tab.* 236.

similarity of substances. Sulphate of Barytes is sometimes found in the Bristol rocks, as my active friend W. Danby, esq. and others, have sent me specimens accompanied with Galæna and Blend: it may be presumed that the same may be found at Knaresborough; and therefore while I am showing the productions of one place, those of another will be inferred; and if coincidence continue to help our inferences, it will become so absolute a certainty that no one will be at a loss to know the nature of a spot, even underground, and tell whether it is worth the expense of further examination for treasures out of sight.

The present specimen is an example of a sort of small nests of crystals of Sulphate of Strontian, spotting the rock in a remarkable manner, and also a red variety of Cœlestine, comparative, however, of the cœlestial regions when beginning or ending the day delightful! These nests or druses, as some may call them, were found in excavating the canal, and are occasionally very fine, with somewhat larger crystals in them. The present are chiefly as represented in the *lower geometrical outline.*

Just as I was executing these, my good friend W. Danby, esq. sent me a specimen from near Knaresborough with elongated crystals, much resembling the Nutfield Sulphate of Barytes, but of a pale blue colour and smaller. I add a figure of the form with the nucleus.

Specimens of nearly white Sulphate of Strontian are found at Barry Island, South Wales, that have tables like the lower figure. My specimen was given me by Mr. Herbert of Bristol. It will be seen how the faces differ from the columnar to the tablet or table form by a slight attention to the outlines.

Feb 1 1812 publish'd by Jas Sowerby London.

TAB. CCCCXLV.

SILEX dissiliens.

Laumonite.

Class 2. Earths. *Ord.* 1. Homogeneous.
Gen. 4. Silex. *Spec.* 16. Laumonite.

SYN. Zeolithe efflorescente? *Haüy Traité,* 4. 410.
Laumonite. *Haüy Tabl.* 49.
Lomonit. *Werner.*
Laumonite. *Bournon in Trans. of Geo. Soc.* 1. 90.

THIS substance is so well treated of in a memoir of the Count de Bournon's in the Transactions of the Geological Society, vol. 1. p. 77, that I think it sufficient to take most of my description from it, while I do not deprive those that have an opportunity to indulge in reading the excellent original. It appears to have been formerly known as Efflorescent Zeolite, but Werner termed it Lomonit, in honour of M. Gillet de Laumont, to whom we are indebted for the first knowledge of it. The former name was given it in consequence of its disintegrating or falling into powder by exposure to the air.

The Count determines the primitive crystal to be a tetraëdral prism with rhombic bases, the sides meeting at 92° 30′ and 87° 30′: the bases are inclined upon the edges of 92° 30′ so as to form with them angles of 55° and 125°: the height of the prism is to the edge of the terminal faces in the ratio of 8 to 7. It divides in a direction parallel to all its planes, but more easily longitudinally than on its terminal surfaces: the longitudinal division takes place more easily on two of its opposite sides than on the two others. Integrant molecule a slightly rhomboidal tetraëdral prism; it is besides divisible parallel to its axis, and to the greater diagonal of its rhombic terminal planes. Fracture lamellar. Spec. Grav. taken with a piece but slightly changed by exposure, 22,34 *. Hardness, when not changed, sufficient to cut glass with ease. Electricity by friction, none. Reducible to a jelly by the action of acids. Fusible by the blowpipe without addition, with a slight ebullition, affording an opaque white enamel. Mostly disintegrating on exposure to a warm atmosphere, which may be partly prevented by gum or varnish, or by keeping in distilled water. Colourless and transparent when fresh, but in altering, becomes more opaque; shining and pearly on the longitudinal faces of the prism.

Found mixed with a lamellar Carbonate of Lime, which is highly phosphorescent when heated, producing a bright orange light.

Laumonite is almost always in a crystallized state. It was found at Huel goet in Lower Brittany twenty years ago, by M. Gillet de Laumont, but the Count now finds it to occur in other places. He has specimens from the Island of Feroe, also from the Venetian States: some covering Prehnite, dull and pulverulent, from China. It occurs also with Stilbite and Analcime at Port Rush, in the county of Antrim in Ireland; and the friendly Mr. R. Phillips, a few years since, brought fine specimens from Paisley in Renfrewshire; thus it is found to be a British mineral, and these latter specimens are here figured by Mr. P's favour; and I congratulate myself that my friends will be pleased that it is thus added to the British Catalogue, not the first,

* Water being considered as 10,00.

446

Feb 1 1812 Published by Jas Sowerby London and I presume not the last of many which have been, or will be added in the short space of time occupied by the publication of this work. I have figured outlines of the more remarkable groupes of crystals that occur upon the specimen. They are all primitive.

The Count enumerates altogether ten modifications and above thirty varieties.

TAB. CCCCXLVI.

Red Laumonite.

When I figured the red variety of Zeolite or Stilbite, I had these specimens by me (sent by Mr. G. Don, then gardener at the Edinburgh Botanic Garden, found on his journey from Forfar). They seem to belong to the same rock, but their aspect did not allow me to class them as a variety. Since the able discrimination of Laumonite by the Count de Bournon, I am pleased to show this new variety as a British mineral, as a proof that we are continually discovering substances in our own country that seemed to be only foreign productions. The present specimen does not so readily disintegrate as the foregoing, as it is not so completely changed by exposure to the common air. It has, however, the same form of crystal, and agrees with it in other particulars, and is much coloured by the Red Oxide of Iron. The radiating structure is remarkable in these specimens, and gives them the appearance of Stilbite, but they have not so rich a lustre. These specimens have the phosphorescent Carbonate of Lime (see last page) about them which the foreign specimens have, which has also the diagonal fracture.

Pub. as published by Jas. Sowerby London

TAB. CCCCXLVII.

ZINCUM carbonatum.

Carbonate of Zinc.

Class 3. Metals. *Ord.* 1. Direct Combinations.
Gen. 4. Zinc. *Spec.* 1. Carbonate.

This extraordinarily elegant specimen seems to vie with any mineral before found either abroad or at home, and I feel somewhat pleased in considering it as fairly the pride of my country:—the most precious jewel is enhanced in value by partial considerations, especially when rare. It is entirely new, and was found this year (1811) in Rutland cave mine near Matlock. It is of a nature pretty readily expressed in figure, and particularly in colour, except the satiny illinition, which is minutely distinct in the fibrous texture, so that it bids fair to be recognizable. These fibres are extremely thin and tender, and appear somewhat flattened and elongated crystals, somewhat analogous to the Red Oxide of Copper in fibrous octaëdrons. The divaricating fasciculi form into hemispheres so delicately tinged with Carbonate of Copper, that they can only be imitated by using a combination of that metal as pointed out by Nature's own example. The small lighter green spots are probably of the same substance as the larger. The other dark green ones are merely Carbonate of Copper, the same as *tab.* 47, which is now outvied, although it was thought superb when first found, as is also the fine specimen (*tab.* 279) in the possession of Mr. Sheffield.

Feb. 1 1815 published by Ja. Sowerby London

TAB. CCCCXLVIII.

ZINCUM oxygenizatum (siliciferum).

Silical Oxide of Zinc.

Class 3. Metals. *Ord.* 1. Direct Combinations.
Gen. 4. Zinc. *Spec.* 1. Oxide. *Sect.* 2. Silical.

Tab. 156 shows the pretty yellow variety of this substance in neat crystals: the present is colourless, and shows some variety in the crystals which are attached to the sides of hollows in massive Fluor. *The front figure* is of a remarkably pretty specimen, having a largish bundle of thickish crystals in the front, and deeper in the hollow, several fine crystals in very thin plates, modified as at *the right hand figure.* The crystals in the bundle are as in *the middle figures.* I add another figure of a specimen found on the same mass of Fluor, with the crystals like *the left hand figure.*

This is part of the same gangue that belonged to the last rarity, and in common with it partakes of the same substances; dispersed through part of it, however, there are many minute cubes of Sulphuret of Lead. The hollows are lined with transparent White Fluor, some of which is delicately coated with Yellow Oxide of Iron, and speckled with decomposing pyrites. Some Carbonate of Lime in modified metastatic crystals also accompany it: they are remarkably fine on the back of the large specimen.

Mr. Smithson has made some observations on this species, as mentioned in our *tab.* 156.

449

1 Apl 1812 published by Jas Sowerby London

TAB. CCCCXLIX.

C A L X sulphata.

Sulphate of Lime.

Class 2. Earths. *Ord.* 1. Homogeneous.
Gen. 3. Lime. *Spec.* 4. Sulphate of Lime.
Sect. 2. Common Sulphate of Lime.
Div. 3. Amorphous.

The *lower figures of Tab.* 236, exhibit the common red and white varieties of Amorphous Gypsum. That part of the present specimen which is of a blue colour has by some been considered as a variety of the Anhydrous Sulphate of Lime; (see Exotic Mineralogy, *tab.* 39,) so ably described by the Count de Bournon in the Transactions of the Geological Society, under the name Bardiglione *. Its softness and the considerable loss in weight which it suffers upon being heated red hot, determine it to belong to the common Sulphate of Lime; or, as the Count de Bournon would express it, the Hydro-sulphate of Lime.

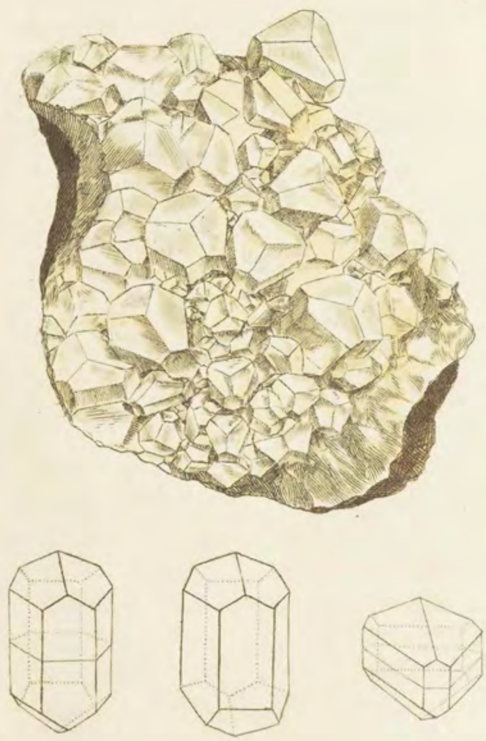
Blue is a colour extremely scarce in Gypsum, and it is tolerably bright in this specimen; it does not appear to have been noticed by any author. The outside of the mass of

* In this paper the Count hints at the probable existence of Bardiglione in the Salt mines of Cheshire. I should be glad to find this suggestion verified.

which the figure represents a part, is very soft and nearly opaque; the inside is harder and more transparent as it approaches the blue, with which it is gradually blended; the blue in the centre being the hardest part. I obtained this specimen at a warehouse in which immense quantities of Gypsum had been collected from Nottinghamshire to be manufactured into manure.

It is sometimes found greenish, &c. as at Bilton, near Knaresborough, by my friend Dr. P. Murray.

450



Apl 1 1812 published by Jas Sowerby London

TAB. CCCCL.

CALX carbonata.
Carbonate of Lime.

Div. 1. Crystallized.

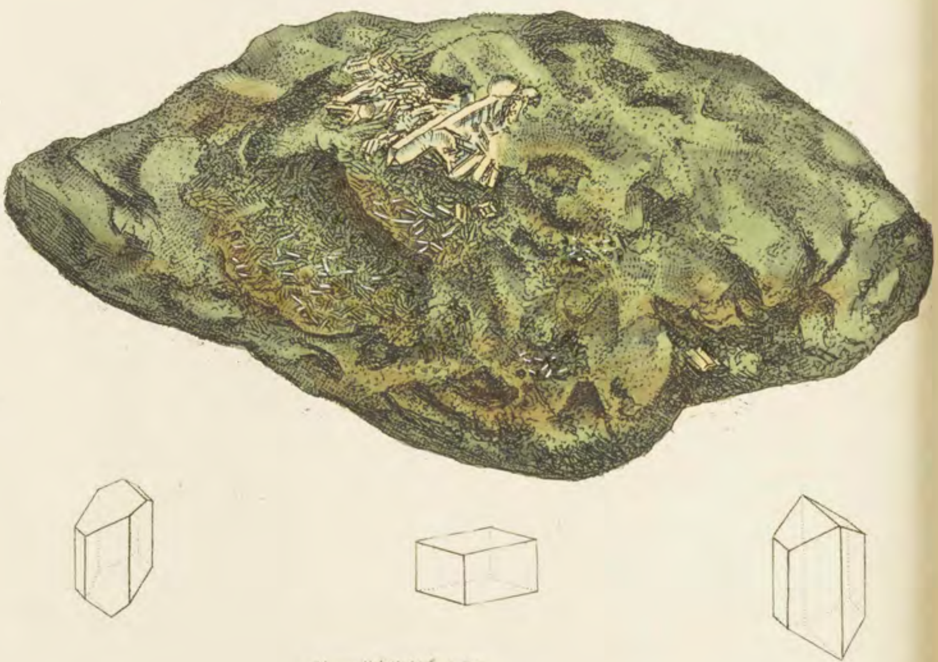
SYN. Chaux carbonatée. *Bournon, Traité,* ii. 12, fig. 37.

MACKLES or Hemitropes are some much rarer than others; that of *tab.* 316 is very rare, my worthy friend the Count de Bournon had not met with that of *tab.* 315, and it may be considered a valuable variety, seeing that he has found 698 other varieties of crystals. The present is also remarkable for being mixed in the group among other forms, which is some variation from the general uniformity of groups of crystals which are commonly of the same variety. The commoner crystals are six-sided prisms terminated by three-sided pyramids, so placed as to render the faces of each other pentangular. See *the right hand figure.* The mackled crystals differ from these in the form of the faces of the prism, which are alternately four- and six-sided. See *the middle figure.* In some the four-sided faces are much enlarged in a lateral direction, and the six-sided ones proportionally diminished, thus rendering the general form of the crystal triangular. See *the left hand figure.* It commonly happens that the small six-sided face is opaque on the surface, and exhibits a slightly laminated structure, as if it had been added after the rest of the crystal was formed.

This mackle is formed by supposing the hexäedral prism with pentangular faces to be divided into two halves by a plane passing horizontally through its middle, and separating each of its sides into two portions, one rectangular, the other pentangular, each half retaining three rectangular and three pentangular faces alternating with each other; then turning one half a sixth part round, the rectangular sides of the different halves are made to meet, producing fresh rectangular or four-sided faces, while the pentangular faces also meeting produce six-sided faces. The plane that divides the two halves is in the same situation with respect to the nucleus, as in the common Mackle of the Metastatic crystal, see *tab*. 33.

As these are not common, nor always easily distinguished, the figure was the more convenient. I was favoured with this specimen by the Rev. Mr. Weston, who had it from Derbyshire.

451



Publish'd ... by Jas. Sowerby London

TAB. CCCCLI.

SILEX epidotus.

Epidote.

Class 2. Earths. *Ord.* 1. Homogeneous.
Gen. 4. Silex. *Spec.* . Epidote.
Div. 1. Crystallized.

Syn. Epidote. *Haüy, Traité,* 3. 102. *Tabl.* 43, 184.
Glasiger Strahlstein. *Emmerl.* 1. 422.
Thallite. *Lameth.* 2. 319.
Glassy Actinolite. *Kirw.* 1. 168.

When I first turned my attention to Mineralogy a few years since, I found a mass of this substance in a pavier's yard in Westminster, who imported stones from Scotland and Guernsey. I expected the stones, being unwrought or bowlders, were from the latter place, and my suspicions were confirmed by my friend Dr. MacCulloch who brought me a specimen from thence. I next received some from the neighbourhood of Keswick, where it occurs in veins in Trap, accompanied by Quartz, Carbonate of Lime, and Compact Feldspar, for the first time proving it to be a British production. The present specimen from the same place, and in the possession of the discerning Mr. Lowry, which has minute and perfect crystals on it, confirms it as such. It is said to have been first observed in Dauphiny, and afterwards in Germany, France, Bavaria, and Norway.

Thus it is rather newly known as British, and I presume will not be found unfrequent. It appears by Mr. Horner's paper in the Transactions of the Geological Society, that it is a constituent part of the rock composing the end hill of the range of Malvern hills, where it is granular, and mixed with grains of Hornblende. The crystals are of a light or dark yellowish green, powder lighter. The primitive, according to Haüy, is an upright prism, whose bases are parallelograms with oblique angles of 104° 37′.

The *figures at the bottom* show the varieties that are to be found on the present specimen. The regular crystals are minute and scattered over the surface of a rugged mass of the same substance, composed of nearly parallel fibres, or acicular crystals grouped side by side; in other places the fibres are larger and penetrate crystals of Quartz. It does not become electric by heat; it melts into a black slag by the help of the blowpipe. Spec. Grav. 3·4529 to 3·46.

	Analysis by Descotils.	By Vauquelin.
Silica	37	37
Alumina	27	21
Lime	14	15
Oxide of Iron	17	24
Oxide of Manganese	1·5	1·5
Loss	3·5	1·5
	100·0	100·0

452

May 1 1802 published by Jas Sowerby London

TAB. CCCCLII.

The Wolfscragg rock near Keswick has veins of Quartz accompanied by what is often called Prase, and which has a remarkably glaucous appearance; it seems to be Quartz intimately mixed and coloured by Chlorite. The Quartz is in some parts crystallized, and some of the spaces between the crystals are filled up with Chlorite; but more of them by Epidote in masses of stellated or fasciculated spiculæ, diverging from the sides of the vein, and of a yellowish green colour. The Quartz is white, and in some parts terminates in small dark ochraceous hollows; the ends of the crystals being stained with the ochre, as also happens with some of the ends of the Epidote crystals which now and then terminate in them, as in *tab.* 451. We have thus both the ingredients necessary for the formation of Prase, but without their being intimately mixed, while some of the Quartz has mixed with the Chlorite, and formed a substance nearly resembling Prase, but readily distinguishable by means of a glass or by the colour.

Apl 1 1812 published by Jas Sowerby London

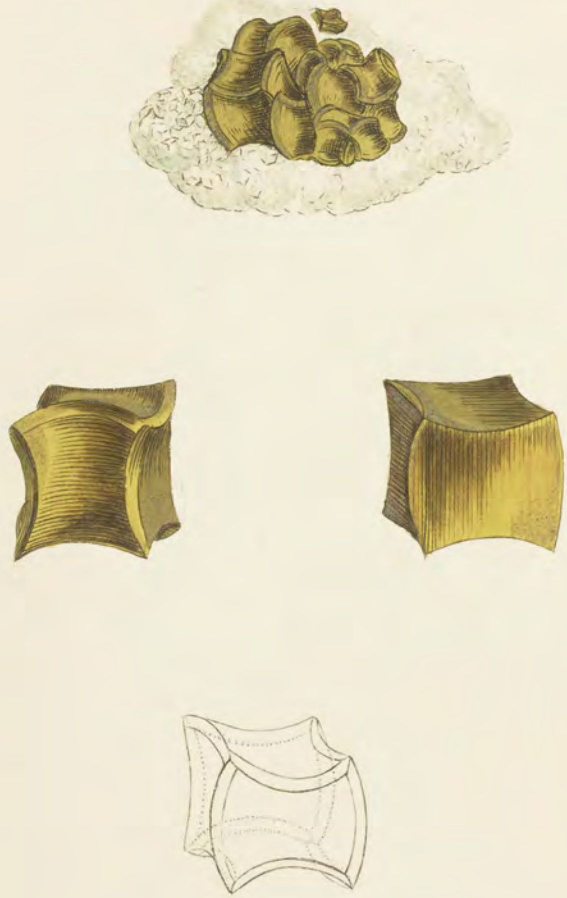
TAB. CCCCLIII.

BARYTES carbonata.

Carbonate of Barytes.

TAB. 127 shows the acute dodecaëdron of the Carbonate of Barytes; *tab.* 109, the elongated hexaëdral spiculæ; and the six-sided column is shown in *tab.* 239: it remains that the present rare and unexpected variety should be shown, being the usual acute dodecaëdron, having its apices replaced by very obtuse six-sided pyramids of such extent as nearly to destroy its faces. The specimens are from Alstone moor, and are in groups more or less confused, and in great variety of directions; they are commonly covered with very small rounded prisms of Sulphate of Barytes, apparently produced by their partial decomposition.

454



Aug 1 1816 published by Ja.s Sowerby London

TAB. CCCCLIV.

FERRUM sulphureum.

Iron Pyrites.

THESE constructions in crystallography have hardly been enough noticed: indeed the laws of aggregation leave much room for endless variety, which perhaps militates more than any thing else against the identifying substances by their crystals, especially, as in the present instance, when the substance does not admit of the primitive fracture being observed, which is so easily understood and demonstrated in the rare Galæna, *tab.* 131. The alternating curves have a certain novelty, and I think a peculiar elegance in this specimen, and when we see several crystals huddled together confusedly and all resembling each other, it is really enough to excite the admiration of every enquirer, while it must certainly very much attract the attention of the geometrician.

The Pearlspar in general is curiously curved, and *tab.* 443 represents one of its extremes, showing the six lateral solid angles of the rhomb, alternating in their curvature *; and this is an example of the eight angles of a cube. *The middle right hand figure*, which is taken from another specimen, shows the more simple commencement of the curvature. Some crystals are a little more curved than others;

* Many of these varieties, which were formerly considered as Carbonates of Lime, are by the penetration of some of our ingenious friends, discovered to be Carbonates of Iron, of which more will be said hereafter.

but all have the bevelling at the opposite and alternating edges; *see the left hand figures.* This specimen came from the neighbourhood of Tavistock, and was presented to me by Miss Elizabeth Pocock, whose attention to the conchology of Britain is well known. It is yellower than *tab.* 29, but probably differs very little as to its contents. It rests upon small equiaxed crystals of Carbonate of Lime.

Apl. 1 1812 published by Jas. Sowerby London.

TAB. CCCCLV.

FERRUM sulphureum.

Iron Pyrites.

Div. 2. Imitative.

My friend Mr. Jonathan Salt first sent me Pyrites in this form ten or twelve years ago, and in a short time it decomposed and fell to pieces. I have since preserved several specimens in water. Mr. Farey observes to me that he has seen casts similar to these found in Whitley wood mine, near Sheffield, which mine is situated in the third coal strata. (See Farey's Derbyshire, p. 214.) He has also presented me with specimens in lumps of Pyrites, called Brasses by the miners, found in a layer immediately above the lowest seam of Coal in his third Coal shale, having a variety of Sandstone called Crowstone, for its floor, in a mine South of Alton in Ashover. It is somewhat remarkable that these Pyrites should generally have lost the shell which has left so curious a cast, nearly like that of an hour-glass, being two cones, point against point, showing that the shell was perforated, or nearly so, at the first volution. It is not less remarkable, that it is the opinion of many that the shell itself is never to be found; and Mr. Martin does not seem to have known it, although he has figured it in Limestone, in his Petrificata Derbiensia, plate 35, fig. 3., under the name Ammonites Listeri. The fragments brought me by Mr. Farey have a coaly outside, and also contain parts of Ammonites resupinatus of Martin, *tab.* 49. This Pyrites being very likely by exposure, to pass into Sulphate of Iron, or Green Vitriol, has given it value and great quantities are sold for making vitriol.

Since writing the above, I have been favoured by the Rev. H. Steinhauer, with some dark gray Limestone, in which shells of the same species are extremely abundant; some with a pyritaceous coating, and from an inch or more in diameter, down to the smallest speck, as if they had been a viviparous animal; the divisions I could not see, perhaps they were eradicated in the great catastrophe. I have, however, one bit that shows the undulations of one division, partly as seen in *the lower figure*. Mr. Steinhauer also favoured me with the following account.

"These fossils are found together with the Anomia Pecten, Gmel. 3342, in balls or nuclei of Limestone, which occur in a stratum of Coal schistus or shale, immediately above the coal. This stratum I have observed at a place about two or two miles and a half north of Halifax, on the road to Bradford, where the Limestone balls are sufficiently abundant to repay the trouble of erecting a kiln to burn them *. It extends northwards beyond Bradford to Idle, in the neighbourhood of Calverly and Farsley near Horseforth; but the Limestone seems less plentiful there; and is only used to mend the roads. The shale, however, is still full of impressions of these shells, and frequently contains crystals of Selenite, particularly at Idle. The Limestone nodules are often much mixed with Pyrites, which sometimes seems to indicate petrified wood, but none of the usual fossils of the neighbourhood, such as Phytolithus verrucosus, sulciculmis, &c.

* They were known already to Richardson, as appears from one of his letters preserved by Llhwyd.

Ap.l 1 1812 published by Jas Sowerby London

TAB. CCCCLVI.

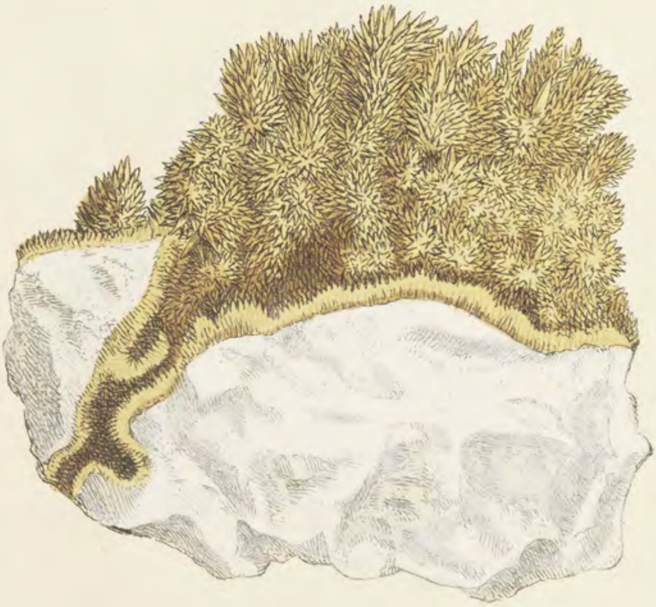
FERRUM Scheelatum

Scheelate, or *Tungstate of Iron.*

Class 3. Metals. *Ord.* 2. Combinations of Oxides.
Gen. 8. Iron. *Spec.* 5. Scheelate.
Div. 1. Crystallized. Crystal primitive.

HAVING figured this substance in *tab.* 165 and 166, with some variety of crystals, we are glad to have the opportunity of giving an additional perfection to the work by means of the present figure, being favoured by the long experienced and indefatigable collector the Count de Bournon, with the use of this unique Cornish specimen, containing nearly primitive crystals, which are rhomboidal prisms of about 115°, and elongated in the direction of one of their lateral rectangular planes, and some placed in pairs, as it were mackled. Being black, they are prettily relieved by the purplish cubic Fluor with narrow bevilled edges. *The right hand figure* shows the prism magnified; and *the two left hand figures* show them in pairs.

457.



June 1. 1812 published by Jas. Sowerby London

TAB. CCCCLVII.

CALX carbonata.

Spicular Calcareous Spar in Chalk.

Div. 2. Imitative. *Var.* spicular.

Crystallized Carbonate of Lime is very common, but I do not know that it has been mentioned in any work as occurring in Chalk. I therefore, while it elucidates this sort of spiculæ, figure it as of rare occurrence. It is from the Sussex lower or Hard Chalk, as it is often called. The spiculæ are in general pretty uniform and very sharp, being very much elongated rhombs. I saw some approach to this in what was called the Hard Chalk about a mile S. E. of Newport * in the Isle of Wight in something like stalactitic exudations, if I may so call them. This stratum seems to join itself to the Limestones of the later formation, but not so gradually as the mixing of Limestone in veins through some of the Chalk at Godstone. *See tab.* 7. Distinct Limestone at most quarries produces stalactites by means of the water running through it, such as Portland, Bath, Oxfordshire, &c. *See tab.* 6. and the Lime in the mortar of cellars or under some arches, as at Somerset House; yet it seldom approaches to crystallization, and Chalk appears less able to support crystallization.

This specimen was presented to me by Lady Wilson.

* A specimen of this, which I brought from the place myself, contained a perfectly round ball of Flint.

TAB. CCCCLVIII.

C A L X carbonata.

Carbonate of Lime.

Div. 1. Crystallized.

A CRYSTAL is denominated compound, when several of one form combine to make one of another. This happens rather rarely in most substances, but is frequent in Carbonate of Lime, the lenticular or equiaxed variety more particularly is grouped so as to form other crystals. The upper figure in this plate is, however, a more distinct example than usual, yet is easily comprehended. In it many equiaxed rhombs are piled together, so as to form a crystal resembling the metastatic variety. In the other figure the pyramids formed of similar rhombs are so acute as almost to produce columnar crystals. Specimens similar to the upper one are found in the county of Durham, North Wales, &c., accompanied by lenticular crystals of brown Iron Spar. The lower specimen represents part of a specimen, the matrix of which is Fluor; it is from Westmoreland. Modifications of different substances may be understood from these examples, although compounded of others very different.

Sulphate of Barytes, *tab.* 380, is compounded of nearly primitive crystals, which is usually the case with this substance, though very rarely with Carbonate of Lime.

[illegible] published by Jas. Sowerby London.

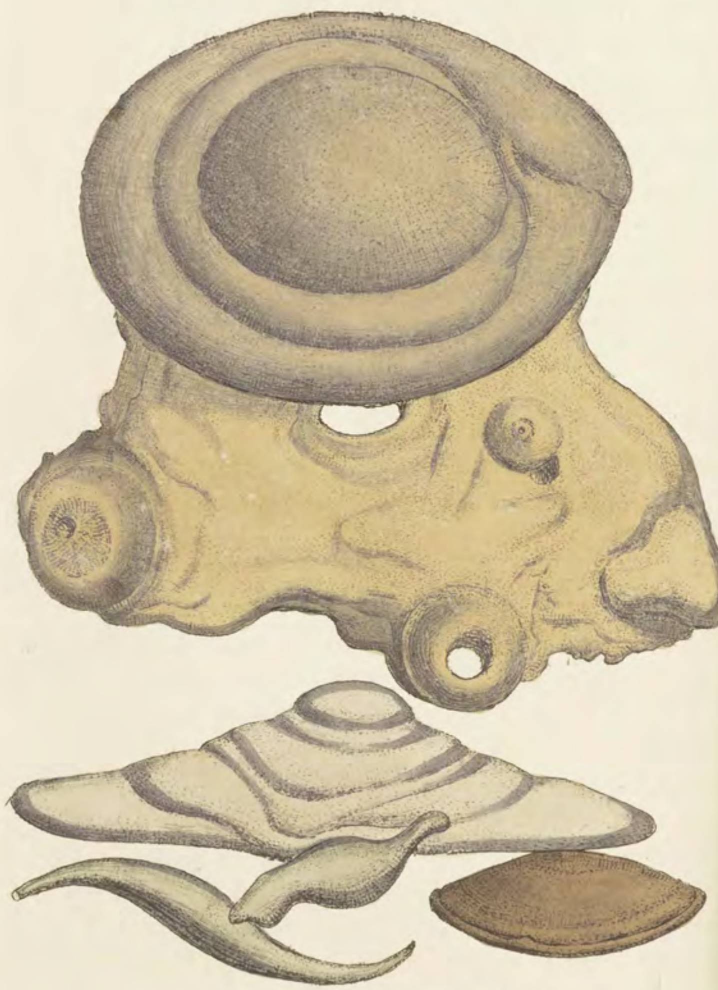
TAB. CCCCLIX.

SILEX quartzum.

Quartzose Encrini, or Encrini in Chert.

Div. 2. Imitative.

Hornstone or Chert is found in many parts of Great Britain; it occurs in several of the Limestone strata, when it often surrounds and penetrates the fossils contained in them. The Encrini (formerly called Entrochi) which characterize the first Floetz or Transition Limestone of Werner, (but which according to Mr. Farey occur also in the Third Limestone of Derbyshire,) are very frequently imbedded or filled with Chert or Quartz, which is rendered very distinct, when by subterraneous decompositions or exposure to the atmosphere the Carbonate of Lime has been carried away. Specimens in this state have been long collected and vulgarly called Screwstones, although their grooves are not spiral. Mr. Farey brought me some specimens he found in walls near Ashover in Derbyshire, where vast quantities are picked out of the decayed Limestone by the farmers. Some of these specimens differ in some parts but little from Flint, while others have the peculiar characteristic opacity of Chert. I have figured at the bottom of the plate two or three Encrini in Limestone, to show the external form, as the siliceous casts show the internal; *the right hand* specimen is a rare variety with a four-lobed aperture through each joint; *the middle figure* is of a branched specimen from Northumberland with which I was favoured by the late Lord Ansley. Near this is figured what appears to be the termination of a branch; it was brought me from Walsingham in Durham. I do not know that a termination has been noticed by any other author. The branched specimen shows the lobes in the perforation to be fewer in the branches than in the main stem. For a further account of the numerous species of these curious fossils, I must beg to refer to Mr. Parkinson's Organic Remains, vol. ii.



June 1. 1812 published by Jas. Sowerby Lond.

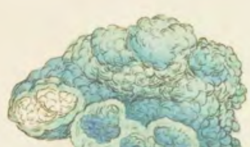
TAB. CCCCLX.

ARGILLA marga.

Indurated Marle or Marlite.

The regular shapes of these stones have occasionally made them an object of inquiry. Many years since some were sent me from Fifeshire under the name of Scotch Coits, and from North Wales under the name of Culm Stones. The figure at the back with holes and a sort of mammillæ was sent me from Newcastle, and was said to be placed edgewise in the soil. Such are found in the bed of a river in Lanerkshire, and are also said to be found in the vicinity of Lough Neagh in Ireland. Rings and fanciful figures something similar are found at Hopedale, Labrador; *the two lower figures*, one resembling a bird, and another curved acuminated one, are from thence, and were presented to me by the Rev. Mr. Latrobe: I add them here to show different varieties, which indeed are endless. They appear to be a deposit of Marle as from some mixed Clay and Lime rocks washed with water, sometimes taking one figure, sometimes another, according to circumstances, which, however, would puzzle the best geologist to discover, like many other of the most simple works of nature. My friend Mr. Oldham has observed some very analogous things, forming at the Dalston clay pits near Hackney. The substance is much the same, but the specimens are more rugged in general. They seem to harden in a different manner from Clay alone, as well as from common Marle, nor will they easily mix with clay for bricks or tiles, nor do they fall to pieces like the marly septaria.

These are not in my knowledge mentioned in any former work.



TAB. CCCCLXI.

ZINCUM oxygenizatum, *var.* siliciferum.
Silical Oxide of Zinc.

Class 3. Metals.	*Ord.* 1. Direct Combinations.
Gen. 4. Zinc.	*Spec.* 1. Oxide.
Section 2. Silical.	*Div.* 1. Crystallized.

These Oxides are so much like some of the Carbonates of Zinc, that upon a superficial examination we should scarcely be able to distinguish them; and perhaps it requires some nice attention to discriminate them even internally, or by the lateral fracture: yet the longitudinally flattish shining fibres are often sufficiently characteristic, and will give a positive distinction, as the Carbonate breaks with rather a scaly fracture. Of the specimens figured in this plate, the white one with long partly diverging transparent spiculæ, covered by an accumulation of bubble-formed almost compact Calamine, is necessary to be known, as it is not a very usual form. The spiculæ in this specimen are not perfect enough to determine their form, but are large enough to become electric by heat, like the more perfectly crystallized specimens. This specimen is from North Wales; and the small bright verditer green one, probably coloured by Copper, is from Wanlockhead. I was favoured with it by Gilbert Laing Meason, Esq. It is a pretty specimen possessing the usual fibrous structure.

These Oxides may be partly discovered by acids, dissolving without effervescence, and the Silex of course remains.

TAB. CCCCLXII.

THIS fine specimen of Oxide of Zinc is from Wanlockhead mine, by the same favour as the last; and having so unusual an appearance, I thought proper to show it as a rare example. It is in some parts very compact and white; in others, shining and waxy, while the fine warm brown tints enliven it, being mostly on the larger apparently accumulated drops of fanciful shapes. The concentrating laminæ and the radiated fibrous striæ help externally to prove it to be an Oxide of Zinc. The small plated piece is remarkably amorphous; it was sent me from Allen's head mine in the county of Northumberland, by my friend Mr. Crawshay.

402

TAB. CCCCLXIII.

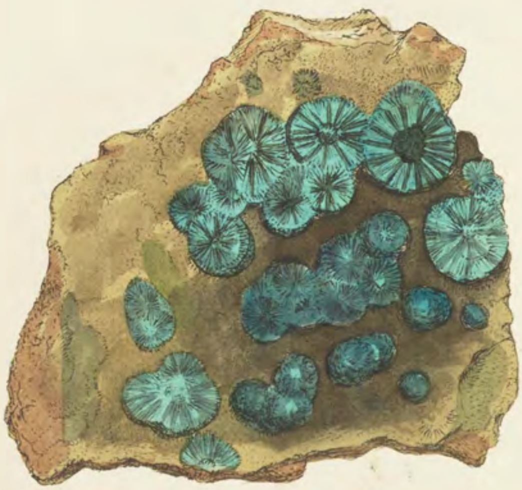
ARGILLA Topazius.

Topaz.

Div. 1. Crystallized.

The newest subject often attracts to itself the greatest consequence: thus the Scotch Topazes were even figured first in this work, although last discovered. It was, however, their magnitude that gave them that honour. The Cornish Topaz has been known to many for some years, but the crystals are not so readily distinguished, being small and often intermixed with quartz; they are always found on the gangue, which does not happen with the Scotch ones. This is an advantage, and points out the geological situation most perfectly. The crystals of Topaz may be distinguished from those of Quartz by their form, their fracture, and partly by their colour. The crystals are four- or eight-sided prisms, striated on their faces, and terminated by six unequal-sided pyramids; the fracture is perpendicular to their sides and very flat, while that of the Quartz is conchoidal and irregular. The Topaz commonly accompanies crystals of Oxide of Tin; but the present specimen, which has no tin about it, is blackened by the dark-coloured edges of laminæ of Mica. It appears to be part of a vein of secondary Granite, composed of largish grains of Quartz, fine granular Feldspar, small plates of Mica, and minute crystals of Tourmaline. I was favoured with the loan of this specimen by my good friend G. B. Greenough, Esq. M. P. It comes from St. Michael's mount.

404



Jan 1 1812 published by Jas. Sowerby London.

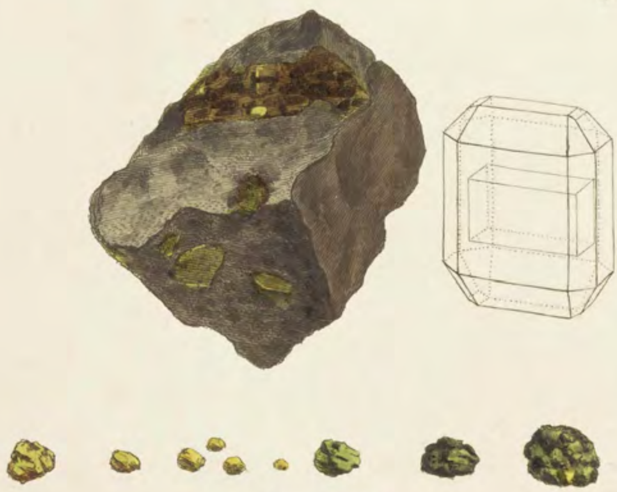
TAB. CCCCLXIV.

CUPRUM arseniatum.

Arseniate of Copper.

THIS is a new variety from Cornwall, and has such an attracting effect that it naturally excites inquiry, although nearly related to some of my former figures. The base of the crowded hemispherical bundle being left in flat star-form radii, compared to the most unusual appearance of Zeolite, it has thus by some got the appellation of Zeolite Copper, which rather tends to mislead; it perhaps has a better title to the name Hydrargillite Copper, from the nature of these radii, and also for the first appearance of the termination of the crystals, which, however, differ somewhat, being nearly related to *tab.* 303, being a modification of that appearance, but too indistinct to be made out. Some of the radii proceed immediately from a centre, while others are, as it were, formed on the outside of smaller hemispheres. *See the right hand side of the upper figure.* These specimens exhibit a remarkable variety of colour from the dark green aspect of the crowded shining radii, and the lighter more separated and somewhat opaque vivid blue green radii mingled among them. The ground between is covered with a nearly powdery vivid green Carbonate of Copper, besides a byssus-like brownish Arseniate of Copper, but not very conspicuous; it is upon Quartz with Mica, &c. *The upper specimen* is in possession of Lady Aylesford. *The lower one* is on a fragment of nearly pure Quartz, in some parts a little ochry.

465



Aug. 1. 1812 published by Ja.s Sowerby London.

TAB. CCCCLXV.

SILEX olivaceus.

Olivin, or Chrysolite.

Class 2. Earths. *Ord.* 1. Homogeneous.
Gen. 4. Silex. *Spec.* 32. Olivine.
Div. 2. Amorphous.

SYN. Peridot. *Haüy, Tabl.* 52. *Traité,* 3. 198.
Chrysolith. *Emmerl.* 1. 27.
Olivin. *Ibid.* 1. 35.
Chrysolite. *Kirw.* 1. 262.
Olivin. *Ibid.* 1. 263.
La Chrysolite et L'Olivine. *Brochant.* 1. 170 & 175.

THE specimen from which the upper figure in the gangue is taken, was lent me by G. B. Greenough, Esq. It is brought from Inimore in the Isle of Mull. It contains one large well characterized mass, showing the direction of the planes of the nucleus at right angles; the cross fracture conchoidal; its usual greenish yellow colour, and some ochraceous stains, produced by partial decomposition. The gangue is as usual, Basalt. The little nodules below comprehend most of the varieties in colour from the yellowish to the olive green, whence its name. I was favoured with these from Scotland by Professor Jameson; the rock in which they were found has decomposed; it was probably of the same nature as that of *the upper figure.* Some of hese are more or less mixed with the blackish green nearly opaque grains of the same substance. The outline shows the form in which it sometimes crystallizes, (the variety named *subdistique* by Haüy,) including the nucleus, which appears to be a rectangular prism.

The lighter and yellower green varieties are generally most splendent, and those of a darker tint less so. Olivin sometimes decomposes in the hollows of Basalt, when its surfaces become more or less iridescent, and are coated by a yellowish or reddish Oxide of Iron. It is brittle, and cannot be scratched with a knife, in the unchanged state. It is nearly infusible without a little borax, with which it melts into a dark green globule. Nitrous acid dissolves the Iron which colours it. Spec. Grav 3·225 to 3·265.

By analysis it is found to contain

Silica	48 . .	52
Magnesia . .	37 . .	38·50
Lime	0·12. .	0·25
Oxide of Iron	10·75 .	12·50

466.

Aug. 1.1810 published by Jas. Sowerby London.

TAB. CCCCLXVI.

SILEX fragilis.

Hornblende.

Class 2. Earths. *Ord.* 1. Homogeneous.
Gen. 4. Silex. *Spec.* 29. Hornblende.
Div. 1. Crystallized.

SYN. Amphibole. *Haüy, Tabl.* 39. *Traité,* 3. 58.
Hornblende. *Emmerl.* 1. 323.

IN *tab.* 79 of this work I have shown the Tirie Marble. I have since obtained better specimens of the substances contained in it. I therefore take it up again, to show what has been discovered relating to the green crystals in particular. By using smaller crystals than had before been tried, we found them to be fusible by the blowpipe. I should therefore consider them as decidedly Hornblende, did not there remain some doubts arising from other characters. Among the specimens I have obtained since my former figure are some crystals, the prismatic faces of which are tolerably well defined, and are eight in number; but their terminations are in general so much rounded and distorted that they cannot be reduced to any regular form. Of the faces of the prism, four are much larger than the others. I obtained for the angle of the incidence of two of these faces which were tolerably flat, 88°; the incidence of one of the narrow faces upon one of these was about 135°: these angles agree very nearly with those of Haüy's variety of Pyroxène, the *peri-*

octaëdre. The general appearance of these crystals is much like that of Sahlite, a mineral considered by Haüy as only a variety of Pyroxène: they have therefore often been called Sahlite by skilful Mineralogists, and the measures I have just given seem to confirm the opinion; but the internal structure, which is more to be depended upon, agrees better with that of Hornblende. The nucleus of Hornblende, according to Haüy, is an oblique rhomboidal prism, the sides of which measure 124° 34′ and 55° 26′ upon each other, with the terminal face inclined towards the obtuse edge, making with it an angle of 104° 57′.

The *upper figure* shows a massive specimen, analogous to the crystals whose faces are the result of breaking; the larger ones of these measure upon each other about 124° $\frac{1}{2}$, and the smaller ones, which are also indicated by striæ upon the larger, are found to be inclined upon the obtuse edge at an angle of apparently about 105°: but this angle is difficult to obtain correctly on account of the irregularity of the edges of the fragments. I have broken several prismatic crystals, and found them to agree precisely in their interior with this massive specimen. The lateral planes of the fragments obtained, gave within a few minutes of 124° $\frac{1}{2}$ for the obtuse angle of their incidence. From the evidence of these measures I conclude this substance to be a variety of Hornblende, and not Sahlite or a variety of Augite. There is, however, one circumstance worthy of notice; it is the extreme facility with which the terminal face of the prism is obtained by fracture in these crystals, whereas in common Hornblende it can scarcely ever be detected, nor is it indicated even by striæ. These crystals on the contrary are often almost foliated in the direction of it, and their surfaces marked by white lines, the edges of the plates in a decomposing state, which traverse them in that direction, as seen in *tab.* 79.

There are, besides the dark green I have just described many dull rounded grains of a much paler colour; but I presume that these differ only in colour, in which they both vary: it often happens that the light and dark grains are irregularly mixed among one another, but still remaining perfectly distinct: this would intimate a greater difference than colour between them, did we not meet with parallel instances in other substances, as the grey and red Feldspar mixed in the Sienite of Egypt. I regret that I have not been able to obtain fragments sufficiently perfect to determine this point. The lowest *left hand figure* shows an extraordinary large and pale coloured piece, but it is too compact and irregular to obtain a measure from. The *right hand figure* exhibits a specimen brought as Zoizite from Glen-elg in Inverness-shire, from which, however, it seems to be perfectly distinct: in form and fracture it does not differ from the *upper specimen*; in colour and lustre it agrees with the substance formerly mentioned as Corundum from Tirie, and serves to prove the identity of the light and dark green grains just mentioned. It is a variety of Actinolite distinguished by most authors as Tremolite, which Haüy from recent measurements has been induced to class as a variety of Amphibole or Hornblende. See Haüy's Tableau, p. 173.

The little red stones mentioned under *tab.* 79 are now found to be Siliceo-calcareous Titanium or Sphéne, of a brownish red colour, by the penetrating Dr. Wollaston, who nevertheless finds the marble to be coloured by Iron alone. Besides these, there are many grains of white Quartz, reddish Feldspar, laminated white Carbonate of Lime, and in some parts small plates of brown Mica.

The Hornblende grains sometimes occur, collected in great numbers together, of both colours, the interstices between them filled with white laminated Carbonate of Lime, forming balls from one to twelve inches in diameter; these balls often contain Mica, and it is in their neighbourhood that the detached plates of Mica are found. The Quartz is also sometimes in large masses more or less penetrated by reddish Feldspar and a little Mica, forming balls of Granite of various sizes, among which the Hornblende is abundant.

467.

Aug 1 1812 published by Jas Sowerby London.

TAB. CCCCLXVII.

SILEX fragilis.

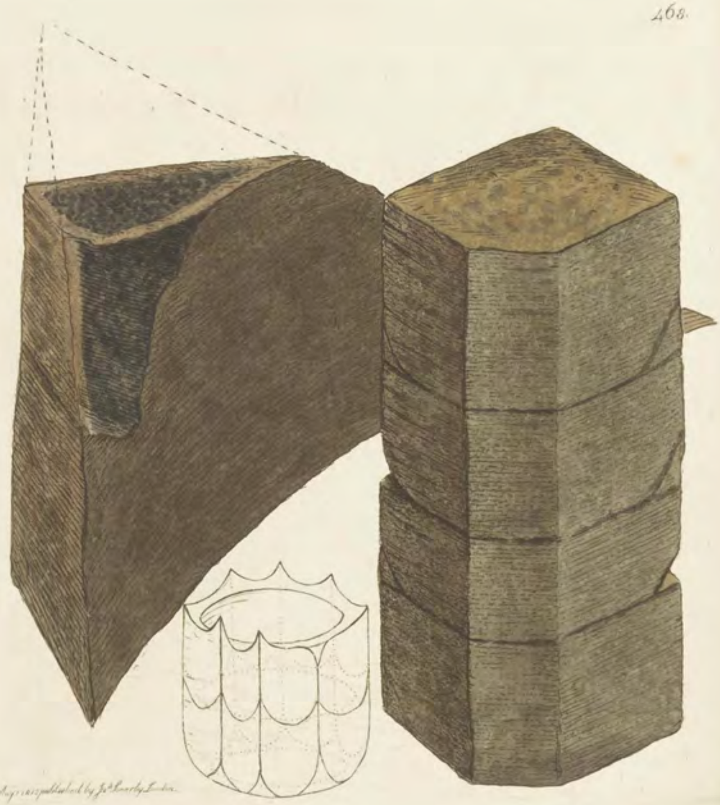
Acicular Hornblende, or Actinolite Schist.

Div. 2. Imitative.

I HAVE called this a Schist or Slate, from the tendency it has to divide into laminæ, although it consists almost wholly of acicular Hornblende or Actinolite, with but a small portion of Feldspar. The whole stone from which this specimen is taken, is a large boulder of several hundred weight, found on Caslaw, one of the Grampian Hills. It attracted the attention of my very kind friend Charles Lyell, Esq. by its particular undulating structure, producing appearances on its surface, which, as he observes, resemble the angles of fortifications in the way Agates often do. But what is remarkable in this specimen, is, that the particular laminæ forming these lines are defined in the neatest manner possible, and are composed of reddish Feldspar, Quartz, and Mica (Granite), looking as if painted reddish for distinction. Again, there are laminæ of light coloured Quartz, with but little mixture, and also veins of pale green Epidote. The Actinolite which composes the principal part of the mass is in waved spiculæ running in various positions, but whose laminated structure coincides with the fissures in the Slate. Some parts of the mass are replete with dodecaëdral Garnets, so minute as not to be discerned without a lens.

The most durable Slate of Penzance in Cornwall, which, although very thin and light, has lasted more than a century in use where it is greatly exposed, has much of this Actinolite in its composition.

Had the Actinolite in this stone been in larger and broad crystals, (Hornblende,) and the Feldspar more abundant, it might have been called Green-stone. In its present form it differs, however, from any rock I have found described. It is to be regretted that, from its being a boulder, we are unable to ascertain its Geological relations.



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TAB. CCCCLXVIII.

Basalt.

Class 2. Earths. *Ord.* 2. Aggregate.

Syn. Laves lithoïdes basaltiques prismatiques. *Haüy, Traité*, 4. 474.
Basalt. *Emmerl.* 1. 339.
Basalt. *Jameson*, 1. 369.
Figurate Trap, Basalt. *Kirw.* 1. 231.

This substance is remarkable for a formation so peculiar, that, when seen in its most regular appearance, it must leave a lasting impression on every beholder. It is conspicuous in Fingal's Cave in the Island of Staffa, Scotland, the Giant's Causeway in the North of Ireland, and in many curious places abroad. There are two excellent prints of the Giant's Causeway engraved by Vivares, from drawings by Mrs. Drury, to the credit of our own country, which are equal if not superior to any thing of the kind yet executed.

It belongs to the Flœtz-trap formation, according to Geologists, and forms a grand example of distinct concretions in the large way, consisting of columns of from three to nine unequal sides, and often forty feet or more long, placed side by side, either perpendicularly, horizontally, or inclined, sometimes curving, but generally straight; they vary much in size, some being very short and only a few inches in diameter, others approaching two feet. In most of these columns curious transverse divisions are no less conspicuous, forming joints which vary in many ways, apparently depending upon a suite of circumstances difficult to demonstrate, although to be conceived by a mind intelligent, unprejudiced, and attentive to natural phænomena. Although much has been said, I will venture a word or two regarding other stones, that may lead to an easier way of comprehending these in question; and as it seems an approach to crystallization to some, we will endeavour to show its relationship in this particular, because regularity is often the next step to crystallization. Thus Stalactites, *tab.* 6, are of particular shapes independent of crystallization, and often finally subside, as it were, with crystallized terminations, &c. But the more earthy ones, such as those from Sunderland, form without crystals, and undulate into funnel forms, see *tab.* 148; and I have some partly globular, and pressing each other's sides, making them angular. Thus a combination of a sort of stalactitical globular drops, when compressed, become imitative of the Basalt; and some have conceived a theory of the Basalt forming from globular depositions into beds or strata, while in different states of moisture, which pressing each other and coalescing partially, when dry may govern their separation. I have here figured part of a column of five unequal sides with three transverse divisions, the uppermost of which is 9½ inches, the middle one 7½ inches, and the lowest 6 inches in length, and all 9½ inches wide, showing that they are not regular in length, and the columnar sides are 10½, 10½, 12, 8½, and 6 inches wide, respectively, or thereabouts. The upper one is flattish at the ends, and has several holes and some cracks visible on the surface in consequence of its being a little decomposed and soft, of a ferruginous brown colour: the base of this joint is a shallow concave segment of a sphere, with a curved truncature on the three corners belonging to the broader sides; the top of the next joint fits the concave of the first by an equal convexity; and the three

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corners answering to the curved truncature, project where not broken off; and so of the other joint, which also shows in the oblique fracture the fresh appearance and the more ferruginous coat, properly described by Kirwan as a natural change in Basalt on exposure. The projecting corners are at every angle on one end of some joints, either at the top or bottom; and sometimes two joints with projecting corners enclose one without any, which may be convex on both ends. The joints are often very flat. I have two that fit each other, and measure only about three inches each long, and eighteen inches wide, and have nearly even corners. The curved pillars are said to have longer joints and coalesce more closely, so that Sir Joseph Banks and others could not obtain specimens.

Basalt is found in some places in balls, and decomposing with ferruginous crusts like the coating of an onion, showing as I think a probability of the abovementioned theory. It seems to be the latter deposit of decomposed materials from an immense overflow of water. The next plate,

TAB. CCCCLXIX.

shows the probability of this more distinctly, as the substance is found to contain shells such as are allowed to have been inhabitants of a former ocean, and very like the most common Bath Ammonites.

The large specimen with a cast of the Ammonite is by favour of the Rev. Mr. Latrobe, and was accompanied by a very pretty specimen with Pyrites for my own collection. I was favoured with the lower one by Sir Humphrey Davy, who first showed me authentic specimens a few years since. It is the finest grained Basalt I have seen, and is remarkably neat on two sides, as if it had been part of a column, and breaks partly into laminæ perpendicular to the sides. The shelly impression is probably the same as the other, only smaller. The Iron, where the shell has left the impression, seems re-oxidized by exposure, if I may use the expression. I do not at present know of any other shells in Basalt, and these only impressed.

Some Basalt is attractible to the Magnet; but this character varies from the quantity and state of the Iron, as neither of these specimens are.

It is coarse or fine grained, with minute or conspicuous illinitions; compact or porous, or holding different substances in vesicles analogous to Toadstone. The fracture of the large-grained is conchoidal; of the fine-grained it is splintery. It is very hard and toughish within, but externally it may be scratched with a knife, so that people mark their names on the pillars at Antrim. Colour black or dark grey changing to ferruginous by exposure, apparently slowly. It melts easily, forming a black semitransparent glass if quickly cooled; but if slowly cooled it assumes nearly its former appearance, in the same manner as bottle glass does that of calcined flint from which it was made.

Spec Grav. from 2·864 to 3·000 according to different authors.

	Analysis of the Basalt from Hassenburg by Klaproth.	From Staffa by Kennedy.	By Bergman.
Silica	44·50	48	50
Alumina	16·75	16	15
Oxide of Iron	20·00	16	25
Lime	9·50	9	8
Oxide of Manganese	·12		Magnesia 2
Soda	2·60	4	
Water	2·00	1	100
Moisture and volatile matter		5	
	95·47	99	

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TAB. CCCCLXX.

ZINCUM carbonatum.

Crystallized Carbonate of Zinc.

Class 3. Metals. *Ord.* 2. Combinations of Oxides.
Gen. 4. Oxide of Zinc. *Spec.* 3. Carbonate.
Div. 1. Crystallized.

SYN. Zinc carbonatée. *Haüy, Tabl.* 103.
Smithson, Phil. Trans. 1803.

THERE has hitherto been some difficulty in distinguishing the two kinds of Calamine, since they both are found sometimes in an earthy and compact form, which in many instances is apt to confound, especially at first sight. The present substance has rather a yellowish, horny, or waxy appearance, but scrapes earthy. It is easily determined when crystallized by its small blunted rhombs, if I may so call them, *see the lower outline*; or if the crystals be not sufficiently distinct, it may be determined by its fracture, which exposes numerous curved surfaces of small rhombs, having a slight waxy lustre, and not laminated shining spiculæ, as is the case with the Silical Oxide. The Carbonate also effervesces in dilute sulphuric acid. The crystals in this specimen are uncommonly distant; but many of them are so round as to have the appearance of irregular grains rather than crystals, while others are pretty well defined. The gangue is a curious tabular arrangement of crystallized Quartz, the masses of which are cemented together by the Carbonate of Zinc. This specimen is from Flintshire. I was favoured with it by T. Pennant, Esq. The Count de Bournon favoured me with the specimen from which the *lower figure* was taken.

TAB. CCCCLXXI.

Div. 2. Imitative. *Var.* Mammillated.

Compact or nearly Amorphous Carbonate of Zinc, like other amorphous subjects, is most difficult to be known by external appearance; the somewhat waxy aspect and bluntish rhomb-like fracture will indicate it, and the more readily when we are well acquainted with the last specimen figured. The present upper specimen is, however, in appearance like confused mammillæ, but with a waxy aspect, and is a greener variety. This substance varies in the intensity of its colour from a bright yellowish green to a dark yellowish brown, and lastly brown, and has seldom more than a waxy transparency. The lower specimen is part of a vein, and appears to have been more or less lined with an ochraceous variety of this substance, layer after layer, on both sides, from the thinness of paper, many times repeated, to that of pasteboard, meeting in the middle, where it is nearly white; the layers are mostly so compressed together as scarcely to show the mammillæ.

Spec. Grav. 4·334.

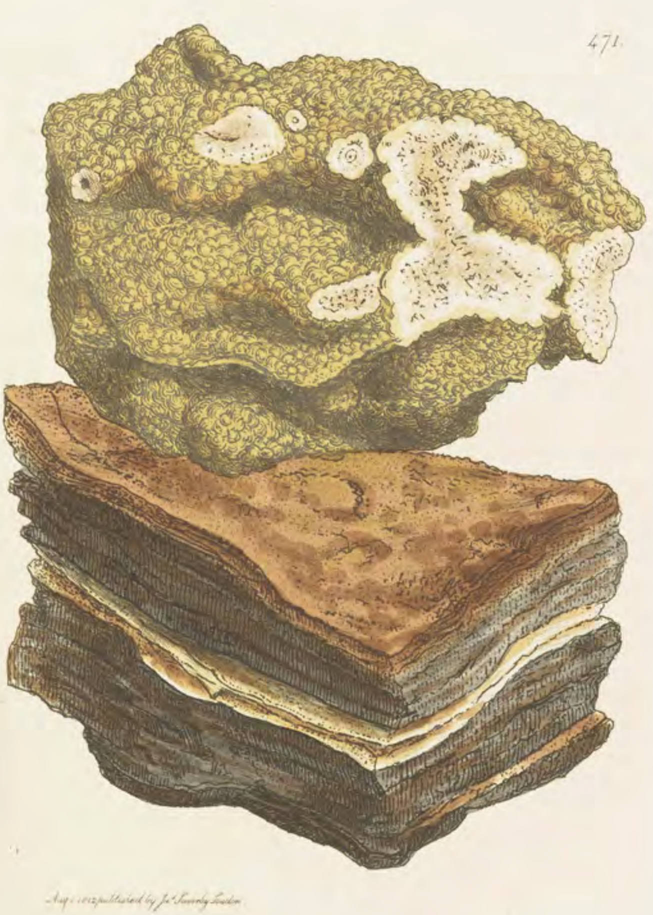
Analysis by Mr. Smithson of a specimen from Somersetshire,

Oxide of Zinc . .	64·8
Carbonic Acid . .	35·2
	100·0

and of a specimen from Derbyshire,

Oxide of Zinc . .	65·2
Carbonic Acid . .	34.8
	100·0

471.



Aug 1 1812 published by Jas Sowerby London

472

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TAB. CCCCLXXII.

ARSENICUM cobalti-ferriferum.

Cobalti-ferriferous Arsenic.

SYN. Grey Cobalt Ore. *Jameson,* 2. 434.
Arsenical Cobalt. *Haüy, Tabl.* 106. *Traité,* 4. 200.

I HAVE had the specimen here figured for some time, being one of Mr. Day's, sent him from Cambourne in Cornwall, about the time that Klaproth published his Chemical and Mineral Observations on the Fossils of Cornwall, dated 1787.

The specimen is more or less covered with a brownish and yellowish Oxide of Iron; the parts which have been long exposed, are of a rather dirty grey colour with very little metallic lustre; the fresh fracture is a little like broken steel, finely granular, but grey and less brilliant than steel: the streak is of the same colour, but rather brighter in lustre when fresh. A forcible blow provokes the arsenical scent, as also heat does. It is fusible by the action of the blowpipe, and gives an intense blue colour to Borax. It is very brittle. Spec. Grav. 5·503 to 7·207.

Analysis by Klaproth of an ore from Dolgooth in Cornwall:

Cobalt . .	20
Iron . . .	24
Arsenic .	33

473.

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TAB. CCCCLXXIII.

SILEX quartzum, ligniforme.

Ligniform Quartz.

Div. 2. Imitative. Wood-like.

The curious attenuated thready and cottony appearance of this Quartz has been so much admired, that I thought it would be wrong in me to withhold a representation of it, as it may prove extremely instructive; for at first it looks so unlike what it really is, that it becomes necessary to be apprized of it, and to attend to it some time to discover what it is. It is very white, nearly opaque Quartz that has been infiltrated into the pores of wood in such a way as to allow the wood to escape, and is so incorporated as to remain a representation of the wood as if it were still existing in the specimen. The fibres are, however, so slightly attached to each other near the outside, that the specimen is continually falling to pieces; but they become closer and more firmly attached towards the inside, where it is pretty nearly in a compact state at present; but I suspect that some Sulphate of Iron or other decomposing substance is mixed with it, and will eventually cause the whole to fall to pieces. It appears to be mostly destitute of the transverse fibres. Its asbestus-like or amianthine aspect has deceived many.

I have met with nearly the same thing before in Carbonate of Lime, but of a brown wood colour, in a specimen from Worton in Oxfordshire, by favour of C. Stokes, esq.; but this is not quite so easily decomposed: it occurs also imbedded in a Siliceous Marly Stone at Nutfield, and this is very crumbly; they are also softer to the touch; whereas the white specimen is harsh and rigid to the touch, very like Actinolite, and, like that, acts as Cowhage does upon the skin.

The specimen was sent by Miss E. Hill from the Whetstone pits at Blackdown near Cullumpton in Devonshire.

The Worton specimen is figured *on the right hand* for comparison: in it the bark appears to have been succeeded by Crystallized Carbonate of Lime.

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TAB. CCCCLXXIV.

SILEX quartzum, graniforme.

Flinty Roe-stone.

Div. 2. Imitative. Granular.

KETTON or Roe Stone (*tab.* 8), Oolites, &c. have been much noticed, and some conjectures have been advanced as to the origin of their form. I do not know that a similar appearance in Flint has been noticed in any previous publication;—it is as remarkable, and more difficult to account for than in Limestone.

The specimens figured, given me by A. B. Lambert, esq. V.P.L.S., came from Fonthill, where there is much variety of Flint arranged in strata with the Limestone: both are replete with many species of shells more or less mutilated; those in Flint are casts nearly filled up with a siliceo-calcareous mixture, or partly agatized (as some say) on the outside, and within flinty: between the two is often Carbonate of Lime. The granules, like those of the Roe-stone in outward appearance, are nevertheless rather more irregularly elliptical, and not formed one coat over another like an onion, as the grains of Roe-stone commonly are; they are of a gray colour, with a somewhat pearly aspect, and approach to Calcedony or Hydrophanous Cachalong: upon being wetted the surface becomes transparent, showing the darker inside: when dry, they are opaque and light gray again: they are nearly loose on the outside of the specimen, adhering more and more till they come to the solid flinty mass, with which they unite as a part, or are sometimes enveloped in the middle of it. The specimen has ochraceous striæ, more or less distinguishing the deposition of the whole in small drops or more copious fluid masses. I have a Green Jasper that has the little drops deposited on it like Roe-stone, but also without any appearance of a nucleus in them.

The fluid state of Silex is here very apparent, and it is as it were in different states of saturation, some subtly penetrating and displacing the Lime of the shells, while a partial solution deposits the small drops or roe-like particles, and again the larger mass seems to be a most copious deposit: this also is in the middle of a vein, while the outside has the granules with the shells as if loosely dispersed among them.

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TAB. CCCCLXXV.

CUPRUM oxygenizatum, siliciferum.

Pitch Copper.

This Ore seems to have been overlooked by late authors; its peculiar aspect, however, appears to me to deserve to be identified as much as many other species; and it is pretty well known by the name of Pitch Copper among the Cornish miners.

The specimen here figured is in some parts of a blackish brown colour, with a pitchy lustre, and is much mixed with Copper Pyrites; in other parts it is less mixed, has a browner cast and fractures like Pitchstone, with sharp angular, and sometimes large or small conchoidal fragments, still retaining that lustre which has been considered as a distinction in Pitchstone: perhaps it is even a little more greasy in the aspect, therefore still more resembling Pitch.

It is the gangue for Green Carbonate of Copper and Arseniate of Copper.

It wants analysing. At present we can only say that we suppose it to be an Oxide of Copper mixed with Oxide of Iron and Silex. Some specimens seem to hold very little Silex, and to result from the decomposition of Copper Pyrites; others hold very little Copper, and Kirwan speaks of some that hold Bitumen: both these may possibly be produced by mixtures of Iron and Copper Pyrites, the latter of which is sometimes accompanied by Bitumen.

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TAB. CCCCLXXVI.

SILEX fragilis.

Hornblende.

Class 2. Earths.	*Ord.* 1. Homogeneous.
Gen. 4. Silex.	*Spec.* . Fragilis.

SYN. Amphibole. *Haüy Tabl.* 39. *Traité,* 3. 58.
Hornblende. *Emmerl.* 1. 323.
Basaltic Hornblende. *Kirwan,* 1. 219.

AFTER waiting from the time of publishing *tab.* 328 to the present, I do not find that there are better British specimens of Hornblende than the present, which is from the neighbourhood of Aberdeen. It is, however, very imperfectly crystallized, although the columnar form is recognizable. It is readily distinguished by its laminated structure and dark green or black colour: its laminæ are parallel to the sides of an oblique rhomboidal prism of 124° 34′, the terminal faces of which are inclined towards the obtuse edge of the prism at 104° 57′. The white part of this specimen is Feldspar, thus constituting a Greenstone, one of the Trap Rocks of Werner; and from the largeness of its grains I suppose it to be one of the older varieties.

Analysis by Klaproth.		By the same.
Silica	47	 42
Alumina . . .	26	 12
Magnesia. . .	2	. . . .
Lime	8	 11
Oxide of Iron .	15	 32
Volatile Matter .	0·5	Water . 0·75

477

Feb. 1, 1813 published by Jas. Sowerby London

TAB. CCCCLXXVII.

SILEX resplendens.

Hyperstein, Labrador Hornblende.

Class 2. Earths. *Ord.* 1. Homogeneous.
Gen. 4. Silex. *Spec.*

SYN. Hypersthène. *Haüy Tabl.* 44.
Labrador Hornblende. *Emmerl.* 1. 328.

THIS substance, now called Hyperstein, was formerly considered as an Hornblende. It was sent me some years ago as a common mineral from the vicinity of Aberdeen. It differs from Hornblende in the form of its nucleus, which is a rhomboidal prism of about 100°. Some varieties of Schiller Spar or Diallage (Brit. Min. *tab.* 334.) very nearly resemble it; but they are laminated only in one direction, and their cross fracture has a waxy appearance, whereas the cross fracture of Hyperstein is ragged and somewhat splintery. The metallic lustre appears to arise, in a great measure, from a commencement of decomposition, as those parts which are nearest to the exposed surface of the specimen possess it in the most eminent degree. It is imbedded in Feldspar of a gray colour; and although more liable to decomposition, its superior hardness defends it longer against the effects of weather and water. The Spec. Grav. according to Haüy is 3·4.

Analysis by Klaproth.

Silex	54·25
Magnesia	14·
Argilla	2·25
Lime	1·5
Iron	24·5
Water	1·
Loss	2·5
	100·00

The specimens from Labrador are generally blacker, but in other respects scarcely different.

Feb 1 1812 published by Jas. Sowerby London

TAB. CCCCLXXVIII.

PLUMBUM nativum.
Native Lead.

Class 3. Metals. *Ord.* 1. Homogeneous.
Gen. 15. Plumbum. *Spec.* 1. Native.

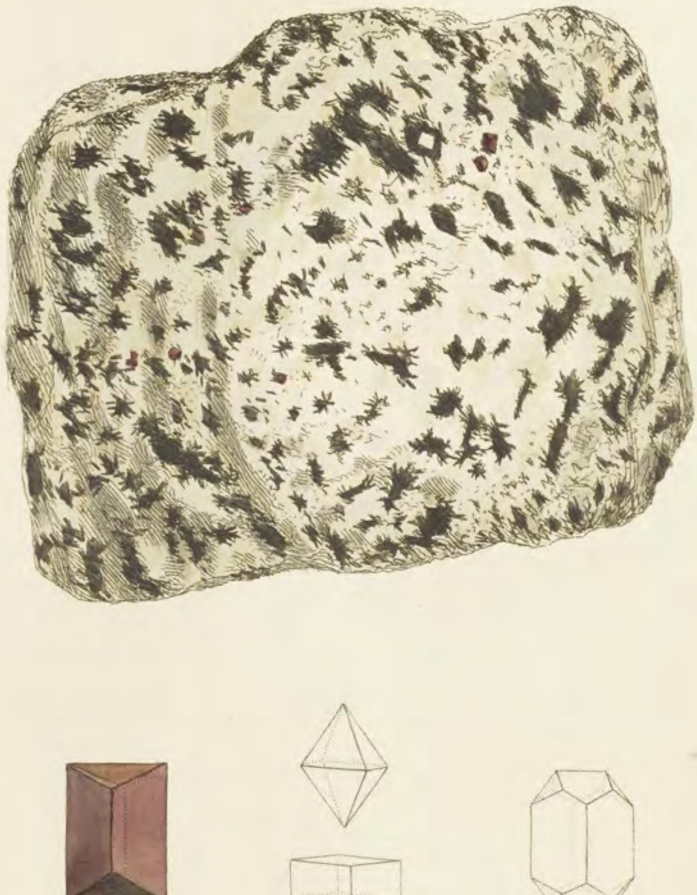
SYN. Plomb natif. *Haüy Traité*, 3. 450. *Tabl.* 79.

NATIVE Lead from the Golch Rake mine near Holywell, Flintshire, was presented by Mr. R. Jones in 1811 to the Geological Society, from whence the delineated specimen was borrowed. It is a curious specimen, and perhaps there is less doubt about it than about any before seen, excepting a specimen in the possession of the penetrating Count de Bournon, which he discovered by chance among other minerals: it is mixed with the usual Cubic Galæna and Red Oxide of Lead. The present specimen is tolerably compact, its fracture is granular: square faces are to be discovered in the fracture, which are perhaps owing to a mixture of Galæna. It is so soft as to be cut by the nail. The outside is in some parts covered with what seems to be a whitish Carbonate of Lead, and next to that it is more dense than the inside.

The existence of Lead in a native state has been much doubted, and there is the less chance of its being found native on account of its affinity for Carbonic Acid; and the same would tend to prevent its being found after having been lost long enough to have been forgotten if it should chance to be brought to a mine. As this is the best British specimen known, I thought I ought not to leave it out of my work. I do not know that it has been analysed: it may probably be a little debased by admixture; yet its softness would indicate it as nearly pure. Much mixture would take away its malleable character, and make it brittle.

The Geological Society have a specimen also, said to be native Lead, among some American minerals left at their house for inspection by T. Meade, esq.

479.



TAB. CCCCLXXIX.

TITANIUM (oxygenizatum) siliceo-calcareum.

Siliceo-calcareous Oxide of Titanium.

Class 3. Metals. *Ord.* 2. Mixed.
Gen. Titanium. *Spec.* Siliceo-calcareous.

SYN. Titane siliceo-calcaire. *Haüy Tabl.* 116.
Titanit. *Emmerl.* 3. 379.
Calcareo-siliceous Titanitic Ore. *Kirw.*2.331.

THIS substance had been observed long since in masses of Sienite, from Scotland, composed of Quartz, Hornblende, and Gray Feldspar, but was not understood, its characters having been overlooked, as it was generally in very minute and irregular grains. The specimen figured was sent me among other pieces of rocks, by a late dealer, in Aberdeen, six or eight years since. It has been more particularly observed lately, and mostly in octaëdral crystals as figured below; which although so small, and lying in various directions, are very neat in the specimen. The octaëdron sometimes has the corners taken off, as in the other figure. The rhomboidal prism in the centre is what Haüy formerly considered as the primitive; but upon making a fresh examination for the purpose of comparing that variety called Sphéne, he has found the rhomboidal octaëdron *figured above it* to be the nucleus: the incidence of the pyramids upon each other is 131° 16′—the small faces at the corners of *the right hand figure* are primitive.

I find it is not so rare as it is small, and that it has been gathered by many. Lady Wilson gave me specimens of Sienite from Culloden with it, and I have also received it from Scotland by favour of D. Turner, esq.

Feb. 1 1813 published by Jas. Sowerby London

TAB. CCCCLXXX.

CARBO bituminosus.

Bituminous Coal.

Div. 2. Amorphous.

CANNEL COAL, so called in many places from its giving a candle-like flame, and which often serves the poor instead of candles where it is obtained (in Scotland particularly), is only the better sort of what is called Splint Coal at Newcastle, and other places where it is also found. Box Coal is a still finer sort; they all seem to be an intimate mixture of a small portion of Charcoal with Amorphous Bituminous Coal, differing in the state of aggregation from the more general form of Coal, which is alternate layers of Charcoal and crystallized Bituminous Coal, very distinct: they often join each other; the Amorphous occurring 18 inches or more in thickness between strata of the other*. Box Coal is occasionally so very uniform as to serve to turn in a lathe to form boxes. At Wigan in Lancashire, which was famous about half a century since for producing it of a more beautiful grain than any other place, an ingenious turner and mechanic took advantage of his judgement in procuring it and turning boxes of it; carvings of Blackmoors' heads and other things were also made of this Coal about the same time. I have an inkstand and a vase of it: the latter is about 12 inches in circumference, and 5 in height. Both at Wigan and abroad it is occasionally used for beads and other ornamental purposes, and even passes for Jet.

* It has been found so large as to be turned into plates, and a number were once turned to supply a feast; they were burnt afterwards to surprise and warm the company, who had no suspicion that plates which were used as if black earthen-ware, could be combustible and flame.

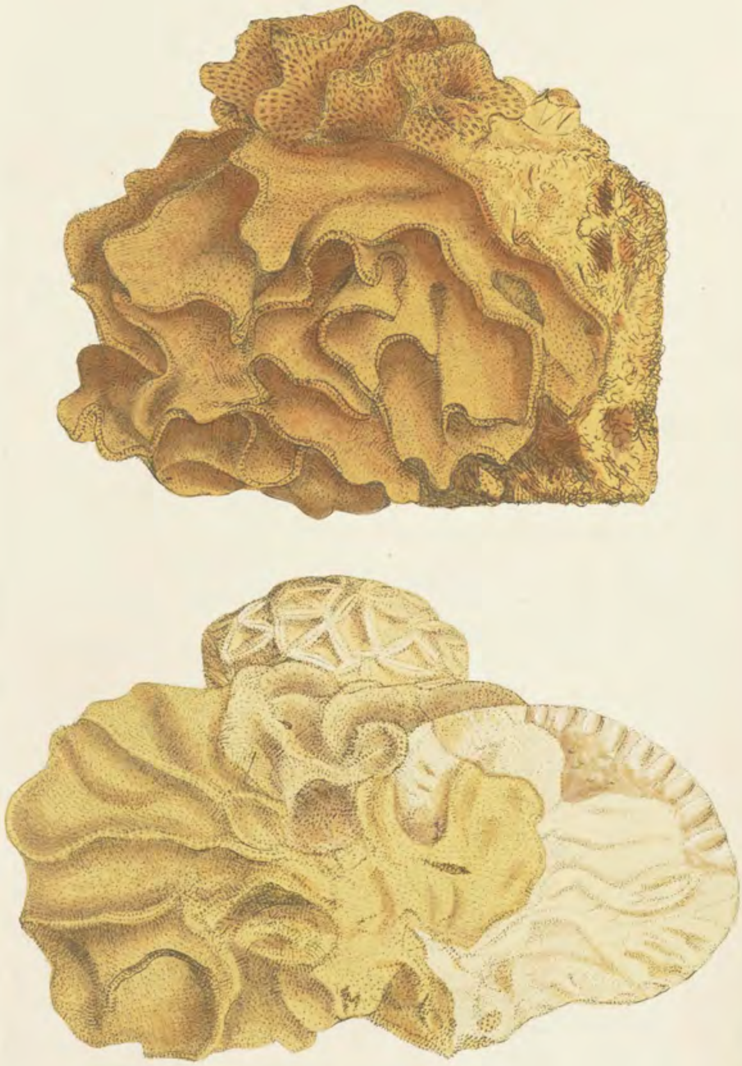
I am, however, more surprised that some of our late authors almost confound it with Jet also. The turner or worker of Jet would however soon inform them of a sufficient difference; Jet producing a snuff brown streak or turnings, and the Coal a black powder: besides, the Coal has not the resinous electricity excited by friction, nor the woody texture *.

The lower figure is the copy of a specimen chosen from among Cannel or Splint Coal from Newcastle; it is far from being of the finest or toughest kind. When liable to split and form large fractures, it will not serve for ornamental purposes; its fracture is often curiously circular, variously undulating or otherwise, that is to say, commonly conchoidal. It often shows the Slicken side appearance arising from two faces of a crack in the rock having glided smoothly against each other, leaving a fine polish as on the *front of the figure.* The best kind for turning is capable of receiving a brilliant polish, but at best it is of a cold grayish black colour (if I may use such terms); as by comparison it is found to have much less richness in effect than the fine warm or brown black of Jet. Sometimes it is very solid, at others it is much rifled or full of cracks, which are often filled with Carbonate of Lime, &c. when in the pit.

The upper figure shows a stratum of Splint with common Coal above and below it; it shows the tendency to the rhomboidal prism in Coal, and the rather peculiar curved and conchoidal fracture.

This Coal is excellent fuel, but if thrown immediately upon a clear fire, it splits and flies about—whence its name. Its good qualities are now so well known and esteemed, that the greater the quantity mixed among other coals, the higher is their price.

* Stone Coal, (*tab.* 408.) which often has precisely the appearance, fracture, &c. either of the Splint or of the more common bituminous Coal of Newcastle, has, I am told, been found in South Wales fit for turning: perhaps, as it has been used to be turned into boxes occasionally, it may then be denominated Blind or Stone Box Coal in contradistinction to Blazing Box Coal. I do not know that it has been turned into plates like the other. If however it have, and they were to be put upon the fire, they would not blaze, and therefore might appear only to heat red hot like earthen-ware. It may be worthy of remembrance, that the soft Charcoal may occasionally alternate with the more solid parts of Stone Coal, in the same way as it does in the Newcastle and other Bituminous Coal; and the Stone Coal has sometimes a greasy or bituminous appearance, and yet is nearly a pure Carbon that will not flame. I have such from Ireland.



July 1 [illegible] published by J. Sowerby London

TAB. CCCCLXXXI.

CALX carbonata, imitativa.

Coralliform Carbonate of Lime.

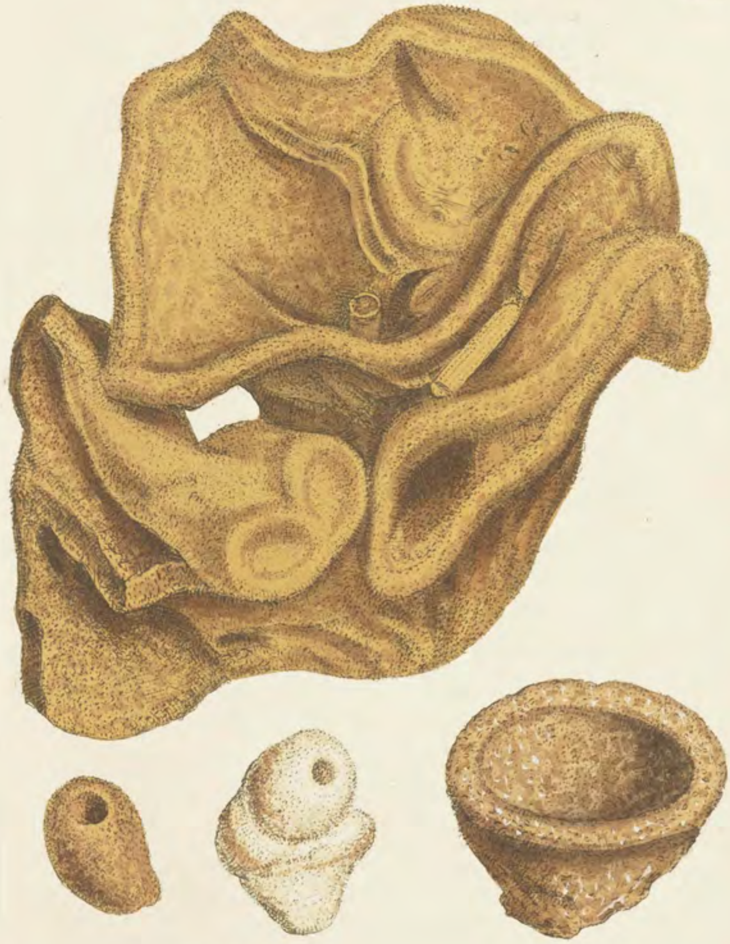
Div. 2. Imitative. *Var.* The remains of Corallines, &c.

THIS mineralized matter, well known in many parts of Suffolk by the name Crag, and scarcely known elsewhere, is found in various parts of the S. E. of Suffolk; as at Aldborough, Orford, and Ipswich. One or two spots in Norfolk may perhaps be included as somewhat similar; but while they agree in some particulars, they differ in others relating to the variety of animal remains. The fragments of corals, shells, &c., are so coloured by means of an ochraceous Iron, as to look like gravel at a distance: the Iron also serves, in union with some Lime, to cement them together into a continuous stratum, which, in some places, is readily friable, in others more compact; often ten or twenty feet thick, in larger or smaller beds. It is remarkable for having vertical inverted conical holes about two feet in diameter, and more or less gradually tapering to the bottom of the Crag; and these are often filled with common mould, bits of roots, &c., apparently from the surface.

The Crag is merely masses of shells and shelly remains, with Zoophytes, &c.; some wonderfully well preserved: the whole partakes in general of a ferruginous tint.

I herewith give a figure of pieces which have preserved some of the tenderest of the Madrepores: the nicety of the fine work is not to be passed over without admiration. *The upper part of the upper figure* is much like the recent Lace Coral or Millepora foraminosa, *Solander and Ellis, t.* 26. It however seems somewhat different; and I believe there are two or three species: the remainder of the figure is an undescribed Eschara, with a Balanus attached to it. This is what some have distinguished as loose Crag from Aldborough; and, when dug, it adheres in lumps easily cut with a spade, and crumbles in pieces. *The lower figure* has a sort of Millepora, of which I do not know any recent analogue. The Eschara seems to be the same as the one above; it appears to have a double row of cells, which lie in quincunx order, and are convex, somewhat oval or broken. There is also a Sertularia; a spreading Flustra or two, one row of cells at the broken edges of which will help to distinguish them: they are of very fine texture, and exquisite structure: they are also in folds or wrinkles over the inside of a Pecten, which is very common in Crag.

These pits afford a great variety of shells and other marine subjects, enough to stock a cabinet, and as perfect as if fresh; and although in general quite ochraceous outside, some are nearly white. These are all preserved in the Crag, which is chiefly broken shells, with some Quartz sand? much more perfectly than if they had been preserved in bran, which the Crag very aptly resembles in colour; varying, however, in being of a darker or lighter ochraceous tint. It is chiefly Carbonate of Lime and Oxide of Iron, and is considered excellent manure in the place where it abounds. The compact kind is used near Orford for building walls, &c., being easily cut into blocks containing about two cube feet each.



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TAB. CCCCLXXXII.

CALX carbonata, imitativa.

Sponge-form Carbonate of Lime.

Sponge Rock.

SINCE rocks or formations may be particularised, and the modern laudable plan of investigating claims definite characters when they present themselves to identify them by, I thought, before I finished this work, it was an obligation on my part to hint something towards it; especially the upper series, which are most numerous, and will necessarily want comparative analogues. With this view, the present Sponge Rock is remarkable, distinctly to be recognised, and instructive. The name, I presume, will answer the purpose as well as Coral Rock or Formation. I do not know that it has been mentioned by any author under any title. I will therefore observe what are its characteristics; not knowing accurately whether its extent or quantity will allow of its being considered a distinct formation, or whether it is only a part of the Coral Rock: which may, however, by such attention, be better remembered. The place where these petrified sponges are found, is, from their appearance, called a gravel-pit, and has been opened a long time to supply the roads in its vicinity. It is altogether a mass of much variety; the sponges, some resembling the Sea-fig Sponge, (*Sol.* and *Ellis, tab.* 59. 4.) being conspicuous and abundant, occur either in large irregular masses, small or just expanding specimens, or very large aggregated or more varied shapes. *The upper figure* is of the latter description, they grow together somewhat parasitically; the smaller irregularly conjoined with the larger, besides admitting of some variety, as undulating, &c. Fragments of Echini, and other marine productions, are often attached to them. *The lower figures* are a series from the younger nearly globose small ones, to the longer and more perfectly cup-shaped ones. It in some measure resembles the Spongia infundibuliformis. I will, for distinction's sake, call it Spongia pezizoides. I had given a hasty description published in Linn. Trans. vol. x. p. 405.

The pit has immense quantities of these, the greater part broken; and also of Echini spines, masses of mixed stones, and I found a curious piece of the septa of a large Nautilus, resembling N. centralis, Min. Conch. *tab.* 1, but I think another species, in which the siphuncle is central. The cast of the chambers is a mere mixture of fine gravel, and bits of shells, cemented by a dark ochraceous substance. There are also some very perfectly preserved Terebratulæ, some smooth, others undulating and notched, showing the cartilaginous appendages within, well preserved. Many other remarkable small corals, and even flustræ, accompany these. Somewhat resembling the Crag Rock as they are called in Suffolk, as *tab.* 481, but does not afford the characteristic Murex contrarius, Min. Conch. 23, or M. striatus, Min. Conch. 22.

July 1 1812 published by Jas. Sowerby London.

TAB. CCCCLXXXIII.

ARGILLA electrica.

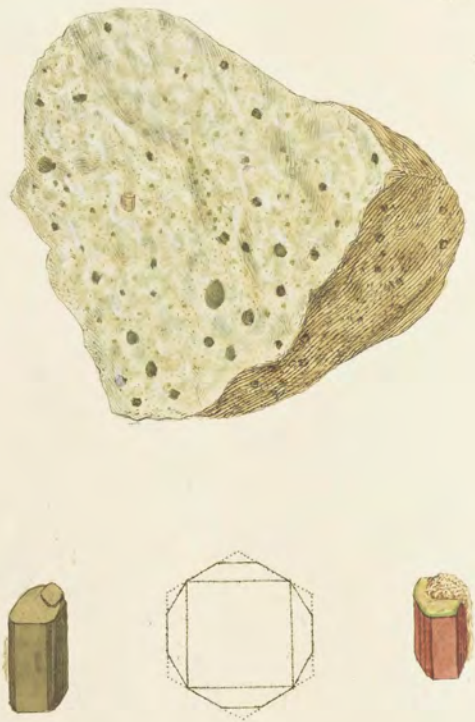
Fibrous Tourmaline.

Class 2. Earths.	*Ord.* 1. Homogeneous.
Gen. 1. Argilla.	*Spec.* . Electrica.
	Var. Fibrous.

THE occurrence of capillary crystals of Schorle or Tourmaline in Unanimity mine in Cornwall, and the novelty of its appearance, warranted a figure of it as a variety in this work; and I am pleased with the friendly means by which I am enabled to give it, having been presented with the specimen by William Rashleigh, esq, M. P., who succeeds to the valuable collection of my late friend, Philip Rashleigh, esq.

The crystals appear, from such as could be distinguished by the microscope, to be all hexaëdral prisms, rather flattest on two opposite sides: the whitish and grayish appearance is a dilute colouring in the crystals, which, when viewed perpendicularly, have often a rich dark blue aspect: they cover Quartz with Killas and Tin Ore.

484



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TAB. CCCCLXXXIV.

ARGILLA Pinii.

Pinite.

Class 2. Earths. *Ord.* 1. Homogeneous.
Gen. 1. Argilla. *Spec.* . Pinite.

SYN. Pinit. *Haüy Tabl.* 53. *Bournon, Catal.* 123.
Micarelle. *Kirwan.*

ST. MICHAEL'S MOUNT produced the present specimen. I am highly pleased to be able to give it as British, and to acknowledge the opportunity of doing so, as one of the many favours conferred upon me by the Count de Bournon. The finer specimens of Pinite are usually brought from a mine called Pini, at Schneeberg in Saxony: in them the Pinite is usually imbedded in Granite; but both the Count and myself have found large specimens containing square prisms, in masses of a kind of decomposing Porphyry, brought as ballast, to mend the roads; but from whence, we have not been able to ascertain with certainty: these masses are also remarkable for large hexaëdral prisms of dark reddish brown Mica, which have numerous vesicles in them as if they had been subjected to the action of volcanic fire. The Pinite is still solid, but brittle.

The upper specimen is a somewhat decomposed granular Feldspar, in which are small octaëdral columns. The other figures are taken from foreign specimens for the sake of illustration; one of them is from Auvergne.

The texture of Pinite approaches to that of Steatite, but it is not quite so soft: its lamellar fracture, from which it takes the name Micarelle, is very indistinct, except near the ends of the crystals from Pini, to which it gives a metallic lustre. It is infusible before the blowpipe. Its primitive form, according to Haüy, is an hexaëdral prism; and he considers the square prisms which sometimes occur, as produced by a great enlargement of two primitive and two secondary faces of the dodecaëdral prism; but the Count de Bournon informs me that the rectangular prism is the primitive form: and this opinion is certainly well supported by his excellent series of crystals. *The outline* explains both these opinions. Spec. Grav. 2·980.

Analysis by Klaproth:

Alumine	63·75
Silex	29·5
Oxide of Iron . .	6·75
	100·00

July 1 1817 published by Jas. Sowerby London

TAB CCCCLXXXV.

PLUMBUM sulphatum.

Sulphate of Lead.

Class 3. Metals.	*Ord.* 1. Homogeneous.
Gen. 15. Lead.	*Spec.* . Sulphate.

SYN. *Bournon's Catalogue* 356.

THE present figures of Sulphate of Lead extend, with what have been done before, to nearly all the varieties at present known in Great Britain; but there are many intermediate ones.

The white part of the upper figure has not the common appearance of a Lead ore, but in the fracture looks like Sulphate of Barytes; it is softer, heavier, and has more lustre than the Barytes, but may be detected with certainty by means of the blowpipe on charcoal. It has a few faces on the somewhat plated edges.

The lower specimen has rather a new appearance, the longer bars (if I may so call them) are brighter, in general appearance, than the above, and are long very acute rhomboidal prisms: the small crystals are also acute rhomboidal prisms with various modifications not unlike some Sulphates of Barytes: they have the plated fracture parallel to the primitive.

The left hand figure represents a large, almost lenticular crystal, corresponding nearly in form with some minute ones from Anglesea. I suppose this to be from Derbyshire; it was in Mr. Day's collection.

All these specimens have indications of laminæ parallel to a rhomboidal prism, such as are figured in *tab.* 153 and 341. The Count de Bournon has been led by reasoning upon the forms of the crystals of Sulphate of Lead in general, to adopt of late a rhomboidal prism of about 101° 30′ and 78° 30′ for the primitive form; a circumstance greatly in favour of what I have stated in the description of *tab.* 341, and which only wants correct measures of the fractures to verify it.

486.

July 1 1819 published by Jas. Sowerby London

TAB. CCCCLXXXVI.

PLUMBUM carbonatum, micans.

Rhomboidal Carbonate of Lead.

Class 3. Metals. *Ord.* 1. Homogeneous.
Gen. 15. Lead. *Spec.* . Rhomboidal Carbonate.

SYN. Plomb carbonaté rhomboidal. *Bournon Catalogue* 343.

THIS Carbonate of Lead is rare, and seldom noticed among those found at Wanlock-head: the crystals are generally small, but well defined and interesting. The Count de Bournon considers the primitive crystal to be an acute rhomb, whose angles are 60 and 120°: this rhomb is often truncated at the apex, and the face produced has a micaceous or pearly lustre: the crystals are also laminated in a direction parallel to this face. By the truncation of the other angles, this rhomb passes into a hexaëdral prism, and when this prism is very short, it becomes a hexaëdral plate, the terminal faces of which being pearly, give it a great resemblance to Mica; from which, however, its weight, brittleness, &c., readily distinguish it. The pearly lustre of the terminal planes, its superior hardness, and primitive form, distinguish it from the common Carbonate of Lead; it may also be known by its melting into a yellowish gray bead, without first becoming bright yellow and powdery, as the common Carbonate does.

The upper figure represents a specimen lent me by my very kind friend G. L. Meason, esq. It is on a mass of common Carbonate of Lead, and it exhibits two varieties; one in long prisms collected together in a large scopiform manner; the other, rhomboidal crystals with their apices truncated. *The next figure* shows small hexaëdral prisms upon Galana. *On the right hand at the bottom*, I have added a large crystal of a brownish colour, one of those described by the Count de Bournon. The tabular variety I have figured in *tab*. 342 as a variety of the common Carbonate, not having information enough at the time to consider it a distinct species.

487

July 1 1814 published by Jas. Sowerby London.

TAB. CCCCLXXXVII.

URANIUM oxygenizatum.

Oxide of Uranium, Uran-glimmer.

Class 3. Metals. *Ord.* 1. Homogeneous.
Gen. 12. Uranium. *Spec.* . Oxide.

These curious varieties of this rare substance are so remarkable, and have so different an appearance, that they may naturally be mistaken, without particular attention. The crystals are, however, mostly square plates, but heaped or grouped in little fasciculi, which give them a more cubical appearance than usual. Some are placed so as to give a fan-like form, being a little elongated, and placed nearer each other at the base of attachment. They vary also in some other respects, but particularly the arrangement of the minute crystals in a linear order. This specimen was brought from Cornwall by Mr. Mawe.

The specimen figured below was presented to me by Mr. Fox; it is in much larger plates than usual, and extremely thin: their rectangular figure is, however, distinctly marked on the plates, which stand in broad fasciculi in different directions: they are very tender, fracturing easily into very thin sparkling Glimmer. The gangue is Red and Black Quartz, or Red Jasperine Quartz. The specimens are from Tolcairn mine.

July 1 1812 published by Jas Sowerby London

TAB. CCCCLXXXVIII.

TITANIUM oxygenizatum.
Red Oxide of Titanium—Rutile.

Class 3. Metals.	*Ord.* . Homogeneous.
Gen. 22. Titanium.	*Spec.* . Oxide.

THESE specimens are from Cairngorum in Scotland, and I feel much gratified that there is added to British Mineralogy before it is finished another appearance and locality of so rare a substance that was not much known even in foreign countries. Many persons possess fine specimens of Quartz containing red needle-like crystals of Titanium and long angular empty spaces, which, by their form, are now known as having probably once contained this substance; but these specimens are mostly foreign.

The upper specimen seems to have been part of an exposed vein in Micaceous Schist, and the Quartz is curiously distinguished by a certain ruggedness, perhaps owing to exposure, which gives it a roughish opacity outside, although it is very transparent and pellucid immediately beneath, holding long straight thin bars of Titanium in various directions, mostly separate, and of irregular forms: they are of an opaque brownish red or bright red according to the position of the light, reflexion, or fracture. The Quartz has a more milky appearance, and is destitute of Titanium in the interior.

The lower specimen has a large proportion of Titanium, in bars an inch or more long, so crowded as to give the whole a brown red appearance, being about half Titanium; the rest, Quartz with some vestiges of the Micaceous Schist.

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TAB. CCCCLXXXIX.

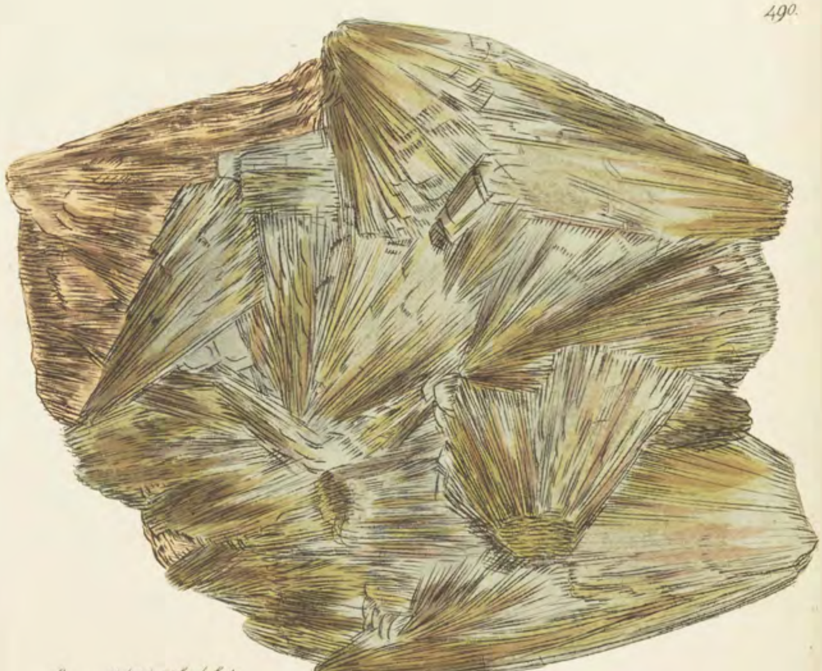
SILEX quartzum.

Amorphous Quartz or Flint.

FLINTS that lie upon the Chalk about Salisbury plain, &c. in Wiltshire show much variety, and have mostly been noticed as being casts of various animal remains. I believe the appearance represented in *the upper figure* has not been before mentioned. The marking cannot be called dendritrical, or described by any other term used in Mineralogy that I know of; and in addition to other unaccountable circumstances attending the formation of Flints, which seem to have been in different states of fluidity capable of taking the nicest casts or impressions, we here find an after substance taking up more or less of the space or vacancies that were apparently formed in the flint by a hot and dry process cracking it. This substance distinguishes itself in the form of a pure white opaque Calcedony, and has in this instance adhered to one side of the crack in such a manner as often to allow the flint to divide again and show the partial passage of the Calcedony which has formed in globules like moisture, and running in various directions confined by the narrow space, has become flattened; and while the effect excites curiosity, it serves to explain the sort of fluidity that succeeded that of the flint. These flints have a marly brown outside.

The lower specimen is a fractured flint from an upper series below Highgate hill towards Barnet, and the whiter markings appear to be in consequence of some parts being more susceptible of change by exposure to weather or bleaching than others. It is thus I would account for it; and as most flints have apparently enveloped various matters, the parts within may be in a state of union, yet sufficiently irregular to be acted upon partially: these mixtures may also account for the variety of colours, transparency, spots, &c., in flints: this indeed is distinctly seen in some that have enclosed Madrepores, which are replaced transparently, while the rest is more opaque and has the usual gray appearance.

490.



Sep. 1 1813 published by Jas. Sowerby London

TAB. CCCCXC.

SILEX talcum.

Massive Talc.

Class 2. Earths. *Ord.* 1. Homogeneous.
Gen. 4. Silex. *Spec.* Talc.

Massive specimens of Talc occurring in large somewhat scopiform varieties may resemble Tremolite or the pale coloured Actinolite, or if darker coloured would approach in appearance to *tab.* 320. The less rigid feel, the pliability, softness, &c. will readily distinguish it. The specimen selected for this figure is from Portsoy, in the neighbourhood of which place a great variety is found with such close resemblances to the above-mentioned minerals in many instances as to be difficultly distinguished, and at first sight seem passing, as it were, into them. The rhomboidal form of the nucleus is marked by lines upon the surface of the plates and is almost measurable, which much assists our discrimination; the angle is 120°. It crumbles rather readily, and will give the soft silvery gloss usual to Talc, by rubbing on the hand, &c. Actinolite irritates like Cowhage, as formerly mentioned. Bright and fine white Talc is very abundant in some parts of the East Indies, the native artists take advantage of it for a permanent colour, and in some states to represent the fine silvery inclining to pearly lustre of the scales of the fishes they make portraits of, which are so much admired in London. It is far preferable to Silver itself for such representations: it is also a valuable article for various purposes, and is sold at a handsome price when good. I should think it might be found in Scotland and Ireland as good as in the East Indies, if properly sought for.

491

published by Jas Sowerby London.

TAB. CCCCXCI.

SILEX

Tremolite. Grammatite.

Class 2. Earths. *Ord.* 1. Homogeneous.
Gen. 4. Silex. *Spec.* . Tremolite.

SYN. Trémolite. *Bournon's Catalogue* 87.
Grammatite. *Haüy* 3. 227.
Tremolith. *Emmerl.* 1. 426.

THIS specimen is from Scotland. Its harsh, rigid texture, and in some specimens its broad laminæ, at first distinguish this substance from varieties of Asbestus and Talc. A certain degree of elasticity distinguishes the fibrous variety from Actinolite, and when crystallized the form of the nucleus, and easy divisibility into fibres by the finger nail, are characters by which it may always be known.

The colour, though generally pale, is however variable; in some parts of the present specimen it passes from white to light greenish and light brown. The lustre is sometimes almost silvery, resembling Mica. In some parts it is in nearly perfect rhomboidal prisms. They show a tendency to the outline below. The cross fracture is fibrous and splintery. The nucleus is a rhomboidal prism of 126° 52′ and 53° 8′, whose terminal planes are perpendicular to the axis. It is divisible also in the direction of the two diagonals of its terminal plane. We are indebted to the Count de Bournon for pointing out the distinguishing marks between Tremolite, Actinolite, and Hornblende.

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TAB. CCCCXCII.

SILEX actinolithus.

Actinolite.

Class 2. Earths. *Ord.* 1. Homogenous.
Gen. 4. Silex. *Spec.* . Actinolite.

SYN. Actinote. *Bournon's Catalogue* 85.

THE Count de Bournon having lately published the differences between certain minerals hitherto confounded together as varieties of Actinolite, some of which really belong to Hornblende, to which Haüy has united all the varieties of Actinolite and Tremolite, we are glad through his kindness of an opportunity of exhibiting a Scotch specimen of that sort to which he has retained the name Actinote. It is in Serpentine, and is quite new to me; it is rendered beautiful by a particular chatoyant lustre that depends upon interior faces or fibres reflecting a yellowish light, under peculiar circumstances, varying according to the stronger or weaker adhesion or greater or less transparency of the surface and the polish of the next plate or fibre. There are two directions of the laminæ, so that the light is reflected in two principal directions. The nucleus of Actinolite, according to Bournon, is a rhomboidal prism of about 130° and 50°, the terminal planes of which are inclined towards the acute edges at about 94°.

The dark green crystals added to this figure for illustration are from Norway, where they were found intermixed with prismatic Hornblende. They show the position of the terminal face, which is the distinguishing character.

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TAB. CCCCXCIII.

Gneiss.

SYN. Gneiss. *Jameson, Lucas, &c.*
Gneiis. *Werner, &c.*

PERHAPS it would be hardly pardonable not to give some hint of what is the popular idea of the formation or periodical series of this our Empire, considered as related to the whole globe.

Granite, being the foundation or oldest rock, consists chiefly of the three substances comprehended at present under the terms Quartz, Feldspar or Kaolin, and Mica. These are exemplified in many parts of this work, but those that relate to the more primitive granite formation are *tabs.* 180, 181, 332, &c. and the others are more and more subordinate, as *tabs.* 211, 212, 224, &c.

The next rock is Gneiss, in which are the same constituents, Quartz being in general the most abundant, and the Mica lies in strata or layers, so that the rock is stratified: the strata varying much in thickness make it in some cases resemble slate; sometimes it seems rolled one part over another or undulating, &c.; indicating a tremendous and mighty agency, beyond the comprehension of us mortals, yet pointed out by the seeming effect on the vast and massive granite, having separated it into immense blocks, logan stones, granules, and even into dust to astonish and amuse us.

The strata of Gneiss, approaching more or less to vertical, form peaks and towering craigs. The black mica in many specimens is so brilliant as to be compared to the fine splendent metallic lustre sometimes found on the laminated glittering substance from the chimneys of iron furnaces. My friend Mr. Meason sent me a specimen from one of the Western Isles of Scotland, something like *the upper specimen*, which is passing into Mica Slate. *The lower specimen* is from the neighbourhood of Aberdeen, and contains small bright cubes of Pyrites. Garnets, Topaz, Tourmaline and most of the metals are found in Gneiss.

The Moor stone of which the crosses in Devonshire are made may perhaps be the beginning of the Gneiss formation, or the latter of the Granite: blocks are apparently chosen of a somewhat continuous form; and I have one 6 feet long and 10 inches in diameter, in which the crystals of Feldspar are $3\frac{1}{2}$ inches long.

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TAB. CCCCXCIV.

Burnt Rock.

Geological research and chemical investigation are requisite to account for the appearance of this stone, which is generally as if it had undergone a burning process. The specimens were sent me by Mr. Pennant himself some years since, and are labelled from near Mosetyn, mentioned in his account of Whitford, p. 136. I hope this plate will be acceptable as a specimen of the pseudo-volcanic nature of some rocks or remains of rocks. I would only hint that it may be pseudo-volcanic, but do not mean to venture an opinion, hoping that its history will come from more conversant hands than myself. Sir H. C. Englefield favoured me some years since with specimens from near Leeds, in Yorkshire, that have some similar signs of heat and fusion apparently having acted upon an irony schistose rock or clay, which has become like dull red Jasper; it is full of cracks, and has a cinder-like bubbled appearance which he could not then account for.

The natural Coak, *tab.* 192, much resembles a pseudo-volcanic production; this is, however, I think, sufficiently explained there as caused by the decomposition of the pyrites by water and air.

The Eizen-kiesel Jasper, *tab.* 219, nearest resembles these pseudo-volcanic changes; the hollows, however, are generally sufficiently characterized to show something like impressions of crystals having passed out of them, and the crystals of quartz are perfect and shining red, transparent, &c.

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TAB. CCCCXCV.

CUPRUM peroxygenizatum.

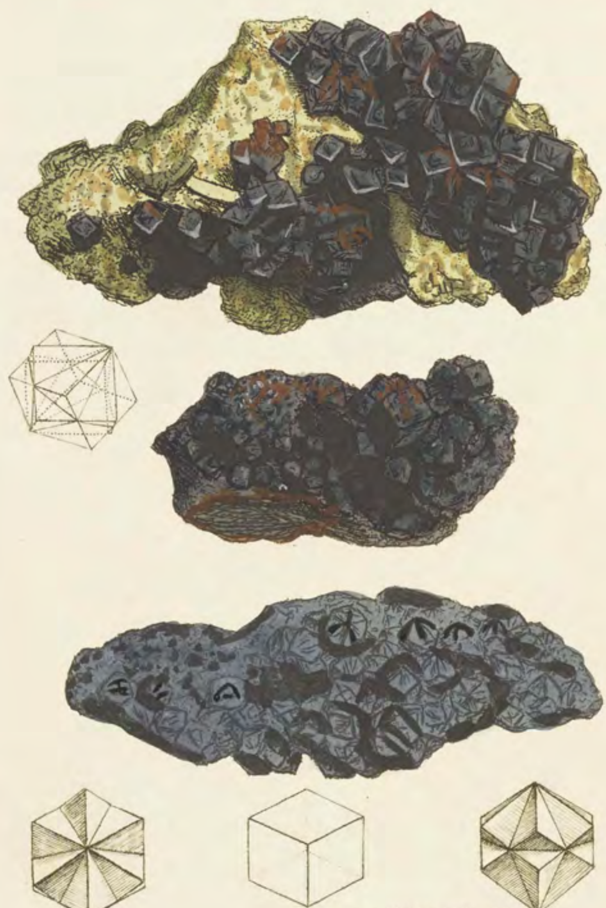
Black Oxide of Copper.

Class 3. Metals. *Ord.* 1. Homogeneous.
Gen. . Copper. *Spec.* . Peroxide.

SYN. Black Copper Ore. *Kirw.* 2. 143. *Thomson,* 4. 451.
Le Cuivre noir. *Brochant,* 2. 180.
Copper-black. *Jameson,* 2. 207.
Kupfer-schwärtz. *Emmerl.* 2. 244.

THIS has often a sooty appearance, but the shining semi-metallic surface produced by rubbing is a particular character of it. It often has the appearance of having been sublimed by some process within the rifts of the rocks, and covers the Quartz, &c., which accompanies other copper ores. In many specimens it is evidently the result of the decomposition of other ores, sometimes forming into small concentric, seemingly botryoidal appearances, something like Iron Hæmatites. It is either pulverulent or in soft, smooth, friable crusts varying but little in colour from blueish to a dusky black, according to the quantity of Iron mixed with it. It appears scarcely to have been noticed as British till lately the Count de Bournon has made it public in his Catalogue, from whose observations it appears that most of the other ores of Copper produce it by decomposition.

It is also found in Hungary, Silesia, France, and Siberia. The Count de Bournon has kindly allowed me to select three Cornish specimens from his collection for figuring. One accompanied by Arseniate of Copper is coating Quartz crystals; another is the last stage of decomposition of blistered Copper Pyrites. I have recently received a specimen or two from a mine in Cornwall, in which the mammillated variety of the black Oxide is covered by spiculæ of dark green Arseniate of Copper; here the Arsenic Acid seems to have entered into combination with the Oxide of Copper, but in the smaller specimen figured the Arseniate seems to be decomposing, leaving the Copper on its surface.



Sep. 1 1812 published by Jas. Sowerby London

TAB. CCCCXCVI.

CUPRUM sulphureum.

Variegated Copper Ore, Buntkupfererz.

Class 3. Metals. *Ord.* 1. Homogeneous.
Gen. . Copper. *Spec.* . Sulphuret.
Sect. 2. Oxygenized.

Syn. Purple Copper Ore. *Kirw.* 2. 142.
Variegated Copper Ore. *Jameson,* 2. 189.
Cuivre pyriteux hepatique. *Haüy Traité,* 3. 536. *Tabl.* 86.
Double Sulfure de Cuivre et de Fer. *Bournon's Catalogue,* 221.
Buntkupferertz. *Emmerl.* 2. 228.

This ore is found in many places, besides Tincroft mine in Cornwall, whence our specimens. It was in Mr. Day's collection, and I have received it from my late friend P. Rashleigh, esq. It is found in masses, plates, and also crystallized. Its crystals are described to be octaëdrons. This expression of the form of the crystal may have arisen from the peculiar and remarkable appearance of certain groups of cubes which are often confused. My specimens, however, show the cubes in some instances very clearly, in others the aggregation of cubes is perhaps such as has hitherto escaped notice, viz. two cubes placed so as to form the resemblance of two pyramids united base to base, each composed of six concave sides with re-entering angles; the edges of the cubes form those of the pyramids; the faces of the cubes intersecting each other form the re-entering angles; supposing the axis of each cube to run through two opposite solid angles; the axes of the two cubes coincide with the axes of the double pyramid. The two cubes thus mixed, with their bounding and bisecting lines, are represented in *the upper outline*, with dots, &c. to make it as distinct as such an outline can well be. *The right hand outline* has the pyramids nearly in profile, and in *the left hand figure* the apex is brought near to the front.

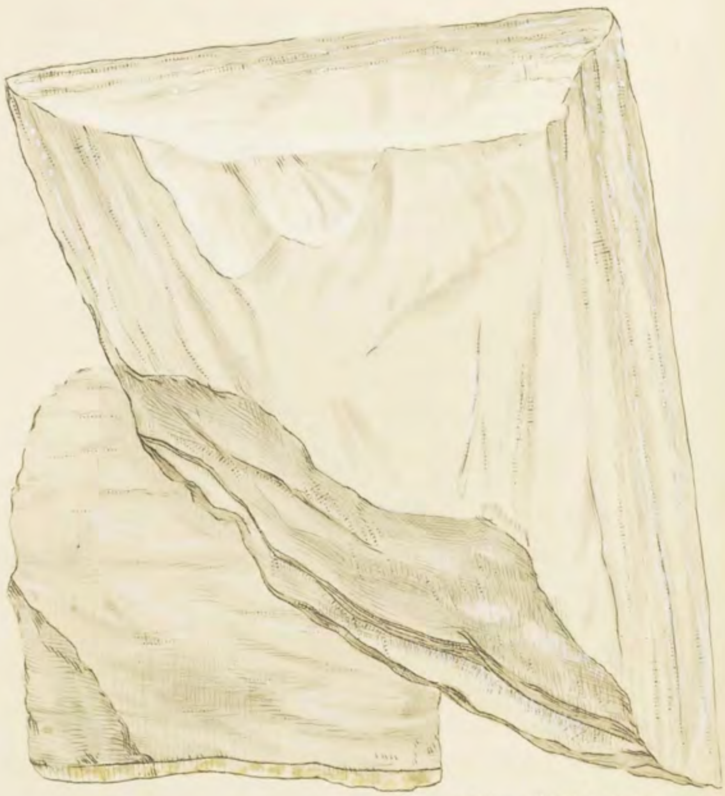
The groups in *the lower specimen* are chiefly these figures placed like the upper outline; in *the middle one* the larger cubes are rather rounding aggregates of many small cubes, hence they are roughish and crowded; their surfaces are partially covered with a greenish patina, showing a forward state of decomposition. The cubes in *the upper specimen* are smooth, variously tarnished or coloured, generally blackish, or steel gray and iridescent in many parts. They also show an inclination to vary inside when broken, as the flaws are often tarnished and iridescent: the darkness of the tints, however, helps to distinguish it from other Copper ores. They are rather easily scraped with a knife, and may always be known from the other Sulphurets of Copper by the purplish red colour of the fresh fractured surfaces.

Analyses by Klaproth.

Copper	63·7	58	69·50
Iron	12·7	18	7·50
Sulphur	19·0	19	19·0
Oxygen	4·5	5	4·0

I have a beautiful specimen accompanied by green and bronzed mammillated Copper from Cook's Kitchen, in which the faces of the crystals are yellow bronzed in one view, and green bronzed in another; thus the two cubes in the groups are distinguished from each other by their colour.

I am obliged to the Count de Bournon for the loan of the *two lower specimens*.



Nov. 1. 1813 published by Jas. Sowerby London

TAB. CCCCXCVII.

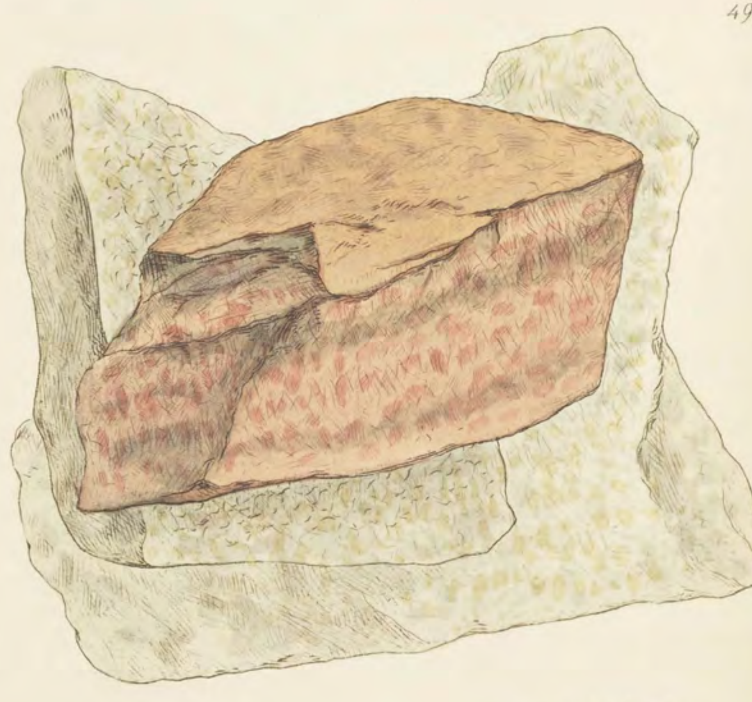
CALX carbonata.

Amorphous Carbonate of Lime.

Div. 3. Amorphous.

In *tab.* 79 I have figured the Red or Variegated Primitive Marble from Tirie; it is of a very fine grain: the present specimen is of an equally fine close waxy texture, semi-transparent and white; it would be beautiful, if it could be got in massive blocks, for the purposes of the statuary. It however seems, from what I have of it, either to have been gathered unskilfully, or it is generally of too slaty or fissile a structure for such purposes; and even when it looks uniform, it is often full of threads of Tremolite or granulæ of Quartz. It is heavier than common marble, and is said to have a portion of Carbonate of Magnesia in it; whence it has been ranked with the Dolomite, so named in honour of Dolomieu, who noticed such marble abroad; but which is not now considered a distinct species. The fine texture is its distinguishing character. I do not know any substance with which it may be compared in that respect, better than that of the Chama gigas, which has no appearance of granulæ or crystallization. *The squarer piece in the* *back ground* has less of the fissile divisions, and contains fewer of the hard granulæ, that are so detrimental to it for the masons' use. It has a small vein at the bottom partly crystallized. I believe it sometimes alternates with the other Tirie Marble, and sometimes with small grained Gneiss containing Garnets, &c.

498



Nov 1 1812 published by Jas. Sowerby London

TAB. CCCCXCVIII.

CALX carbonata.

Coarse Primitive Marble, or Limestone.

A GREAT part of the Earl of Arran's estate at Donegal in Ireland has this Marble in some variety: it much resembles Carara Marble, and I think it might be chosen equal in quality if not superior to it. There appears, from the specimens I have seen, and what have been described, to be great choice of it. *The front specimen* is the common or large-grained variety: it seems composed of regular sized broken pieces, less than peas, of partly crystallized Carbonate of Lime, lying close to each other, and adhering so as to form a tolerably firm and compact mass, sometimes a foot or more thick, and uniform. The present specimen is chosen to show the variety of stratification; it is striped as it were with a mixture of Pyrites, and Mica with the appearance of Chlorite: Mica is also on its surface, and seems to be common to it, and disposed nearly as in Gneiss, dividing it into plates or laminæ. *The middle piece* is of the more common dirty grayish tint, which, added to its coarse grain, renders it unpleasant to those who are used to Italian Marble. The other piece is of a finer grain, and very nearly corresponds with the true Carara Marble above mentioned.

The exposed parts of the rock which is composed of this Marble, are apt to disintegrate and crumble; and, like other stones quarried, it ought to be kept from the sun and air, and dried gradually, if intended for durable uses.

[illegible] published by Jas. Sowerby Lon.

TAB. CCCCXCIX.

ARGILLA subsulphata.

Subsulphate of Alumine.

Class 2. Earths.	*Ord.* 1. Homogeneous.
Gen. 1. Argilla.	*Spec.* 3. Subsulphate.

Syn. Subsulphate of Alumina. *Thomson's Annals*, 2. 238.
Alumine Pure. *Haüy Tab.* 58.
Pure Clay. *Jameson*, 1. 294.
Native Argill. *Kirw.* 1. 175.

Some time since my first acquaintance with the indefatigable Mr. Mantell, he sent me, along with Crystallized Carbonate of Lime in Chalk, (see Brit. Min. tab. 457.) and other things from Beachy Head, a specimen, which I put on one side to examine when opportunity offered, as it presented to me a new appearance. I was soon after favoured by Mr. Brande with a specimen of pure Clay from the Cliff at Newhaven in Sussex, and was struck with their similarity: they have since proved to be actually the same; for Mr. Mantell found his specimen among some Beach stones near Lewes, which had been brought from Newhaven, where Mr. B. found it, and from whence Mr. M. has sent me additional specimens. By careful examination, Dr. Wollaston and Mr. Smithson have found it to be a Subsulphate of Alumine. See *Thomson's Annals*, v. ii. 238.

The description of pure Clay from Halle in Saxony (in Kirwan, and most authors since,) accords so well with this substance, that I feel no hesitation in pronouncing it to be the same; it apears also to occur in a similar situation, as it is accompanied by Gypsum.

It has been suspected by Widenmann and others, that the pure Clay of Halle is only the refuse of some chemical laboratory; Jameson, however, says that its external shape is sufficient to prove it a natural production. The Gypsum that accompanies it, and a similar substance being found in other places where no doubt can arise, confirm his opinion. I am much gratified that this question is settled by specimens discovered in my own country, making a valuable addition to British Mineralogy.—I here quote my assiduous friend's letter on his sending it me from Newhaven, in which he describes its locality: "It occurs both stratified, and in tuberose masses, upon the Chalk, and under a stratum of Sandstone. The first reaches to a great height, perhaps two or three hundred feet above the shore; and as there are several distinct strata of Marle above the Subsulphate of Alumine, it is impossible to obtain any of the latter immediately from its native bed without exposure to considerable danger. Large fragments of the cliffs are, however, frequently falling down, so that a pretty good supply may generally be procured. I consider myself very fortunate in meeting with such beautiful specimens, as two French gentlemen had been collecting it but a short time since."—When fresh gathered it is somewhat unctuous to the touch; it has a horny semitransparency, and is perfectly white; when dry it is smooth but not unctuous, and is opaque; it does not adhere to the tongue, but rubs off on the finger; when wet it cuts like soap, when dry it is smooth, and very soft under the knife; a low red heat renders it friable: according to Kirwan it is infusible at 166° of Wedgwood.

The analysis of a specimen from Halle gave Fourcroy,

Alumina	45
Sulphate of Lime	24
Water	27
Lime, Silica, and a Muriate	4
	100

while Mr. Simon of Berlin found

Alumine	32·50
Water	47·
Sulphuric Acid	19·25
Silex	0·45
Lime	0·36
Iron, Oxide	0·45
	100·00

The Rev. Mr. Western has given me specimens exactly like ours, but smaller, from Lissey in Moravia.

The upper specimen has a very little ochraceous Marle about it in the crevices, and the tuberose appearance is rather smaller than usual; but smaller and larger masses resembling the head of a cauliflower, &c., are found, which differ but little from it. *The lower figure* is somewhat more crumbly, and surrounds a fragment of Common Flint Pebble. Masses of Marle and Crystallized Sulphate of Lime, more or less coloured by Iron Ochre, often accompany these nodules. The Subsulphate of Alumine appears to result from the decomposition of Iron Pyrites, producing Sulphate of Iron, which is again decomposed by the Clay or Lime.

500.

Nov 1 1813 published by Jas. Sowerby London.

TAB. D.

FERRUM hydro-oxygenizatum.

Hydro-Oxide of Iron.

Class 3. Metals. *Ord.* 1. Homogeneous.
Gen. 8. Iron. *Spec.* . Hydro-oxide.

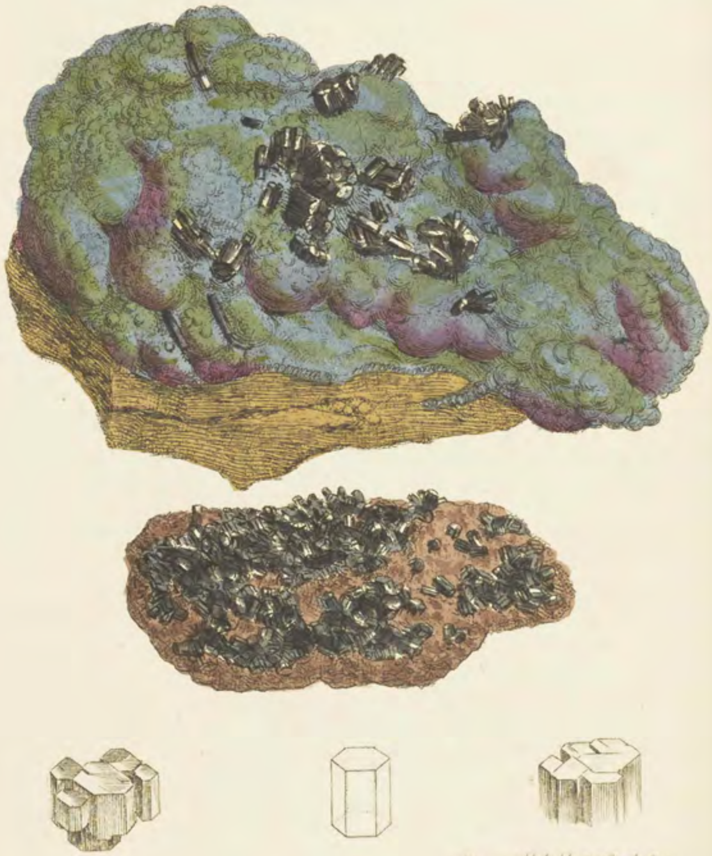
SYN. Fer hydro-oxydé. *Bourn. Catal.* 284.
Fer oxydé. *Haüy Tabl.* 98.
Brown Ironstone. *Jameson.*

HAVING some time had a desire to exhibit some varieties of Ironstone, I now feel a satisfaction in adding the present specimen to British Mineralogy. It occurs in a stratum of indurated Marle that rests on a thin seam of Surturbrand, (see *tab.* 189) called, in such a situation, Coal: the Surturbrand is mixed with striated Gypsum, which beneath is crystallized in abundance in a looser Marle, immediately above the Sandstone that is over the Subsulphate of Alumine; see *tab.* 499. The impression of the leaf looks like the larger foliage of the Platanus orientalis; but as the impression does not expose the extremities, it cannot be yet determined *. In the same mass are the remains and casts of bivalves †, perhaps Cyclades, resembling the Linnean

* It would, if ascertained, be a further illustration of a received opinion, that British Fossils nearly resemble the recent productions of the East.

† This is the only instance I have seen of leaves and shells together, except a Fern cast in Ironstone, accompanied by an Unio of Lamarck. See *tab.* 33 of Mineral Conchology.

Mactra solida or subtruncata, which is also found abundantly in company with the Cerithia in the bed of Blue Clay above, at Woolwich. Thus we have some indication of a contemporary formation: the shells at Woolwich are abundant, and much in the same state of preservation. A cast of an Unio also accompanies the Cyclades in this ferruginous stone. I do not know how it is in Wiltshire, where the Ironstone so much resembles Scoria, and is peculiar for its strange impressions, which I can only compare to the cast of some shell that has a low spire, but the inside seems to have a subdivision that gives it the appearance of being double, and the termination when perfect is like the end of a ram's horn. I hope, from the inquiries now making, to see these more perfect for Mineral Conchology. These casts are accompanied by many other species, but not so distinct as I could wish; the mass often includes little Flints, whole or broken, or bits of Chalk; but is often full of hollows like Iron Scoria: it is certainly only a deposition of Oxide of Iron from water, cementing together any thing in its way, as rusty iron often does. I have added a specimen at the bottom of the plate.



Nov. 1 1813 published by Jas. Sowerby London.

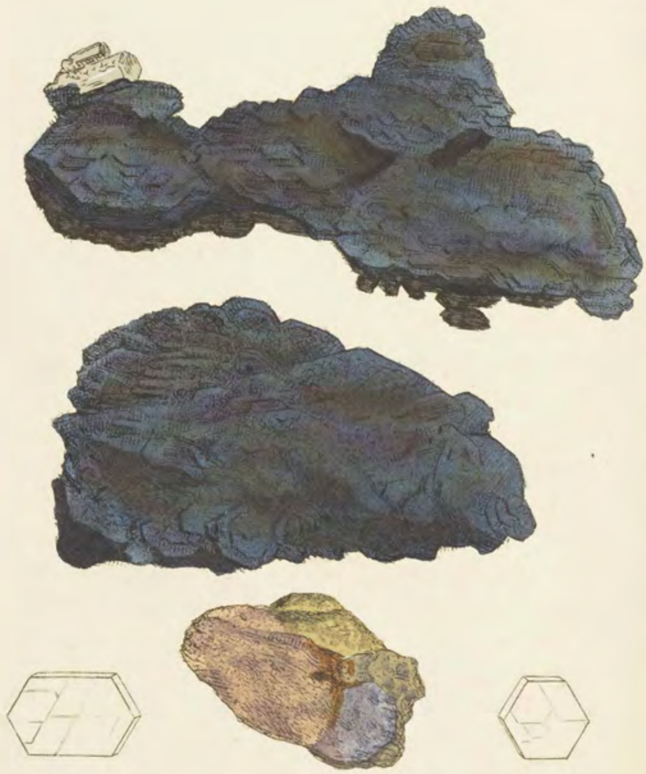
TAB. DI.

CUPRUM subsulphureum.

Subsulphuret of Copper,—Vitreous Copper Ore.

SYN. *Bournon's Catalogue*, 219.

Tabs. 359 and 360 have already shown some modifications of this species of Sulphuret of Copper. The present specimen exhibits single or grouped hexaëdral prisms often heaped in a curious order, generally very distinct from the Pyrites on which they lie, as if scattered over it by chance. The sides of the prisms are more or less broad, corresponding with an irregularity in their aggregating; nevertheless the angles measure constantly 120° or 60°. They are relieved by the fine contrast of colours in *the upper figure* among beautiful blistered Copper Pyrites; see *tab.* 432: in *the lower specimen* they are upon a piece of Quartzose Oxide of Iron;—both are from Cornwall.



Nov. 1. 1812 published by Jas. Sowerby London.

TAB. DII.

CUPRUM sulphureum.

Buntkupfererts.

The late Mr. Philip Rashleigh in 1802 figured a specimen of this appearance as a Gray Copper, which it was then understood to be, and of which there are some specimens that much resemble this, being hexaëdral tables; but the grayness of the surface, generally, and the want of redness inside, constantly, distinguish them.

The present specimen was probably some time before the above period presented by Mr. Rashleigh to Mr. Day, from whom it came into my possession; and it is really so nearly similar to Mr. R's figure, that it might seem to be the same specimen. I have some tolerable specimens without the prismatic colours on the surface; but the coppery redness of the interior is, however, conspicuous.

Some of the plates are three- four- or five-sided, arising from the enlargement of some of the sides at the expense of others; the angles necessarily remaining 60° or 120°, in conformity with the regular hexaëdral prism. *The middle figure* represents the common appearance of this substance in a moderate specimen. *The bottom figure* is from an amorphous fragment. I presume all are from Tincroft Mine in Cornwall. The primitive Crystal, &c. has been described at *tab.* 496.

503

Nov. 1. 1813 published by Jas Sowerby L.

TAB. DIII.

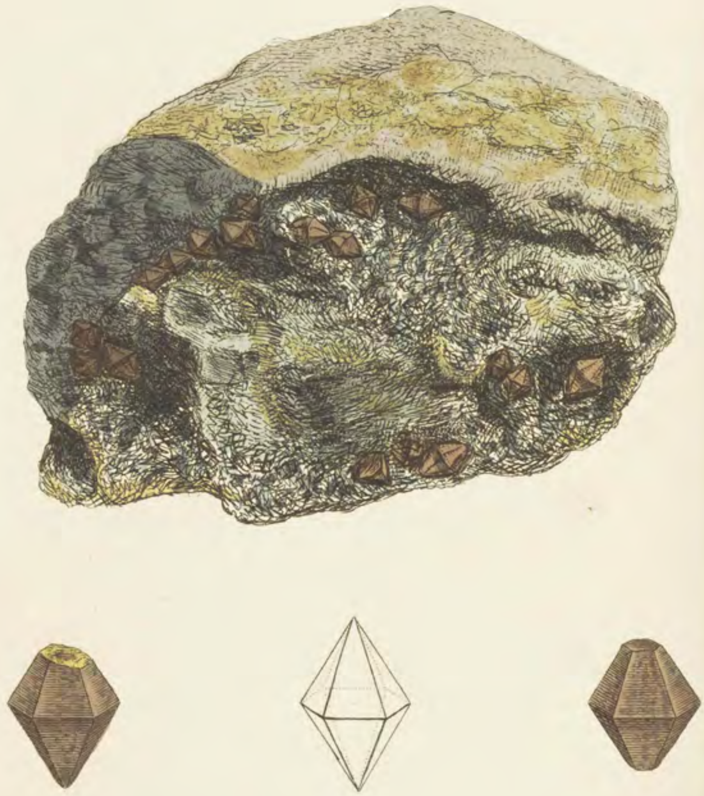
CUPRUM sulphureum arsenico-ferriferum.

Gray Sulphuret of Copper.

Class 3. Metals. *Ord.* 1. Homogeneous.
Gen. 12. Copper. *Spec.* . Arsenico-ferriferous Sulphuret.
Div. 1. Crystallized.

SYN. Cuivre gris. *Haüy Tabl.* 86.
Cuivre et Fer sulfuré gris. *Bourn. Catal.* 223.
Gray Sulphuret of Copper, &c. *Brit. Min. Tab.* 358.

My kind friend, the well-known and scientific Mr. Stackhouse, of Pendarvis, favoured me with the best specimens I had seen of this substance from Cornwall, some six or eight years since. I did not then know that I should not see better. I now believe there are not much better specimens, nor larger Crystals known. It is more common in small steel-grained-looking Crystals, whence this Ore has commonly been called Steel-grained Copper Ore. Its surface resembles fine polished steel, with rather a whiter lustre; and my friends must conceive a little from the description, as our methods of imitation will not so nearly resemble this steel-like lustre as could be wished. *The figure at the bottom of the plate* shows the forms of the crystals magnified : *the right hand figure* shows the truncations on the triëdral angles, which are sometimes only one or two, and correspond with the planes of the tetraëdron or octaëdron; and are so irregular in size, as to confound young crystallographers, by disguising the other faces; especially among such shining groups in holes and corners.



Nov 1 18[illegible] published by Jas. Sowerby London

TAB. DIV.

CUPRUM sulphureum, granulare.

Granular Sulphuret of Copper.

Class 3. Metals. *Ord.* 1. Homogeneous.
Gen. 12. Copper. *Spec.* . Granular Sulphuret.
Div. 1. Crystallized.

Syn. Cuivre et Fer sulfuré d' un jaune pale et d'un grain fin et compacte. *Bourn. Catal.* 232.

Among my Cornish specimens of Gray Copper, I have long retained one, peculiar for several acute bipyramidal dodecaëdrons of a dull slightly metallic lustre, rough surface, and grayish brown colour, that are dispersed about it. The greater part of the specimen is Quartz and Common Copper Pyrites, the surface of which is covered with many rhomboidal dodecaëdrons of Gray Copper, partly imbedded in each other: the pyramidal dodecaëdrons are scattered among these, but not imbedded. Their fractured surface is dull, and exhibits a fine granular texture and grayish yellow colour: their hardness is less than that of Common Copper Pyrites, and they are rather sectile. It appears to me probable that they may be the same variety of Copper Pyrites, only crystallized; as that commonly called Blistered Copper, which the Count de Bournon has lately distinguished by the name of Cuivre et Fér sulfuré d' un jaune pale et d'un grain fin et compacte; of which *tab.* 432 is a representation.

The middle figure shows the apparent proportion of the crystals magnified; they are seldom so short as Quartz, but appear occasionally to be longer than this figure. *The right hand figure* shows a truncated one, with blunt terminal edges; and *the left hand figure* is intended to show the fracture, which is rather rugged, and shows the yellow metallic lustre, proper to it according to the Count de Bournon.

JS 1816.

TAB. DV.

TURF.

Turf and the return of vegetable into fossil or mineralized matter has been allowed as a mineralogical subject in many instances, and is highly providential. In numerous places in Great Britain there are large bogs which afford a cheap fuel, so essential an article in human economy, where it would be otherwise very rare. The plants peculiar to bogs of this kind are chiefly annuals which require but little earth, and having flourished for their season, subside on the bed, where nature preserves their remains in progressive stages from the oldest to the newest in succession for ages, to be produced and used periodically,* almost immediately, or as an heaped and lasting store for futurity, being as it were the simplest chemical agency to form a sort of coal, and that from the very surface of the earth, whether in valleys or on hills.

The first figure is the looser turf and upper surface, it shows the remains of decayed vegetables and is a little inflammable. The next figure, 2, is older, more compressed, and often in the state of touchwood; when dried if set on fire, it burns like a fusee; it is of a warm brown colour. Fig. 3 is a still more compressed sort, harder when dryed, and shines when sawed asunder; it is of a dark brown colour, and is longer burning. Fig. 4 is still more compressed and hardened, having, occasionally, dense black Carbon interspersed, see the lower figures; it represents a specimen from Ireland, where the others are also very common. The late Dr. Scott, of Dublin, who sent it me in 1800, observed this black substance separate in some of the bogs, appearing like a jelly, but when dried became black, dense, and brittle about as hard as charcoal, and burning with a poignant vegetable odour and without flame.

The third specimen is a variety gathered by Miss

* Being fit for fire turf in from four to six years.

Codrington, at Muddiford, near Christchurch, Hants, and seems to have undergone some further change, being very hard and somewhat porous, resembling Coke. Thus I have given the chief varieties of this curious substance. It may be proper to observe, that these while in the wet bog remain soft and more or less spongy; after drying they shrink much, and the denser ones are not to be softened again in water.

Thus small annuals are resolved into a coaly substance retaining much of the character of vegetable extract on the uppermost surfaces of the earth in which the remains of trees are preserved for ages little changed; the next surface, in the Clay stratum presents us with wood changed to what is termed Plank and Bovey coal, tab. 188; the next and further change is the substance called Surturbrand, then succeeds the Alum Clay with the wood more dense and jet, tab. 51; but none of these belong to the common coal formation. Portland and Kimmeridge afford a bituminous Clay, possibly the bituminous infiltration may be owing to the stumps and remains of trees found replaced by stone. (See tabs. 163, 164, and 473.) The common coal basins, as they are usually called, are different from either of these, and are under the more ponderous pressure of Sandstone, Limestone, &c. having the woody remains most distinct in the form of burned Charcoal, as at Newcastle, &c. with a brittle black admixture of Bitumen, tab. 48, also, most of the varieties, as Splint, &c. perhaps including the stone Coal of Wales; the Kilkenny Coal, and Natural Coke.

The Turf and Peat bogs in some parts of Lancashire are highly impregnated with Petroleum; in other respects I presume they are the same. I have specimens of Turf with Gypsum about them by favour of Mr. Skrimshire from near Lynn, which, in some measure, show that the waters there held Gypsum in solution. It seems that the simplest operations of the seasons produce this useful substance as it were spontaneously: a very little earth washed in is a sort of casualty.

J.S. 1816.

TAB. DVI.

CALX carbonata, magnesiata.

Flexible Magnesian Limestone.

SYN. Flexible Limestone. *Annals of Philosophy,* Vol. 4. p. 517.

FLEXIBLE Magnesian Limestone has been long known in the neighbourhood of Sunderland, it lies in horizontal strata in the Marsden rock, about five miles distant, southward, near the sea. It was not procured for scientific research till lately; at first it was rather plentiful, but I understand it has now become rare.

Flexible Siliceous Sandstone from Brazil has long been considered as a curiosity, and certain Limestones have been made flexible by means of heat; the dark marble of the Black rock near Cork, has been observed by the Masons to be flexible when in thin and long strips, yet I believe none of these are so flexible as the present, which I cannot but consider as a curious independant addition to British Mineralogy, not being known abroad in the magnesian rocks; indeed the Sandstone above mentioned is scarcely, if at all, noticed in many mineralogical works. The kind from Sunderland has the appearance and feels like a fine-grained Sandstone, and is of a light yellowish brown colour; soiling the fingers or having an earthy softness similar in that respect to common Chalk. It has a somewhat fœtid odour when scraped while damp. It is laminated and will divide into various thicknesses, being generally sold in pieces of a foot to two feet or more long, and from a quarter of an inch to three-eighths in thickness: it may be bent most when wet, and returned straight again. I got a piece 14 inches long, 2 inches wide, and one twentieth of an inch thick; when dry it seemed hazardous to bend it more than $3\frac{3}{4}$ inches, (for I had broken similar pieces in such attempts) but in water or while the water was perceptible in it, it bent $4\frac{3}{4}$ inches, when it broke.

We are obliged to Dr. Thompson for his analysis published in the Annals of Philosophy,

Carbonate of Lime	62.00
Carbonate of Magnesia	35.96
Insoluble matter	1.60
Loss	0.44
	100.00

Dr. Thompson says this Magnesian Limestone has been long burnt in the neighbourhood, and sent to the South and North, and no complaints have been made of it as a manure, and some affirm that Carbonate of Magnesia is not injurious to land. Dr. Wollaston considers it as a granular magnesian Carbonate of Lime cemented by common Carbonate of Lime. It seems a floated settlement, and sometimes flattened empty or air spaces are conspicuous in it; that these spaces tend to promote its flexibility seems probable, and the looser laminæ of the mass are in general most flexible, but this stone does not appear to possess the elasticity of Bitumen, which Mr. Hatchett thinks owes that quality to its spongy texture and the air contained in its cells. Whether the effect of the sun's warmth contributes to its flexibility, as heat does to make marble flexible, may be but little doubted, as I have a piece which admitted some fibres of roots or Rhizomorpha betwixt its laminæ. In bending it feels firmer than the flexible Sandstone of the Brazils, that giving a loose shaking sensation to the hand.

There are other flexible stones such as Gypsum, Talc Mica, Asbestus, one variety of which, figured in tab. 122. bears much general resemblance in appearance to this, its flexibility, however, depends upon its fibrous structure. A sort of Sandstone, elastic and flexible in water, was brought from the beach of Haynau near Canton, in the Chinese Seas; it is above half an hundred weight, and is compared to a piece of Boiled Beef; it was bought at an hundred guineas value, and I believe is now in the possession of Mr. Mawe.

J.S. 1816.

TAB. DVII.

ARGILLA Andalusiæ.

Andalusite.

SYN. Cubic Feldspar. *Karst.* 2 *Bergm. Journ.* 1788, p. 809.
Petrilite. *Kirw.* 1. 325.
Andaluzit. *Werner.*
Stanzait. *Flurl.*
Mikaphyllit. *Brunner.*
Feldspath apyre. *Haüy Traité* 4. 362. *Tabl.* 60.
Scotch corundum. *Brit. Min. t.* 69.

THE grey variety of Andalusite has scarcely been noticed, except by Dr. Blake as mentioned by Dr. Fitton in the Geological Transactions: the specimens discovered by him at Killiney in Mica Slate were in part internally of the characteristic red colour, and some of them are scopiform. The substance I have figured as Corundum, from near Aberdeen, possessed the characters of the Andalusite from the Forez which the Count de Bournon first described, as *Spath adamantin d'un rouge violet;* I allowed myself to be guided by great authority, therefore, could connect it with nothing but Corundum, from which it is now admitted to be distinct. Kirwans Petrilite seems to have remained in obscurity, until Dr. Fitton, after examining the Leskean collection, made it known that it is what Werner has since called Andalusite, and that Karsten was the first discoverer of it calling it, Wurflicher (Cubic) Feldspath.

Such specimens as the two upper ones here figured I have repeatedly received from Aberdeenshire; they are worn pieces of micaceous Schistus, in which are imbedded grey rectangular prisms much harder than the rock; the fracture of these prisms, parallel to their sides, is laminated, slightly glistening, across them it is splintery. They are infusible. I have been puzzled much by them, but considering the grey variety of Adalusite, of Killiney, is intermediate between them and the red, it seems proper that they should be included under the same species.

Below is figured a specimen of micaceous Schistus containing similar prisms but much softer, and more allied to the black parts of the crystals of Macle. They seem to strengthen Mr. Stephen's supposition, that there is a connection between these two minerals, an idea that receives some additional strength from the tubular form sometimes assumed by the Andalusite, as formerly observed in Brit. Min. 1. p. 145, the similar position of the laminæ and the variable degrees of hardness of the two substances. It is much to be wished that comparative analysis were made. I would observe, that the measures given formerly by me, are incorrect, being taken upon rounded or modified faces, and not from the fracture, which produces a rectangular prism.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J.S.1816.

TAB. DVIII.

SILEX piceus.

Pitchstone var. laminated.

Pitchstone in lamellar concretions was first found by Professor Jameson, forming a vein in Granite, in the Isle Arran, it has since been found at Newry of a more open structure, approaching to columnar, also traversing granite; of this the following account is taken from a paper of Dr. Fitton's in the Geological Transactions:---" The vein is first observable in the township of Newry at the bottom of a bank of Granite, above half a mile from the northern end of the town, on the right of the road leading to Downpatrick; it crosses the road and runs due westward, ending on the side of the great road from Newry to Belfast. Its length, so far as hitherto observed, is half a mile. The rock, which is covered with mould to the depth of about a foot, consists of grey Granite; the vein is about two feet and a half or two and a quarter in width; at the places of contact both the Granite and Pitchstone are disintegrated, the latter being almost as soft as Clay, but becoming gradually harder as it approaches the centre of the vein. The structure of the vein is foliated, the folia being perpendicular to the horizon and also to the walls, and besides these there are seams, that run longitudinally, parallel to the horizon, and nearly perpendicular to the folia."*

The first figure exhibits a specimen from the interior of the vein of Newry, it is easily divided into irregular, but commonly four-sided prisms, their sides often concave, and their ends showing the vitreous fracture, with se-

* Trans. of Geological Society, Vol. 1. 278.

veral small vesicles, scarcely visible, except with a lense; a few white semitransparent crystals of Feldspar are scattered through it. Fig. 2 represents a specimen from the side of the vein were it unites with the granite, its laminæ are smaller; its surface quite dull, and its fracture approaches to earthy; it has altogether more the appearance of a Clay stone porphyry than of a Pitchstone. Both of these are from the extensive Geological collection of G. B. Greenough, Esq.

Fig. 3 shows the variety from Arran, it is a much more perfect Pitchstone than either of the others, being of a more glassy texture and less easily divisible into plates, and scarcely at all into prisms, it is also of a much deeper colour; I have it by favour of Mr. P. Neill with other interesting specimens.

509.

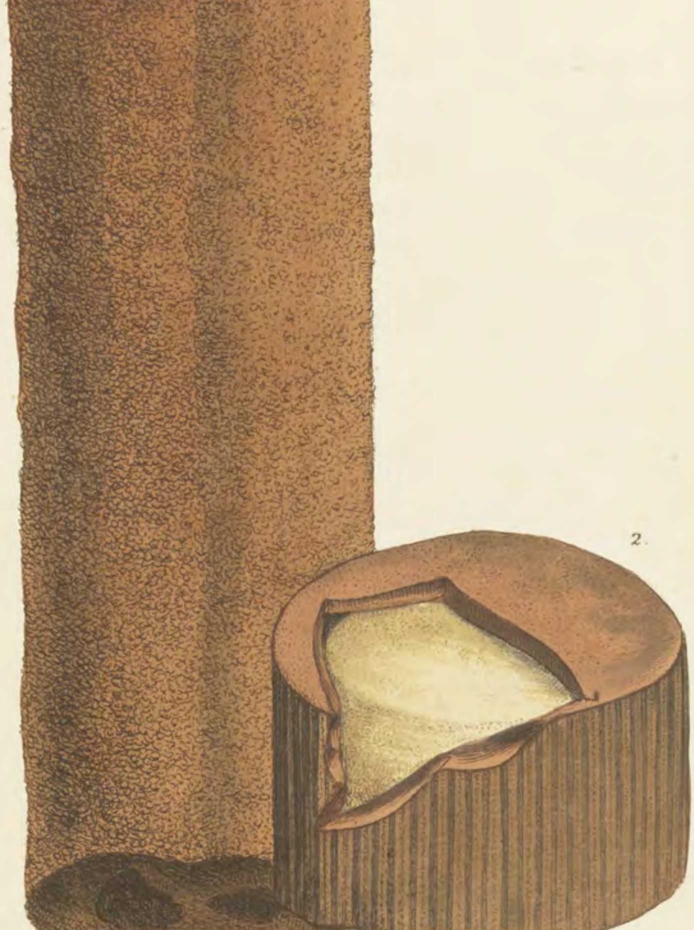
J.S. 1816

TAB. DIX.

SILEX fragilis *var.* scopiformis.

Scopiform fibrous Hornblende.

This brown variety should not be overlooked, especially as it is attached to a substance often called Pitchstone, figured in tab. 357 and 475, but which is rather a kind of Jasper, as it is infusible. The present specimen has some Galæna about it, others are accompanied by Iron and Copper pyrites, Blend Quartz, &c. The radii spread from centers and occasionally intersect each other irregularly; it is not so hard as the purer kind; is more liable to decomposition, and is somewhat dull and earthy. In some specimens the fibres penetrate the Jasper, and are so intimately mixed with it, as to produce a mineral with intermediate characters. Its locality I have not exactly learnt, it is some mine in the vicinity of Redruth. Mr. Greenough possesses an excellent series of specimens, from one of which my figure is drawn. I possess a specimen marked Scotland by Mr. Day.



J S 1816.

TAB. DX.

FERRUM hydro-oxygenizatum.

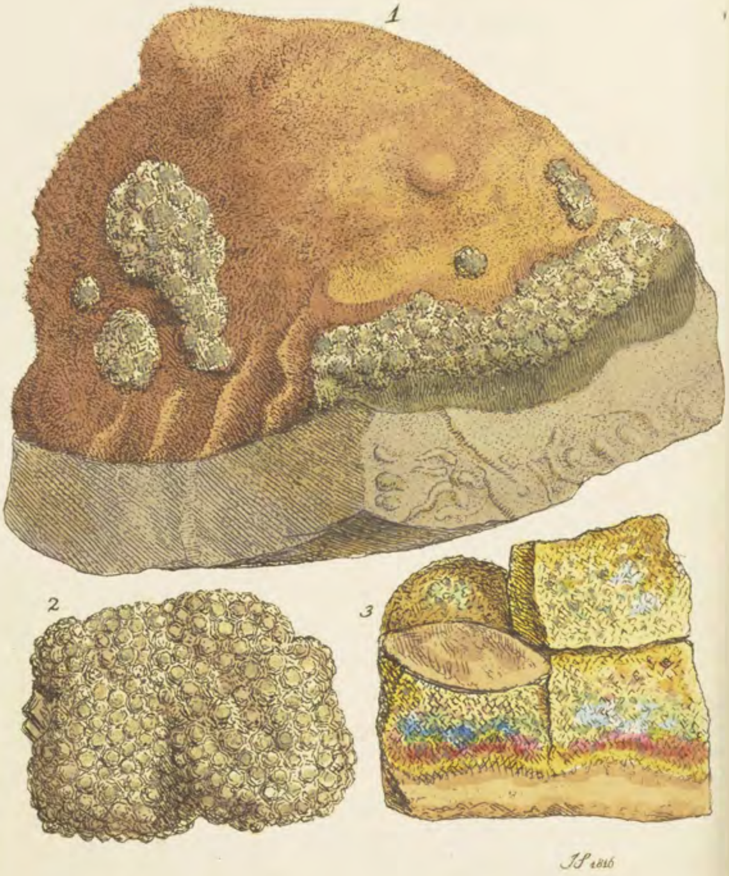
Hydro-Oxyde of Iron.

One of my former friends, the late Dr. Jackson, sent me this from Derbyshire in 1808, probably gathered at Nottingham, in the sandy remains that supply Fullers earth, see *tab.* 231. I believe they are not rare there as I had formerly seen others very similar. Hydro-Oxyde of Iron causes many fanciful shapes; the present form is somewhat striking and may lead to information. Now to hazard a conjecture respecting their origin, they may possibly be formed by water containing Carbonate of Iron, making its way upward through the sand, depositing the Iron oxyde in its passage so as to give it permanency. I understand they are sometimes two or more feet long. I shall be glad of further information upon the subject, as I shall perhaps, have to say more about them hereafter. The sand attached to them has a few particles of Mica in it, and the grains are for the most part very small, but rather largest externally.

The cementing power of this Iron thus deposited is curiously exemplified in the other specimens from the Grit rock in Mortyn park quarry, by favour of Mr. Farey. The Clay has been separated from the surface of the Ironstone filling the remains of a reed, and the oxyde freed from its carbonic acid* has been left forming a crust on

* Argillaceous Ironstone seems to be Carbonate of Iron mixed with Clay, the ochres and brown oxydes of Iron are in general found to contain water, and may, therefore, be distinguished chemically as well as mineralogically from the Red or peroxyde, which is free from water. The Systematical Index will show to which of these species each of the figures already given belongs.

the outside, strong enough to make a complete oval neat box with nearly a flat bottom and top, including a nucleus of decomposing Ironstone shut up in it as if contrived by human art. It evidently belongs to the coal formation, as most Arundines are characteristic of it, and this has some small vestiges of coal on the outside.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JS 1816

TAB. DXI.

FERRUM sulphureum.

Mammillated Sulphuret of Iron.

In common every discoverer of this very pretty attractive substance becomes elate at the idea of having found Silver or Gold; some means of undeceiving such, with other useful information concerning it, should not be overlooked.

I have shown some varieties of pyrites already in this work; the present specimens, however, are somewhat instructive as well as pretty. Fig. 1 is from Highgate Tunnel, it is part of a Clay marle septarium, covered for the most part with waxy brown spiculæ of Carbonate of Iron, with various little masses of the pyrites, which have a blistered appearance and are of a bright silvery lustre, mostly composed of very small smooth faces of cubes or cubo-octaëdrons, (highly resembling such as are found more solid in the Cornish Copper mines, see fig. 2.); the base shows the marly clay outside, and a few marks, caused, probably, by some animal remain. Fig. 3 represents a few septa of a small specimen with iridescent pyrites, mostly inclining to octaëdrons and more or less dull, spread over the surface of every interstice, probably as deposited by water; even a bit of a Crab's claw is included. The beautiful brilliancy of the original must be conceived in a great measure, as it could not be equalled, yet the information I believe will not be misunderstood. This specimen was more ochraceous in the tint of the Clayey marle. Pyrites such as these seem to occur every where, even in primitive mountains. The Cornish ones are apt to decay, as do some of those from Highgate.

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J.S. 1816.

TAB. DXII.

FERRUM carbonatum.

Carbonate of Iron in rhomboidal spiculæ.

THIS brown Carbonate of Iron encrusts the columns inside the Highgate and Sheppey Septaria; at the latter place it is called waxen vein, see *tab.* 172: a term the appearance of some varieties seems to warrant. It is not long since most of the linings of Septaria have been proved to be Carbonate of Iron with Carbonate of Lime sometimes filling the interstices; some of those of Suffolk and a few other places, have Carbonate of Lime only. Such as are found in Derbyshire, above the Coal-measures or Coal formation, called Iron stones, (see *tab.* 116.) have whitish Carbonate of Iron in the form of Pearly spar in the divisions, which is generally understood. Carbonate of Iron in its present state, however, is not so generally known as not to require figuring here. The colour varies much as well as the form, the surface being sometimes smooth; at other times beautifully crystallized in spiculæ of various dimensions; some so minute as to give a plush or fine velvety lustre, which is easily disturbed by handling, particularly when fresh gathered. The present specimens are from Highgate Tunnel. Some specimens had upon them the stellæ of Sulphate of Barytes, called Lepastri, see *tab.* 172, but they were rare at Highgate. It may be worthy of notice that many of the cavities of the Septaria lined with Carbonate of Iron, contained a quantity of water apparently very pure, some of which I have had four years in a phial, gathered by B. G. Snow, Esq. who paid so much attention to that place; it should seem that the ingress and egress of the water formed the deposit or lining of Carbonate of Iron, pyrites, &c. and I presume much depended upon the seasons whether this water came loaded or not with substances to deposit, as these linings seem to have been deposited at various times and are often various in the same stone. The upper figure is from a velvety specimen; the lower one shows the spiculæ arranged in tubercles; this kind is sufficiently hard to bear brushing without injury.

May 1 1806

TAB. DXIII.

CALX fluata.

Amorphous Fluor.

The purple specimen was lately sent me by my friend Mr. Samuel Wright of Cork, from near Tipperary in Ireland. Amorphous Fluate of Lime is not very common, and this variety is sufficiently remarkable to claim a place here, while we must not forget the Cornish Chlorophane* that has been particularly noticed by Mr. Phillips, who favoured me with specimens; one of them is represented in the *lower figure*, which, like the foreign ones, is united by Calcedony or Silex intimately mixed, so as to allow of ignition, or rather an exposure to a common red heat several times without cracking, when it gives a beautiful effulgence, or rich glow of a fine green or purple colour, &c. The purer crystallized fluor generally cracks just at the heat that best exhibits the colour, and flies to pieces. The Irish specimens may be heated two or three times, with care, but the glowing colour is not so vivid after the second time.

Our *upper specimen* fractures in somewhat irregular angles, and is interspersed with Carbonate of Lime, from which it is known partly by its lilac tinge and a lustre peculiar to Fluor in all its forms.

In the *under specimen* the Fluor is of a greyish colour mixed with Calcedony, and has brownish or ochracious Quartz interspersed in parts.

* See British Mineralogy, tab. 11.

514

May 1.1826.

TAB. DXIV.

SILEX Achates.

Calcedony or Agate.

(Argilliferous Silex.)

Syn. Silex Quartzum; var. *Brit. Min. Tab.* 83, 160, 307, 309, &c.

This beautiful specimen was found near the surface of the ground at Churchills, near Lanford, Somersetshire; and is part of one double the size, belonging to my kind friend, C. John Harford, Esq. It is instructive in as much as it appeared not to have been long from the rock in which it probably originated, as it has no such marks of violence* as many agates and separate siliceous stones have, thus implying a rock beneath, from which it had been detached. Richard Wilding, Esq. was so kind as to send me a year ago, specimens from Llanrhaiadr, near Denbigh, of a dark grey Limestone, including a great variety of siliceous, coated, hollow, tuberose masses, now I conceive it must be a similar rock that has produced this, a circumstance which may be worthy the attention of those whose leisure will allow them to indulge a desire of forwarding geological knowledge.

The boldness of the circles and the variety of the depositions is superior to any Agate I ever met with, either British or Foreign. The surface of each layer has small

* On the fresh cut side it was observable that the exposed part of the whiter coats was more opaque than the interior, as if the little exposure it had had caused a difference by dissipating the water or loosening the particles, as in common flints, &c.

rounding risings all over it, which are more or less conspicuous in the section, but rather more so in the first or smaller circles; the distinctness or facility of separation intimates a cessation or interval between the layers, thus marking dryer or wetter and more or less copious deposits, and a sort of seasons.

TAB. DXV.

Red Calcedony or Carnelian.

Believing the formation that affords these specimens is very little known, and as far as I know, not hitherto spoken of by any author, I feel much satisfied with a sort of discovery that is very interesting. The *specimen, fig.* 1, is from Llanrhaiadr, in North Wales, as mentioned above; the Limestone containing it is characterised by the remains of a shell, formerly called an Anomia, but now distinguished by the generic name Productus (Min. Con. v. 1, p. 103.) The specimen I have chosen includes this shell, but little changed in substance, and filled with Limestone like the rest of the rock, curiously wrapped up as it were, in the red siliceous mass, which is more or less perfect Carnelian, as the lapidaries would call it, resembling that imported in the rough from the East Indies, &c.* but which has not been assigned to any particular rock, being found, according to the best information I can get, loose upon the surface in various parts. Great Britain affords Carnelians also among the loose gravels of her shores, (see tab. 83.) long worn and

* Some say that many are coloured by art, I should have thought this an unnecessary cheat.

515.

May 1 1816.

disengaged from their primitive situation, very probably from such a rock as that I now figure, by its decay, and this rock remains in some places as a type to assist us in reasoning upon a subject hitherto obscure. The Carnelian appears to be congenial with the Limestone rock, and to occur in various shapes, passing into Calcedony in little round drops, mamillæ, &c. as the figure shews: it has little inverse rhombs of reddish and yellowish carbonate of Lime about it (similar to those of tab. 4, from Carnarvonshire); may they not all belong to such Limestone rocks, as when more exposed to decay, by their situation near the sea, have furnished the Carnelians found among the flinty gravel that so often guards the coast in a very providential manner? Some other specimens shew a nearer approach to flints, such as the Carnelians of the coasts are found among; may they not also have a similar origin? The lighter Calcedony and flints of the Downs of Wiltshire, &c. seem more allied to those of the flinty chalk, as are those of the ochracious gravel, perhaps, for the flints being washed out, rolled, and exposed, would, when mixed with the ochracious loam, absorb more or less of its colouring matter; this opinion is strengthened by comparing many of the organic remains, found in gravel, with those common in the flinty chalk, such as casts of Echini, Terebratulæ, what are now called Alcionii, from which the chalk figured at the top of tab. 7, may be considered to have derived its form,* &c.

The Limestone on the east coast of Ireland contains flints that I understand become redder as they approach the trap which lies over it; the *under figure* is taken from one of these from Larne, it has Analcimé crystalized in a hollow upon it, a substance generally understood to be formed in trap rocks only.

* Tab. 215 shews a configuration depending on other parts of these curious animal remains.

May 1 1816

TAB. DXVI.

FERRUM oxygenizatum.

Red oxyde of Iron.

VELVETY and mamillated red oxide of Iron is not so common as the smooth superficially black or brown hydro-oxyde of tab. 431, we, therefore, do not pass such a beautiful variety over; the powder being red of the one, and brown of the other, is the distinctive mark and very decisive, although overlooked until pointed out by the Count D'Bournon. The present specimén is from Lancashire; it is a valuable one.

The brown oxyde is not, as I know of, valued by the smelter, as it would require more pains and fuel to reduce it, and produce less metal.

May 1, 1816.

TAB. DXVII.

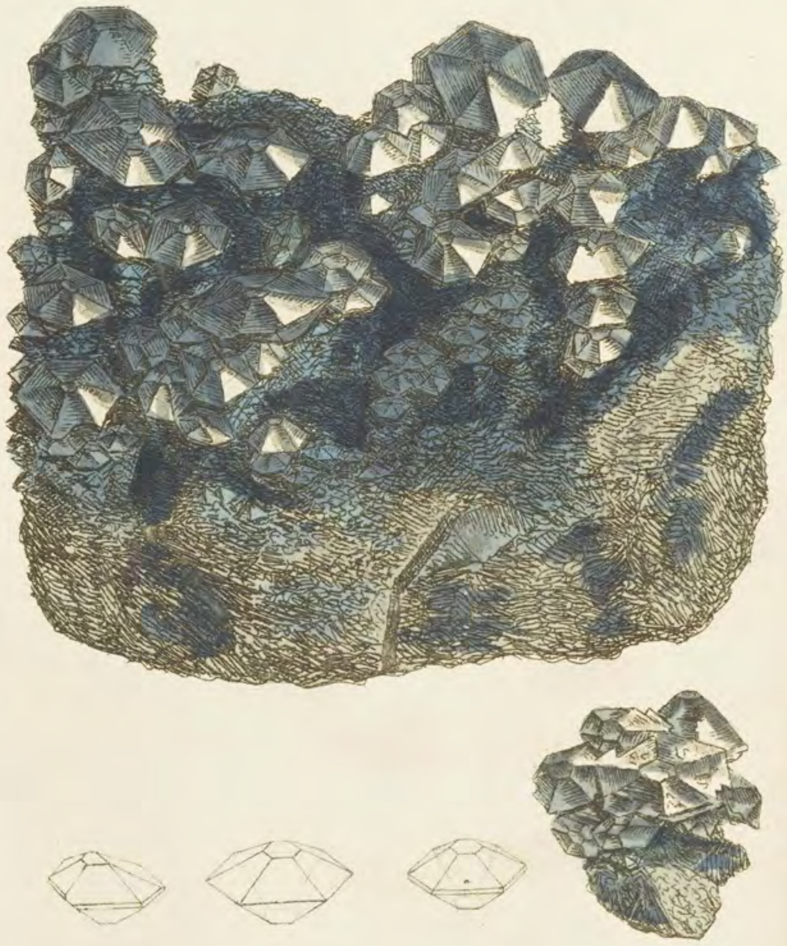
FERRUM carbonatum.

Carbonate of Iron.

The singular specimens here figured are not common, nor have such been much noticed; they are, however, instructive, for which reason I think them proper for this work, and the series I have given is selected rather with a design of shewing the changes taking place under ground, although I bring two different genera under our cognizance in one plate.

The first fibrous radiating specimen I noticed, accompanied the lenticular variety figured in tab. 198; it was of a light brown colour, and the cross fracture exhibited a bronzelike lustre; sometimes each fibre, at others the whole body of fibres had a thin coat of nearly white Calcedony, and in some parts a few fibres penetrated into Calcedony of a red colour. I have since recognized a specimen, formerly Mr. Day's, in which the Carbonate of Iron is blackish, and coated with dull Calcedony; it had often been taken for schorl.

The *upper figure* is from a very pure variety; it is blacker than the one just mentioned, and is free from Calcedony; the form of the crystal is distinctly a very acute or very much elongated rhomb, with a fracture similar to that of carbonate of Lime. Some of the crystals have their apices truncated: among them is a small portion of pyrites, as is shewn in the *magnified figure*. It is probable that this has been produced by the decomposition of pyrites; it seems to occur in a situation where decomposition and change are constantly going on. The *lower figure* exhibits the calcedony as it remains after the carbonate of Iron, of the kind I first mentioned, has decayed: a single specimen often exhibits, when turned about, many stages of this decomposition, and the various forms of the crystal as retained by the calcedony. I have given a magnified representation of a few of these collected together below. It sometimes happens that the pyrites remains among the calcedony, when it is difficult to decide whether the calcedony derives its form from fibrous pyrites or carbonate of Iron, or whether the pyrites have filled the spaces left by the latter; but a series of specimens explains it. There are some lenticular crystals, which serve as supports to the fasciculi; quartz and copper pyrites occur upon both specimens: they are from the same mine as the large specimen before mentioned (tab. 198): in describing that formerly I was misled by the appearance of the pyrites for want of more specimens.



May 1 1816.

TAB. DXVIII.

CUPRUM subsulphureum.

Subsulphuret of Copper, or vitreous Copper ore.

Cornwall often affords us remarkable subjects, and this Copper is certainly one;—not from the variety of the form of the crystal, but from the strange manner in which the crystals are attached to each other and to the mass; at first sight like a number of forged nails with broad clouted heads, such as are beat into shape by a certain number of strokes of the hammer: the oddity of driving such a number of nails half way, or a little further, into any thing, would make a novice suspect it to be something else, and even an adept is at first in doubt. The number on a fine specimen that was in the possession of Mr. Mawe, part of which I have figured, puts us in mind of some fungusses that grow in heaps. The whole specimen, 9 or 10 inches long by 8 wide, had at least 120 principal crystals supported upon other smaller and more obscure ones forming a kind of stems; as in the *lower fig.* taken from a small specimen in the possession of —— Lounds, Esq.

I have figured the six-sided prism (tab. 501) and the acute pyramid (tab. 360), but had in my collection only a poor specimen (tab. 359) that shewed this obtuse pyramid obscurely; the crystals upon the one now figured are so conspicuous and remarkable, that I am pleased to have it before I close the work:—it is still very rare; I have however obtained a similar, although inferior, specimen to shew my friends.

The crystals are most of them truncated; and according to the proportion of their sides the faces are from 3 to 6 angled: sometimes the pyramids are united by short six-sided prisms: they are often rendered a little irregular by transverse striæ: they have but little metallic lustre, somewhat resembling Plumbago; the iridescent, or blued steel colour of their surfaces often adds to their beauty.

The mine from which it was risen, in 1813, is called Wheal Abraham.

May 1, 1816.

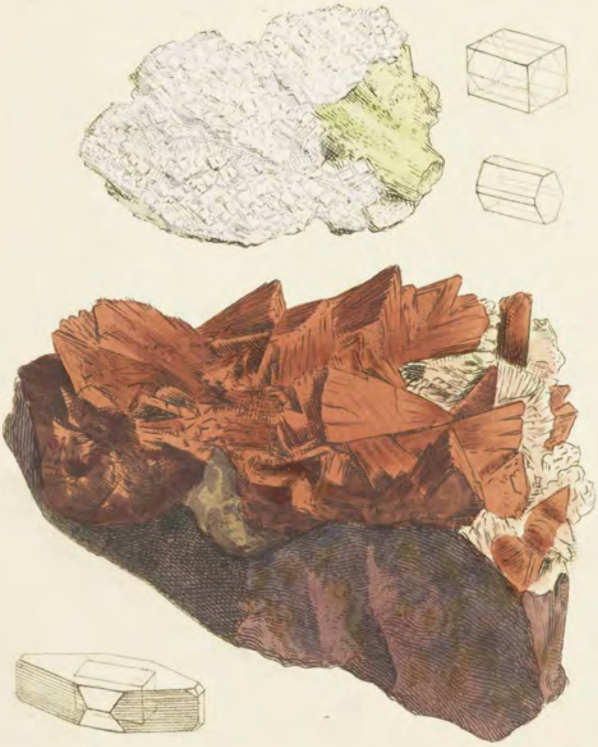
TAB. DXIX.
SILEX Talcum.
Talc.

This beautiful variety I found in the fine Serpentine rocks at the Lizard Point in 1799: as I do not know that it has been before noticed, and as it is not common I am glad to shew it to the learned world. It is accompanied with hardish plates of Steatite and Serpentine; the former somewhat resembling dark coloured Ivory, as in the *upper figure;* the *lower specimen* bears more resemblance to the steatitic substance formerly imported under the name of French Chalk, and used for absorbing grease from silks, &c.: the Serpentine about it is approaching to fibrous. The Talc forms a layer between the Steatite and Serpentine; its laminæ are perpendicular to the surfaces of the layer, and are very long; they are also striated transversely, which gives them a little of the appearance of the Asbestos in veins in Serpentine, from Wales, (see tab. 123). I have one specimen from Portsoy; in it the laminæ require to be examined with a lense to be distinctly seen.

At first I was led by the difference of form from that generally assumed by Talc, to suspect I had discovered Hydrate of Magnesia; but the precision of Dr. Wollaston, who examined a fragment I sent to him, shews it to be Talc, for he found it to consist essentially of Silicate of Magnesia. The Doctor believes the peculiarity of the fracture to be owing rather to the circumstance of the mechanical compression, to which it has been subjected, than to any thing unusual in the composition.

The rich silky or satiny appearance in the specimens attracts the eye, but is not to be so perfectly expressed as I could wish.

520



May 1 1817

TAB. DXX.

SILEX Ichthyopthalmus.

Ichthyopthalmite.

Syn. Apophyllite. *Haüy Tabl. p.* 36.
Apophyllite, Ichthyopthalmite *Bournon Catal.* 101.
Silex Ichthyopthalmus. *Sowerby Exotic Min. Tab.* 26.

In the improved state of Mineralogy since this work began, what was generally considered as Zeolite has been divided into many species; of one of them, the Ichthyopthalmite, or Fishes-eye-stone, only one variety was for some time known, and considered as exclusively foreign; other varieties having been since found, it is discovered that some minerals hitherto thought to belong to the other Zeolites, have been found to belong to it: among them are two or three British ones; that I have figured as Stilbite from Strontian, (tab. 258,) is one of them. The *upper figure* in the present plate shews the primitive crystal upon carbonate of Strontian with carbonate of Lime; it is from Strontian, and serves to illustrate the former plate (258;) and to make it clearer, I have added an outline of the crystal upon that plate: the rounded sides there mentioned are composed of one primitive and two secondary faces confounded together by striæ. The *lower figure* exhibits crystals of an entirely different form; in them all the edges of the primitive are replaced,—the vertical ones by wide faces; the terminal planes are also considerably larger than the sides, so that the crystals have the general form of acutely rhomboidal tables, such as often accompany the fine foreign specimens of prismatic Stilbite, and then shew such beautiful white pearly surfaces and translucent edges. The colour of these crystals is remarkable, and nearly the same as that of the red Stilbite, figured at tab. 260, but rather more inclined to purple, by which a few crystals that occur upon that specimen may by a careful examination be distinguished; they are both from the same rock: the few white crystals about this are Stilbite.

Stilbite, although often very brilliant, may be disguished from Ichthyopthalmite by its inferior lustre and transparency.

J.S. July 1 1816.

TAB. DXXI.

CARBO Bitumen.

Viscous Bitumen.

SYN. Hydrogen Bitumen. *Brit. Min.* ii. 69. iv. 113. v. 17.

THIS is a nearly fluid variety of Bitumen; it exhibits the various tints, from the greenish brown to the rare amber colour, sufficiently, we expect, for illustration. The green may be seen in a liquid state in a phial, at the British Museum, and I have figured the solid green variety tab. 137. all these varieties occur occasionally from the running or liquid state to the hardness of Asphaltum, but of a tougher texture, between Asphaltum and hard leather.

The upper specimen is so soft, that a trifling touch separated some of the bubbling part, exposing the greenish interior, and the other parts retain their bubbled and liquid running like appearance, as if merely a little hardened by exposure to the common air, and if kept in a moderate temperature in a drawer will probably continue as it now is for ages. It is as usual on a variety of Limestone, that occasionally holds Flüate of Lime, Sulphuret of Lead or Galæna, remains of shells, Entrochi, &c. The lower specimen is of the hardness and texture of the softest India rubber, of a more amber colour, and is rather scarce: the Fluate of Lime and stone as usual. They are brought from Castletown, the usual locality. The lower left hand specimen is somewhat magnified to show the irregular structure. The green coloured specimens generally appear orange by transmitted light, which is the reason why the thinnest parts of the specimen above appear of that colour, but the lower specimen is so transparent, that it appears of an orange brown, with very bright reflections.

J S July 1 1806

TAB. DXXII.

CARBO retinasphaltum.

Highgate Rezin, or Retinasphaltum.

SYN. Bitumen resiniferum. *B. M.* 1816.
A resinous substance. &c. *Thompson's Annals,* Vol. 2. p. 9.
Gillman in Monthly Magazine, &c. 31. p. 535. A member of the Lambeth Chemical Society in Do. Vol. 32. p. 108.
Fossil Copal. *Aikins Manual, p.* 64.
Mawes Catalogue.

THE Retinasphaltum figured in tab. 186, leads us to admire the progress of Nature in the various chemical changes in the system. The discovery of an analogous substance in the Clay of Highgate, by B. G. Snow, Esq. Surgeon, of that place; so extraordinary in the Annals of Mineralogy, must raise our admiration, and the more so as it is considerably different from that of Bovey.

At first sight it seems to resemble Resin, and it acquires a low degree of resinous electricity by friction, so characteristic of that division. Its specific gravity when pure is 1.0375; it is in flatted pebble shaped lumps, and seems to have subsided both regularly and irregularly, as if it had been partly in a melted state; part, especially the outside, is of a soft and somewhat corky texture, and whitish; other parts are of a compact resinous texture, from a light yellowish to a dark brown colour, with the glassy fracture, &c. of resin. The light part when inflamed, gives out much smoke of a pleasant odour, melts, froths, and when blown out, subsides rather solidly and like the brown part, which generally has the pleasantest and most permanent odour, melting and burning quietly. Rubbing or crumbling it between the fingers or scraping with a knife, expresses an odour like that of lemon thyme; a very few specimens are rather fœtid. It is softer than rosin in the darker parts, losing its angles and polish by handling; and it differs but little in the other parts which are rather crumbly when not broken or perfect. The lumps are sometimes found independant, at others mixed with pyrites, with various appearances,* sometimes in polished globules, filling a few of the vesicles, of which some pieces have many. A few specimens have been found attached to the remains of stumps of trees perforated by Teredo antenautæ, and to Septaria, but in general they are separate among the Clay from 10 to 90 feet deep. Some globular pieces have been found as large as ones fist, but they are more commonly about the size of broad beans: when boiled in water it communicates a very slight taste to it and swells much, becoming porous, but no part seems to be dissolved. Cold Alcohol dissolves a part of it slowly, and boiling Alcohol digested upon its powder extracts about 36 per cent. of an orange brown odoriferous resin from it, without materially altering its appearance,† except that it is rendered more arid to the touch, for the unaltered powder adheres to the fingers almost as much as that of rosin. Turpentine dissolves it completely, forming a lighter coloured solution, than a

* Although a great quantity of resin has been found at Highgate, perhaps a peck or two, little now remains, because almost all has decomposed. Brongniart thinks some has been found lately on the Continent, and Sir J. Banks and Sir Charles Blagden have procured him specimens from Highgate for comparison, to which I have had the pleasure of adding a specimen from Crockerton, that comparison and analysis might be made to a greater perfection.

† Powdered copal boiled in Alcohol unites into a stiff elastic mass somewhat resembling white caoutchouc, a character that at once distinguishes it from the Highgate Retinasphaltum.

similar one made from the Retinasphaltum of Bovey. It is easily distilled; when a small portion of gas, an orange brown oil, and a very small cinder are the whole products, but no acid, (analogous to the Succinic) or alkali is obtained. It is soluble in Sulphuric and Nitric acids, and convertible by them into Tannin like other resinous substances. The part insoluble in Alcohol seems to be intermediate between elastic Bitumen and Asphaltum; when melted it is of a dark bottle green colour, semi-transparent and free from scent. When inflamed it smells like Bitumen mixed with some vegetable matter.

Mess. Trimmers have occasionally found the same substance in the Brick Clay (blue Clay) at Brentford, and I have had a specimen from Hyde-park, with the Nautili found there, in 1812. Dr. Woodward seems to have described it (Vol. 1. p. 168. No. 45) as "two samples of Amber, brown and foul, found at least 30 feet deep in the pit where they dig clay to make tiles, at Richmond, Surrey," and says, "the workmen call it Rosin, there is in some pieces of it a salt that I take to be Vitriol, which starting and shooting makes the mass very apt to dissolve and fall to pieces, of which I have seen several instances, one of these samples being very little broken, and is covered with an exterior crust, after the manner of all true nodules. Exposed to fire this sort burns and emits an oil and a smell, exactly like that of Amber, but exerts no electric attractive power when rubbed or heated." Again Bk. 2. p. 18. b. 36. "A resinous matter found lying between the bark and the wood of some of the trees dug up in Wilmeslow mosses; they call it frankincense." We are not sure what these are, the former seems most likely to be our substance. I find, by writing to my friend, the Woodwardian professor, that neither of these substances remain in the collection at Trinity College, Cambridge.

The upper figure, or No. 1, is a large piece of the best sort, or such as is not liable to come to pieces or decompose, being free from pyrites; it is a dark rich brown within, and outwardly only coloured by the clay in which it was found: it is about half of a lump which weighed nearly five ounces, and was broken ere it fell into the hands of my kind friend Mr. Snow: it breaks nearly like rezin. No. 2. is a curious variety arrested apparently while dropping like melting rosin; of a duller colour, and has pyrites or sulphuret of iron about it. No. 3. has hollows like bubbles, that seem to have been filled with brilliant pyrites that has passed out, one piece *in situ* excepted : in this piece the lighter and darker varieties are partly mixed. No. 4. is in some parts quite white and crumbly, mingled with a lightish amber coloured variety, its analogy to the light coloured amber, tab. 273. is curious. No. 5. shows a lump of the earthy appearance or variety. No. 6. part of a mass found within a ball of pyrites, surrounded by shells, and which has the earthy texture, having apparently undergone a kind of decomposition or disintegration, probably owing to the pyrites outside it.* No. 7. is a yellow brittle inflammable substance found in the clay at Crockerton, which much resembles the yellow variety from Highgate; the quantity hitherto found has been very inconsiderable, but I have ascertained that it contains an acid, so that it is between the retinasphalt and amber : should the acid prove to be the succinic, (which I rather doubt,) it can only be a variety of amber.

An hasty analysis of the Highgate resin, by digesting 100 parts in alcohol, afforded the following results, viz.

Bitumen, yielding 4 parts of cinder	65.
Resin, not quite free from alcohol	37.5
Oxyde of iron and earthy matter	2
	104.5

The alcohol adheres strongly to the resin, which is easily decomposed : to this circumstance may be attributed the increase of weight.

I formerly observed in a note that the Highgate resin was sometimes found in contact with the septaria : this was thought a mistake, and was *contradicted*. I still have a specimen, shewing it with the remains of wood and Teredo antenautæ, Min. Con. tab. 102 ; thus proving that it accompanies both animal and vegetable remains.

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* See a figure of this whole specimen in Mineral Conchology, tab. 27.

J.S. July 1.1816.

TAB. DXXIII.

SILEX Mesotypus.

Red Mesotype and Red Zeolite.

The colour of the variety of Mesotype exhibited in the upper figure has apparently misled, as it has long remained in several collections among uncertain species. It is formed in Amygdaloid, like the other Zeolites, and has lined the cavities, more or less accumulating or filling them up, or succeeded by Carbonate of Lime or some other substance. The specimen selected has earthy or nearly loose wacke outside; then commences the Mesotype which is conspicuous from its redder colour, and passes in stellated fibres into Carbonate of Lime, of the sort that exposes the diagonal fracture very distinctly, as happens in many Scotch specimens. I believe the outside of the rock or exposure to changes of weather makes them conspicuous, as they seldom extend far within. The lower specimen is nearly all Mesotype, the whiter as well as the coloured part, the stellæ passing either into the solid or perfectly relieved in hollows: it serves to illustrate and connect the above variety with the commoner white ones, tabs. 265 and 266.

524

J. S. July 1 1816

TAB. DXXIV.

SILEX fulgens.

Stilbite.

Stilbite is partly distinguished by the peculiar lustre of the surfaces of its lamina, resembling some sorts of Gypsum, such as tab. 233. which figure is from a specimen of a silver or satin like lustre, and partly talcose aspect; a character that it is scarcely possible to represent, but which is eminently conspicuous in the specimen I have here figured from Scotland. The crystals upon it are rectangular prisms, the faces of which are primitive; it is a rare form: the nucleus, according to Hauy is a very short prism, although the crystals generally assume an elongated one.

525

J.S. July 1 1820

TAB. DXXV.

MANGANESIUM oxygenizatum.

Spicular Oxyde of Manganese.

THIS modification of Manganese has a pretty appearance, forming a sort of druses in the more solid masses, especially when enlivened by little groups or mingled with the nearly white, rather pearly Carbonate of Iron, and sometimes transparent Carbonate of Lime. The Manganese has a semimetallic appearance in the mass, and breaks partly earthy, the spiculæ of a shining black; a few are magnified below to show the structure with the rhombs of Carbonate of Iron, which have a neatness in their minute granular appearance.

TAB. DXXVI.

Mammillated and Stalactitic Oxyde of Manganese.

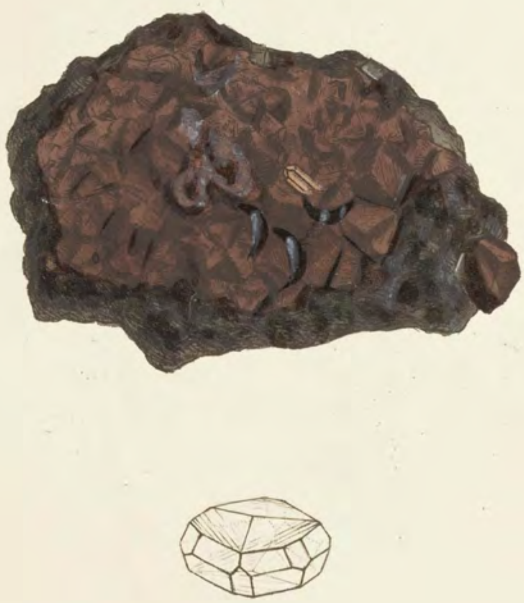
MANGANESE is worthy of being known in all its appearances and varieties, as an useful and valuable article to the Bleacher and Printer. It is abundant in many places, yet those who have seen it in the greatest abundance, perhaps have never seen it either mammillated or stalactitical; we, therefore, show it in a mammillated or partly stalactitical form, as in the upper figure, bubbling as it were in rounded knobs, and yet breaking with a smooth, somewhat conchoidal fracture. The lower figure exhibits a determined stalactite, with a little drop at the bottom; it seems to have accumulated with moisture, either in drops, or divided so as to form a sort of coating, more or less continuous.

The upper one is moderately dense, but the lower one is lighter to the hand, and I have some which feels like cork in the hand, with a bright and dark fracture, and another specimen as light, dull, smooth, and brown internally. These specimens mostly come from Mendip Hills.

526.

J. S. July 1 1816.

527



TAB. DXXVII.

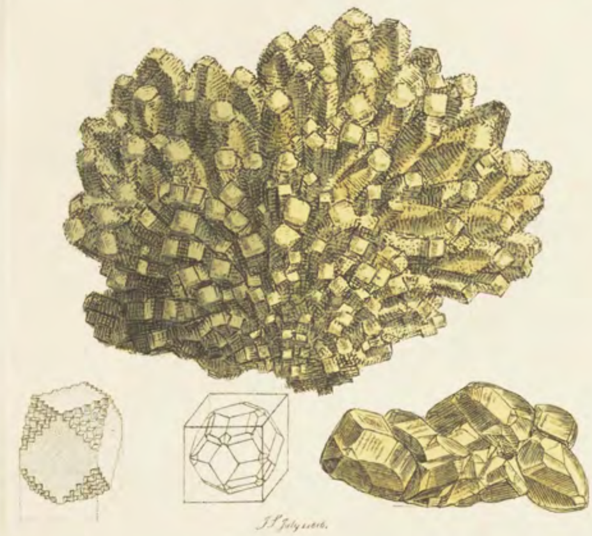
FERRUM oligisticum.

Oligiste Iron ore.

SYN. Ferrum *oxygenizatum*. *Brit. Min. tab.* 64. 65. 66.

This Iron ore is better known as a production of the Isle of Elba than as British; it is, however, found in various places, generally in laminæ, but seldom in thick crystals, see tab. 64 and 66. The specimen here delineated came from near Penzance in Cornwall, where it is sometimes found in finer specimens, although more generally of a rather confused appearance This expresses the usual aspect, while a few of the crystals show the modifications more distinctly, which are derived from the obtuse rhomb, as represented in the outline below; it is a variety between the *uniternaire and binoternaire*, of Haüy.

528.

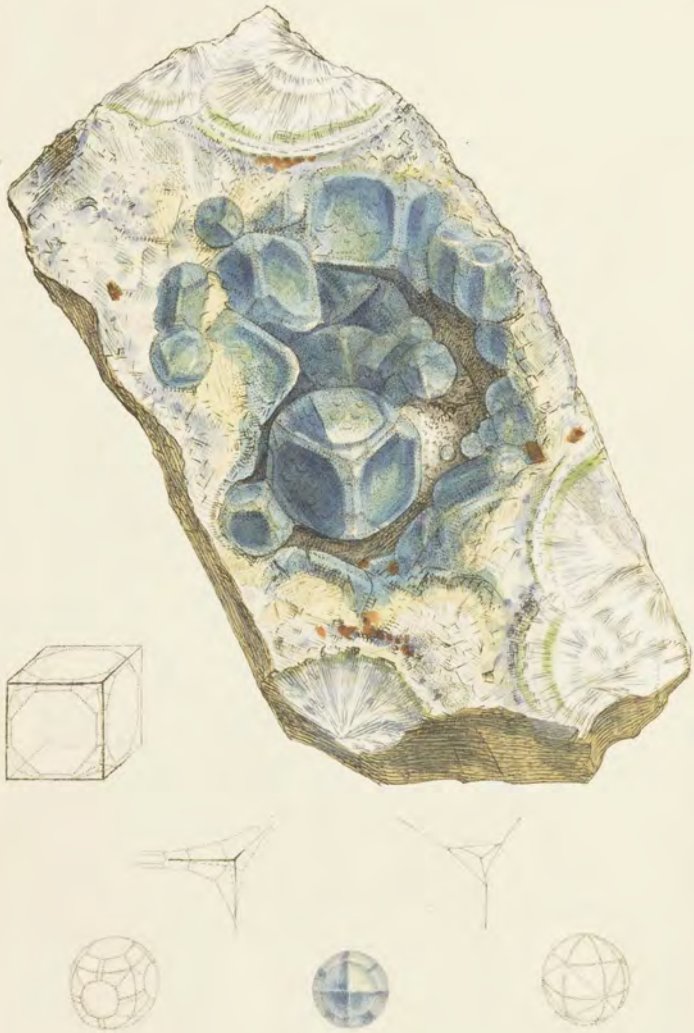


TAB. DXXVIII.

FERRUM sulphureum.

Iron Pyrites.

Sulphuret of Iron, figured so long since in cubes clubbed together (tab. 29,) is here represented, showing the manner of aggregation by nuclei into a cubo-octohedron, as it were done on purpose for instruction, and is very interesting to a novice, besides assisting him in the comprehension of the means of aggregation and symmetrical method that is displayed in the variety that accompanies it, which variety is of a whiter hue and differs but little else than in the number of facets, and which required the middle lower figure to explain it as derived from the same cube by nuclei so minute as to leave a finely polished surface; and when rounding in the facets, as in some parts of the specimen, still shows no irregularity or gaping. Thus the philosophy of nature is explained by her own actions, and the larger help to explain the smaller to our admiration, and the more so as we are allowed to improve in discernment, and what was formerly a sort of chaos, now becomes subjected to mathematical calculation.



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TAB. DXXIX.
CALX fluata.
Fluor.

Bere-alston Lead mine, in Devonshire, has of late produced many beautiful and curious varieties of Fluor; from a collection of these (kindly lent me by W. Lowndes, Esq. consisting of a series of crystals whose general form is the cube, with six faces, more or less deeply cut upon its solid angles, and some of which are almost spherical) the present has been selected as most novel in its appearance, and containing the greatest variety. The fluor of this mine, particularly the more globular varieties, is characterized by a rough surface, as if it had been corroded, but the exemption of several of the facets of crystals, in other parts very rough, seems to infer that some circumstance at the time of their formation caused this appearance, or that the corroding substance must have been partially sprinkled over them. The matrix is hornstone, and it is accompanied by Quartz, Iron pyrites, and Argentiferous Galæna, in brilliant octohedrons, with their edges modified; the specimens are frequently very crumbly, liable to fall to pieces, and often without the hornstone matrix, having been taken from large hollows. The crystals have not only the faces ranged around the solid angles of the cube, above mentioned, but often two and sometimes three faces upon the edges—there are also in smoother varieties or those approaching nearest to specimens from the northern counties, cubes around whose solid angles may be discerned twelve minute facets. A few of the globular crystals are produced by the extension of only three faces around each angle of the cube, or which leads to the same form, four faces upon each angle of the octohedron; as the six faces upon the angle of the cube are the same as eight upon the octohedron or primitive form. The faces of the cube on most varieties of Fluor are rendered slightly convex by the superposition of very low four-sided pyramids, the edges of the laminæ composing which are seen in striæ, but upon the faces of these varieties there are often many little circular convexities, as if the crystals had been formed of drops and seldom any striæ, except upon those faces situated around the angles of the cube, upon which they are sometimes rather strong. The globular appearance of the crystals is given them by the number of faces of which they are formed, amounting in the simplest to 24, and in the most complex to 80: in many it is rendered more perfect by the curvature of the six faces upon every angle of the cube amounting to 48, and producing crystals precisely similar to spheroidal Diamonds. The greatest number of faces obtainable from an assemblage of all the modifications exhibited in the plate would be 162.

The specimen figured contains a good series of crystals, with two faces at each edge and six at each angle: in the larger ones the faces of the cube predominate; in the smaller ones they are almost lost, and the crystals gain a spherical contour. Between these crystals and the Hornstone are radiated, almost globular masses of Fluor, similar to that usually turned in Derbyshire into various ornaments, but smaller, and in such a state of decomposition as to become almost fibrous, and delicately white: the inside of the crystals is yellowish green; the surface pale violet: the usual colour of rounded ones from the same mine and seldom above half an inch over, is deep purple: the cubes are often dull yellow or whitish, and sometimes an inch and half or more square. I have a small specimen with nearly white cubes, about the angles of which are placed three facets inclined upon the faces of the cube, leading to the most simple of the spherical forms, a corner of one of these is drawn.

530.

TAB. DXXX.
ARGILLA Schistosa.
Coal Shale.

SYN. Schieffer Thon. *Werner.*
Shale and Stourbridge Clay. *Kirw.* 1. 182.
Clunch and Shale. *Farey, Derbysh. report,* *pp.* 161, 180, and 443.
Shale and Indurated Clay. *Aikins manual,* 241 and 242.

ONE of the principal rocks that accompanies Coal is the Slate-Clay or Shale; it differs from Slate (Clay-slate), to which sometimes it bears a great resemblance, in the imperfection of its laminæ, and in falling to pieces when exposed to the vicissitudes of wet and dry, producing a kneadable Clay. The varieties are many, some of them are nearly pure Alumine; others contain much Silex and sometimes grains of Mica; those containing most alumine are nearly infusible, and, therefore, fitted for fire bricks and lute, that will stand the intense heat required for smelting Iron and other refractory ores; these are providentially placed as if to point out their uses, immediately beneath the fuel; one of the best kinds is called Stourbridge Clay, it is coloured grey by Bitumen, therefore burns nearly white, and it readily falls to pieces when wetted: other kinds, more strictly termed Shale, do not fall to pieces until exposed to the weather, such contain more silex and are proportionally more fusible: several of them also hold Bitumen enough to render them inflammable. Thin layers of Bituminous coal often occur in strata of Shale, and the larger strata of Coal are bounded by and include layers of Shale, fragments of which are too often brought to London among the coals; if these slates, as they are called, find their way into the fire, they prove troublesome by stopping the draught, otherwise, if kept red hot they radiate much heat and consume slowly. All the strata contain Ferns, the stems of large reeds or gigantic plants, similar to Euphorbiæ, Cacti, &c. converted into Bituminous Coal; these are much more numerous in some parts of strata than in others; some of the stems are horizontal and compressed; others are vertical and cylindrical, and both are often filled with argillaceous Ironstone, see tab. 61. Nodules and beds of this latter are the most valuable products of this Shale, particularly when they occur in the vicinity of good coal, as in Staffordshire, where the same pit often affords both. Shells sometimes occur; those I have met with are of Lamarckes Genus Unio and are figured Min. Con. t. 33. these are often filled with Ironstone. Shale alternates with several kinds of Sandstone, many of which partake more or less of the nature of Shale; some indeed seem to be little else than a mixture of it, with fine sand and a little Mica, while others are a pure sand containing layers of Mica; such is the Yorkshire paving stone. The former are termed Blue post, Binds, &c. and the latter White post, Grits, &c. most of them have a few vegetable impressions and specks of Coal.

The upper figure shows the common and lighter appearance: the other is varied, with a more coaly aspect, and has the impression of Shells about it, with the shining or Slickenside appearance in broad masses: it is from a specimen by favour of Mr. Farey, who brought it from Scotland. I have such from Nottingham long since, by the attention of a long lost friend, as well as from other places, which shows it to be common in several Coal-fields.

TAB. DXXXI.

TOADSTONE.

SYN. Toadstone, (a variety of Trap.) *Kirw.* 1. 229.
Transition Trap, Amygdaloid, &c. *Jameson*, Vol. 3.
Toadstone. *Farey's Derbyshire Report*, 277, &c.

THIS rock occurs in thick strata, alternating with several of the older Limestones of the central parts of England, and ranks among the Transition rocks of Werner; its basis is a very fine grained Greenstone, being an aggregate of Feldspar and Hornblende: a greater or less proportion of green Talc enters into its composition, giving it a brighter green colour and more earthy texture. The varieties are numerous, but this figure we think sufficient for this work. This is an intermediate variety, it contains much Talc, and has chiefly Carbonate of Lime in the vesicles, and some small balls of Iron oxyde. The browner and more compact varieties commonly contain imperfect agate, and rarely Zeolite.

The amygdaloids with a basis of Wacke, which occur in the newer Flætz Strata contain fine Agates, Zeolite, Carbonate of Lime, &c. There are three regular strata of Toadstone, alternating with the Limestone in Derbyshire; from one of these the specimen figured was sent me.

3

1.

2

J.S. Apr 1. 1815

TAB. DXXXII.

CUPRUM sulphureum.

Granular Copper Pyrites.

THIS is the second specimen I have met with of the granular Copper pyrites in crystals : it is of a dull aspect, with something of the appearance of the more common Iron pyrites, which the crystallization, in cubes, having one or more of the solid angles truncated and passing to octohedrons, favours; but it is of a granular texture and otherwise differs, as it can be scraped with a knife easily, and its internal lustre is dull. The crystals rest upon mammillated pyrites of the same kind.

From Ecton mine, which is pretty well known to produce the richly variegated Copper pyrites, coarsely shown in the present plate, but more particularly in the next.


1.
2
2+
3
4
5

TAB. DXXXIII.
CUPRUM sulphureum.
Sulphuret of Copper.

THE yellow Copper pyrites found at Ecton is remarkable for its variegated tints. The crystals belong to a modification rarely found elsewhere, and besides vary much in the proportion and number of their faces, either resembling the tetrahedron or octohedron in their general contour, and are mostly disposed in confusion, sometimes mackled and often very difficult to discriminate, yet occasionally showing great regularity, altogether calculated to try the most skilful in the science. The modifications from which these crystals result, would, if regular, produce six facets upon each angle of the tetrahedron, inclined in pairs at obtuse angles, over the faces of the tetrahedron, in all 24 (see f. 3): it seldom happens that more than eight of these facets occur upon one crystal, and often only two or three, which are occasionally so enlarged as to occupy nearly the whole of the faces of the regular primitive tetrahedron, changing it into an irregular one: these secondary faces are distinguishable by striæ, (see f. 5.) Sometimes the angles of the tetrahedron are truncated, leading to the octohedron. I have one or two specimens containing this form, in which generally three crystals are joined together by the faces of the tetrahedron, so as to produce a kind of stellated mackle, as shown in the middle outline, f. 4. in which the striated faces belong to the modification above-mentioned; there are but two large ones upon each face of the tetrahedron, but there are also minute striæ indicating others. The edges of the tetrahedron also are truncated, this is a very curious specimen, for so much symmetry is rarely produced by modifications so incompletely formed. This sort of Copper pyrites is most commonly found on balls of Sulphate of Barytes, see tab. 96. and Carbonate of Lime; I possess a magnificent specimen two feet long and one wide, with these more or less compounded, from Ecton, helping the ideas in the contemplation of the vastness and grandeur nature occasionally exhibits, and hence creating a wonder that we do not pay more attention to the lessons to be learnt from her in our architectural ornaments, which are generally mere copies of unnatural fancies, rather than imitations of the sublime and natural.

The larger figure on this plate exhibits several groups of octohedrons with their edges truncated, fig. 2. they also are mackled as is shown in figure 2.; the mackle is, I believe, new and rare: the specimen is a Cumberland one, its matrix pearly Carbonate of Iron.

1.

J. S. sculp. 1816

TAB. DXXXIV.

CUPRUM phosphatum.

Phosphate of Copper.

SYN. Cuivre phosphaté. *Haüy Tabl.* 92. *Karsten Jour. de Phys.* 53. 350.

TAB. 54 Exotic Mineralogy, shows an inferior specimen of this ore as a great rarity; the time has however arrived that far better are discovered in our own country, the description and figure of which will, I trust, be received with satisfaction, although before noticed as foreign.* These fine specimens from Cornwall are truly remarkable, as well as their similarity to the Arseniates for which they have been taken: yet so precise was nature in producing them, that I don't know a single specimen having been found till lately, and, therefore, the Arseniates figured in this work were not intermixed with them.

It is, perhaps, difficult to know by mere external aspect, yet by a little practice in comparison, we may distinguish it by its colour and superior lustre, and next the blowpipe with Charcoal may add to the certainty, by the want of the garlick-scented fumes and by the grey scoria produced, differing from the Arseniate, which produces fumes and a globule of nearly pure Copper; analysis settling it most perfectly, and probably with the same result as the foreign ones.

* Indeed foreseeing that such discoveries might happen, from other examples, I partly postponed the Exotic Mineralogy, but that work will re-commence when the present is finished.

The upper specimen from Gunnis or Gunner's lake mine possesses much variety, the darker parts are the phosphate, which is shown with a larger character in the lower figure; they are accompanied by Carbonate of Copper and Silical Oxyde, with a whitish bloom upon its surface.

I have met with some specimens whose crystals resemble those of the dark green Arseniate, and I have found such specimens to contain a small portion of Arsenic acid; the proper crystal of the Phosphate being an acute rhomb.

535.

J. S.

TAB. DXXXV.

MANGANESIUM oxygenizatum.

Filmy Oxyde of Manganese.

Div. 2 Imitative; in films.

SYN. Manganése oxydé argentin. *Haüy Traite,* 4. 245.

THIS, although not very conspicuous, is a curious mineral and is worth distinction, being very little known. It will now probably be readily recognized by the figure and description, and be preserved in greater plenty and better specimens. The specimen here drawn is a mixture of the usual dull Oxyde of Manganese, with the black Oxyde of Iron, and I think the metal used with the silvery and tarnished lustre rather happily represents it as lying in a thinish film upon the gangue. It is not unusual near Exeter; my specimen was among Mr. Day's, which I have now had for some years: it frequently lines the hollows in masses of mammillated hydroxyde of Iron.

536

J.S. Sep 1 1816.

TAB. DXXXVI.

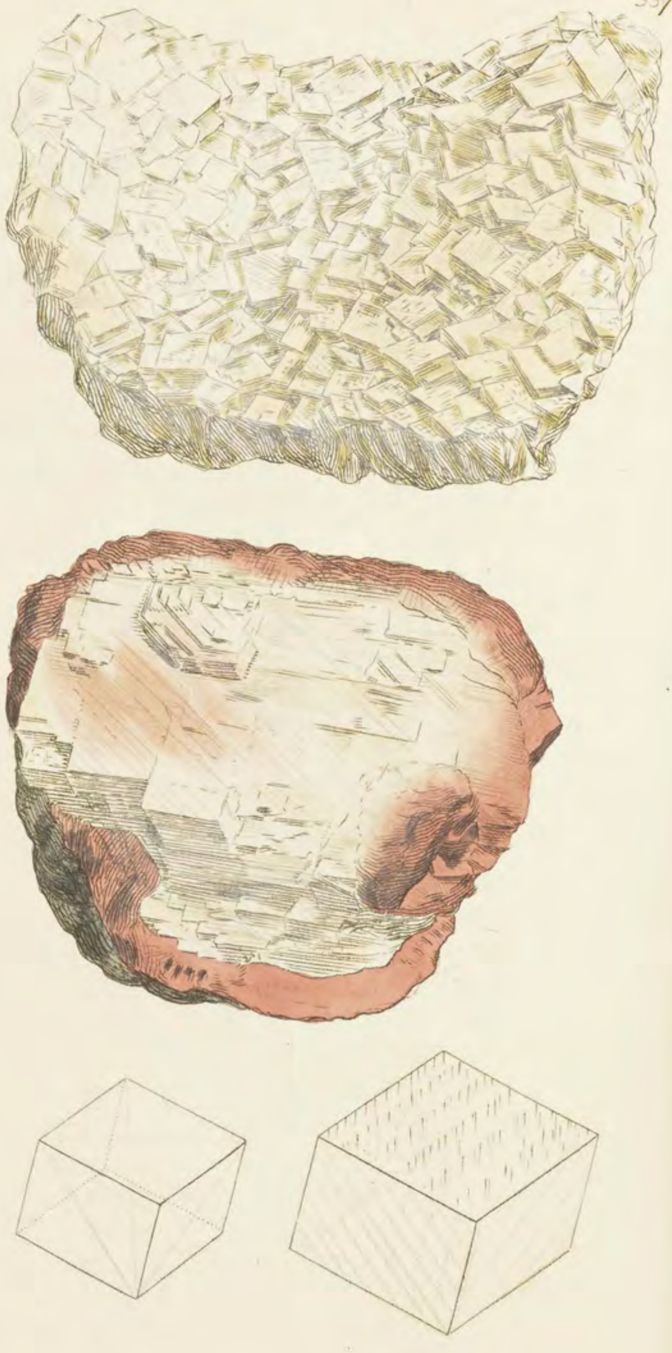
SILEX petuntse (manganesiferum.)

Manganesian Feldspar; Rose Manganese.

Syn. Manganése Lithoide. *Bourn. Cat.* p. 397.
Manganese oxydé rose silicifére *Haüy Traité,* 4. 248.

It is understood that Manganese here causes the rosy tint the Feldspar has acquired, and it has thus been specifically distinguished; I am doubtful if it be proper to make such distinctions, as it may create endless confusion, for thus every different coloured substance may become a species and confuse distinctions. However, as it has been particularized, it becomes our duty to exhibit it. The specimen was brought me by Mr. Mawe, with the following account of his discovery:—" To the South-West of Callington, in Cornwall, which stands upon a hill of schistus, one mile and a half, the road declining all the way into a deep valley, at the bottom of which holes are dug for manganese, there is a place which has the appearance of a small quarry, about six feet deep, shewing a perpendicular section of the soil or Strata, which consisted of blackish earth a foot or two below the grass. Then an irregular Stratum of hard stone in large fragments both angular and rolled, situated in a bed of Manganese more or less in thickness. In using my hammer to break one of these masses I was surprised to find the interior of a beautiful rose colour; this induced me to make more diligent search, and I found the same Stratum on the other side of the road, where I employed myself in breaking large masses of this substance, the highest colours of which I selected, and on comparing some specimens with the Siberian, it was difficult to discriminate one from the other. I could not discover any means of knowing which piece was best coloured before I broke it, nor did I perceive one part, viz. the outside to be higher coloured than the interior, although the masses were above a foot solid."

The Manganese was long since supposed to give the crimson tint to many minerals by Bergman, Quartz, and other substances being occasionally tinted with it; but it is probably rather a mechanical than a chemical combination, and may vary in density.



TAB. DXXXVII.
CALX carbonata.
Carbonate of Lime.

Div. 1 Crystallized, var. primitive.

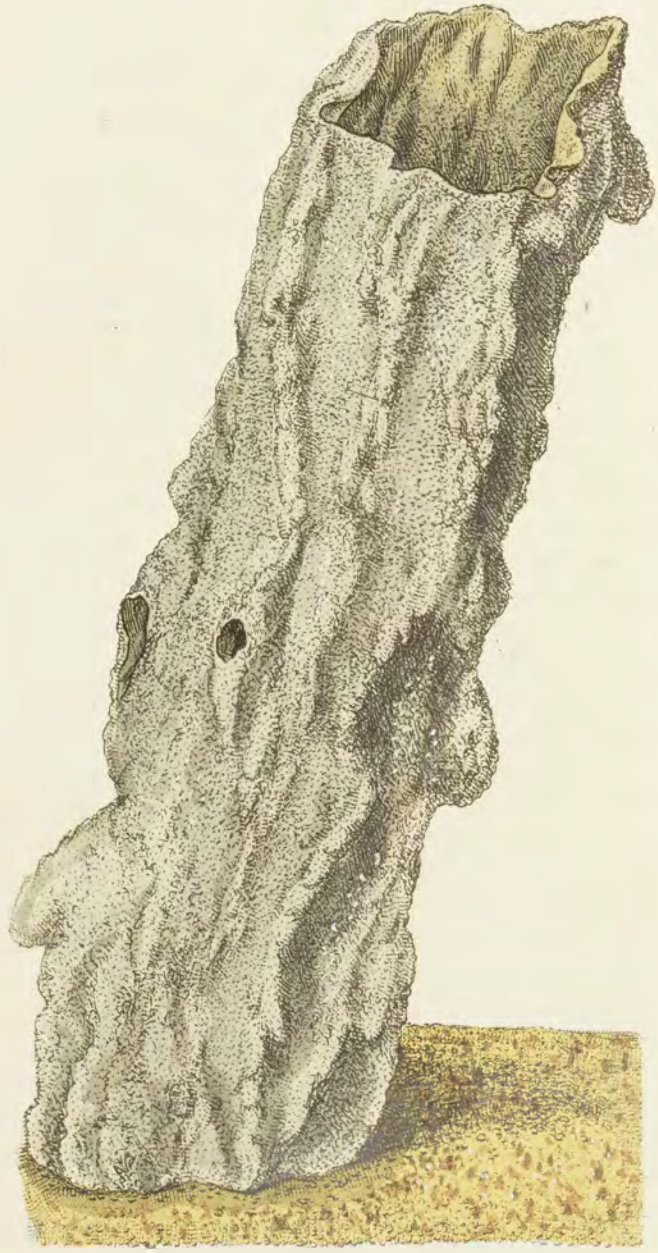
The primitive Crystal of Carbonate of Lime formerly being rare in Britain, I was glad to figure even a doubtful specimen upon Coal, in tab. 3. I have lately received from Sherborne, by favour of the late Mr. Herbert a handsome fragment of the lining of an Ammonite, formed of primitive rhombs, which are peculiar for the diagonal striæ upon their surfaces; striæ that seldom appear except upon fractured faces; the upper figure in this plate represents this specimen.

Some years since I had Carbonate of Lime sent me, which, besides the usual rhomboidal fracture (see tab. 2.) had indications of fractures extending across the longest diagonal of the rhombs: as I received it from an Aberdeen dealer, accidentally with other subjects, I was led to consider it a character of Scotch Carbonate of Lime: I paid more attention to it, and found that Carbonate of Lime, when it accompanies Zeolite, has this character strongly. I have since received some from near Keswick, along with Quartz Crystals, and a mass of opaque suet-like Carbonate of Lime, with similar marks, from Lord Dudley's quarry at Dudley. I have some also by favour of my kind friend Mr. Danby, from St. Vincent's Rocks.

A store of curiosities brought from Iceland by the Rt. Hon. Sir Joseph Banks, when he went in the year 1772, to visit the Geysers, or Boiling Fountains, having been rummaged, a quantity of Carbonate of Lime was discovered, with these diagonal striæ sufficiently conspicuous to characterize it; and by some it was soon considered as particularly related to the volcanic formations: some of the specimens had foliated Zeolite or Stilbite about them (see tab. 259 and 260, where also the diagonal fracture of the Carbonate of Lime is mentioned in the description, vol. iii. p. 117: the specimen was from Hall-hill, Kincardineshire.) Sir Joseph, understanding my desire to enquire into the nature of the Carbonate of Lime brought from a determinedly volcanic country, readily welcomed me to take a quantity sufficient for any examination; and all the specimens were marked, and even frequently fractured in conformity to the long diagonal which interrupted their transparency, so that it was supposed all the specimens were opaque; however, I broke out some very clear fragments; many were really opaque throughout, and all were destitute of the diagonal, more or less, internally. Thus it appears to be a sort of weathering or external change that renders these lines conspicuous. Some of the specimens from St. Vincent's Rocks are deeply furrowed with the diagonals, but are destitute of them internally.

If the rhomb be divided by these six long diagonal striæ, it will be resolved into two kinds of molecules, that is six irregular tetrahedrons and two bipyramidal hexahedrons; but if in the short diagonals there will result six equal irregular tetrahedrons only. Whether this fracture may assist in developing a difference, (besides Dr. Wollaston's measure of the nucleus) between the Carbonate of Lime, Carbonate of Iron, or Brown-spar and Magnesian Carbonate of Lime, or Bitter-spar, may be a question; I do not know that these latter ever show a diagonal.

It is remarkable that in the Iceland specimens the diagonal flaws are only to be discovered in two directions, and where they cross each other they produce opaque lines, resembling spiculæ arranged in rows across the rhombs: I have not met with any thing similar in British specimens; see the right hand outline.



TAB. DXXXVIII.

QUARTZUM vitrificatum.

Vitrified Sand tubes.

SYN. Vitreous tubes. *Trans. of Geo. Soc. vol.* 2. *p.* 528.
Ceraunian Sinter. *Syn. Brit. Mus. p.* 16.
Blitz-Sinter.

'ERE I terminate this work I have the satisfaction to add the figure of another phenomenon almost as extraordinary as the Meteor stones, and nearly as difficult to conjecture the origin of, although we see it must be of comparatively recent formation. That tubular accretions of sand should be formed in a sand bank, forty feet above the sea, on the coast, with every apparent sign of vitrification within, is certainly much out of the usual course of nature's operations. The discovery of these tubes was made by E. L. Irton, Esq. at Drigg, in Cumberland; who perceived the ends standing above the loose sand like little chimney pots; they were exposed by the drifting of the sand. Mr. Irton's zeal for investigating them had nearly cost him his life, for he got buried up to his throat in sand while searching for their terminations: in 1812 he had followed one to the depth of fifteen feet, and next year the sand had been carried away to more than that depth by the wind, and the excavation was continued to twenty-nine feet, where the tube, which had hitherto followed a perpendicular course, met with a bed of pebbles, and was united to one composed of a greenish grey hornstone porphyry: here its course was rendered oblique for a short distance, but it resumed its perpendicular direction; it was much diminished in diameter, but the termination was lost, after proceeding another foot, by the sand falling in. There were three tubes found near each other on one bank, others have been met with in the neighbourhood, but they are so brittle that the wind soon destroys them, and they can only be discovered soon after the wind has removed the surface of the sandbanks; they are generally inclined, and have a few short reflected branches (one specimen was furcated); when they enter the bed of pebbles above mentioned, they pass in a zigzag direction from one stone to another, and are then gradually lost in a dark colour given to the sand: they are seldom straight in any part of their length, and are often perforated by small holes:* the sides are always much and very irregularly plaited so as sometimes even to meet and close the tube; their greatest diameter at the top is about two inches; the branches are often not more than the fourth part of an inch wide and are short: the interior is smooth and shining but uneven, composed of a difficultly fusible transparent and whitish glass, containing a few vesicles and some dark grey specks; the outside is much corrugated and rough from the adherence of the sandy granules. The sand near them is changed to a dark grey from a pale reddish colour, by the blackening of the redder grains, and the white granules of Quartz have become opaque. The origin of these tubes appears to be well explained at the end of the second volume of the Geological Society's Transactions, where it is shown that the sand consists of grains of greenish black fusible hornstone porphyry and Quartz, but that there is not enough of the former to flux the Quartz, except in a heat urged by oxygen gas; by the help of which a similar glass might be produced—and that the banks are in a favourable situation for discharging the electricity of the clouds coming from the sea; that the sand being an imperfect conductor would be perforated in the way a quire of paper or a glass jar is sometimes done by electricians; now the heat of a flash of lightning is more than equal to that produced in small experiments in oxygen, and, therefore, would very probably fuse the sand in its passage; the pressure of the surrounding sand would wrinkle the sides of the tubes before they could cool and thus give them their irregular form. Their terminations, among the moist gravel at high watermark, discovered since the publication of the Transactions, serves to strengthen this theory; it is observed also, from the shifting nature of the sand banks, the tubes must be of recent formation. I am indebted to C. König, Esq. of the British Museum, for the following information :—

"These sand tubes were first observed in the Senner Heide, (Senner Heath) in the county of Lippe, in Germany, where, on account of their being considered as the results of lightning, they are known by the name of Blitz-Rohren (lightning tubes). The form of the German tubes is exactly like that of the English ones, but they are frequently not more than a quarter of an inch in diameter. I understand they are referred by Emmerling and Lentz to the Kiesel Sinter of Werner: the latter author calls this variety Blitz Sinter from its supposed origin."

* One specimen in the Geological Society's collection is so much perforated as to resemble lace.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TAB. DXXXIX.

QUARTZUM cos, *var*. micaceum.

Micaceous Sandstone.

This is distinguished from Mica Slate by the rounded form of the grains of Quartz, and by the Mica lying in separate specks and not in continuous laminæ, between the layers or beds of the stone; it is of a more recent formation than the Transition rocks, over which it lies and continues in many varieties through the coal formation; several form a sort of slate and serve for roofing houses, &c. others are stratified in a rough way, much resembling Gneiss, and in many instances they contain fragments of Feldspar in a more or less decomposed state; it varies in colour, being of a red brown, sometimes lighter or yellower, and where it appears to be near the coal formation, charcoal is very distinct in it. In some places, as at Dundee, in Scotland, there is a brown micaceous sandstone that is brought occasionally to London in immense blocks for some of the bridge and canal works, &c. where also, some of the Yorkshire strata are used; the former contains a clayey shale in larger or smaller masses, almost free from Mica.

The micaceous sandstones seem, according to Geologists, in a great measure to designate formations; thus the coarse ones and those without petrifactions are generally the oldest; those of a finer grain with vegetable remains and Clay or Shale, belong to the coal formation; the latest, is, perhaps, that which contains siliceous casts of shells, as that of Devonshire.

The principal figure in the plate is a fragment of Yorkshire Flag-stone, such as is used for paving in London; the best kind contains much less Mica and is a very durable stone. The right hand figure is from a specimen containing decomposed Feldspar. The left hand figure, a specimen from the neighbourhood of Coal; it contains the Charcoaly remains of some plant, the bituminous parts of which have probably entered into the composition of the coal. The lower figure is from a piece of the kind brought from Dundee, with Slate Clay, or Shale attached to it.


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TAB. DXL.

QUARTZUM heterogeneun.

Greywacke and Greywacke Slate of Geologists.

TRANSITION Slate of some consists of granules of Quartz, fragments of Slate, &c.* cemented together by a clayey talcose or micaceous paste; the granules are often large, the cement rough, and the general structure of the rock compact; at other times the granules are minute and the paste smooth, approaching in appearance to Hornstone, and in large columnar concretions; when the granules are small and the paste has a ragged fracture the rock is generally of a slaty structure; this last variety is the most remarkable, because it contains sometimes the remains of animal exuvia: I have, therefore, given several figures of it.

The columnar Wacke, of which I have specimens from Coniston, is distinguishable from Basalt, not only in its composition and colour, but by the form of its columns, without joints and ragged on their sides, as if they had shrunk from each other; they are about four feet long, mostly four-sided, three or four inches square, and very sonorous.

In the year 1799, although scarcely attending to the subject, I could not help noticing the Limestone and Slate near Plymouth, passing almost imperceptibly into each other in some places, and in others very distinct and alternating. I have ever since desired to get proper specimens to elucidate this, but have been interrupted: fortunately, however, the Rev. William Buckland has lent me two or three very interesting pieces with the following label:—" From Lord Fortescue's quarries of Transition Limestone, at Filliagh, near Southmoulton, Devonshire: the Lime forms subordinate beds, alternating with coarse Slate, of which a fragment accompanies the shell; fragments of the stem of an Encrinus

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* Some, apparently recent rejectamenta of the rocks, returned and hardened on the shore at Ilfracomb, resemble these.

occur, though sparingly, in the same slate: the position of which is for the most part vertical, but varies to a wedge shape, Saddle shape, Herring-bone, &c. The Lime sometimes appears in the form of a vertical bed of large lenticular calcareous concretions. Organic remains are very scarce." One of these is an Ammonite, formed of Carbonate of Lime with a little pyrites, very similar to, if not precisely the same as A. sphæricus, Mineral Conchology, tab. 53. fig. 2.—another, an Encrinus of the same kind as occurs in the Transition Limestone, that accompanies the Greywacke Schist, (see fig. 4.) Fig. 5 exhibits the cast of an Encrinus in Carbonate of Lime imbedded in Schist, from Mount Sion, Docks, Plymouth: thus forming a link between the Limestone and Schist; I have a specimen from Glyn Duffus, containing impressions only of a species of the Genus Spirifer (Anomia) and a minute Trilobite, in which the Lime is so incorporated with the Schist as to effervesce but slowly in acids. The other specimens figured are of a coarser browner kind from rocks, that do not, as I know of, contain any Limestone, and are probably of an earlier formation than those of Plymouth, but not so old as those of a less slaty structure.

Fig. 1. is a fragment of a rather columnar shape from the summit of Snowdon: it is nearly the same variety as a prismatic mass, 7 feet 5 inches long, several inches square, and covered with impressions of shells brought from Tintagel in Cornwall to our Geological Society's collection: the shells impressed in these, I find from their general form, belong to the new Genus Spirifer, which I have separated from the Terebratula of modern authors, a genus of shells common in the oldest Limestones, such as those of Derbyshire. Fig. 2. a more slaty specimen, from the same place, gathered by Richard Cotton, esq.

Fig. 3. is very remarkable for containing the cast of part of a spiral univalve, but it is to be regretted that there is not enough of it to mark even the genus. I am indebted to Miss Leach for it, who collected it on Snowdon. Many of the casts in these Snowdon specimens are replete with a brown ochraceous matter, which burns like powdery Charcoal.

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TAB. DXLI.

PETUNTSE porphyriticus.

Porphyry. Feldspar Porphyry.

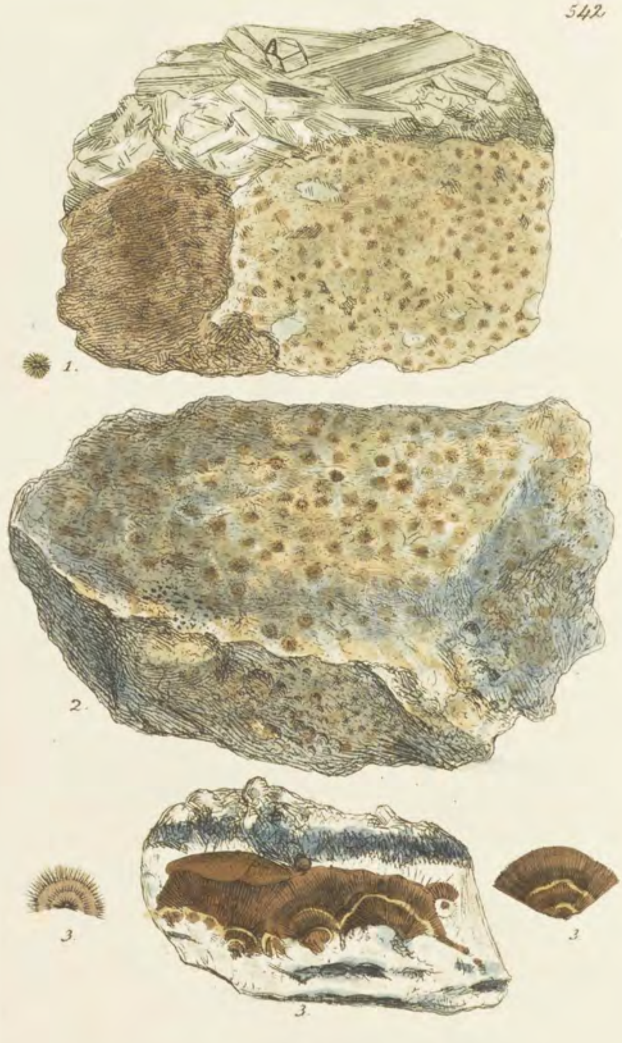
It is conformable to Moses that the Earth was without form and void, and that the Earth was covered with water, which was to be gathered together in one place, and let the dry land appear: when this took place, it would happen in the separation of the Earth from the waters, that it would naturally be more or less crystallized, which agrees with what we see: the most perfect, or those that have been least disturbed in largest crystals, and the rest becoming more and more mingled, especially if agitated, as appears to have been the case; this happens in most solutions, even in artificial ones.

Rocks composed of a basis, through which are dispersed crystals, are called Porphyries; such as are said to belong to what is considered the oldest rock, are a sort of muddy or amorphous remains of some of the component parts of that rock, viz. Quartz, Feldspar and Mica, with either one or more in the form of crystals: those belonging to later formations partake of the nature of the respective rocks, such as Pitchstone Porphyry, Claystone Porphyry, &c. The present specimens are from the older rocks of the Grampians, in Scotland, and are thus related to them. The upper one has a siliceous base approaching to an Hornstone with crystallized remains of Quartz, Feldspar, and Mica, scattered in it. The middle specimen is chiefly reddish Feldspar, in which some is imbedded in crystals, &c. with Quartz and spots of Feldspar, containing Clay, Chlorite, &c.*

* This variety, by the accurate attention of Colonel Imrie, is shown to constitute vertical Dykes, stretching nearly from N. to S. whose course cuts the line of the Grampian hills nearly at right angles.

Feldspar when in a state of incipient decay is apt to have the odour of a clayey stone as this has. The lowest specimen is commonly called a Claystone Porphyry, and is also scented; this seems to contain many ingredients, it has at least the addition of an ochraceous oxyde of Iron, and if I may judge from the pinky hue of the basis, it is tinted with Manganese. The Feldspar is not so prominent as the Mica, which gives the dark spotted appearance: the Quartz is inconspicuous.

Porphyry was much used by the Egyptians, Romans, &c. and after choosing admirable specimens, mostly with a hard red jasperine ground, with that intelligent preference that proved their judgment, as is shown by the excellent works for which it is used in architecture or statuary, still preserved to confute those who might have doubted their attainments; they probably worked it with well hardened tools, with much patience, and ground it to their purpose with emery or other hard materials, and polished it as we do Carnelians, Agate, &c. with Rottenstone or something to answer a similar purpose. These red Porphyrys were probably found in Egypt imbedded in their Sienitic Rocks, which they used in their greater works, the well-known Cleopatra's needle and Pompey's pillar being made of it with immense labour. We are now advanced in the use and art of cutting Granite for buildings, which is, perhaps, a promise of attaining at some future period their perfection, though they will still have the merit of originality.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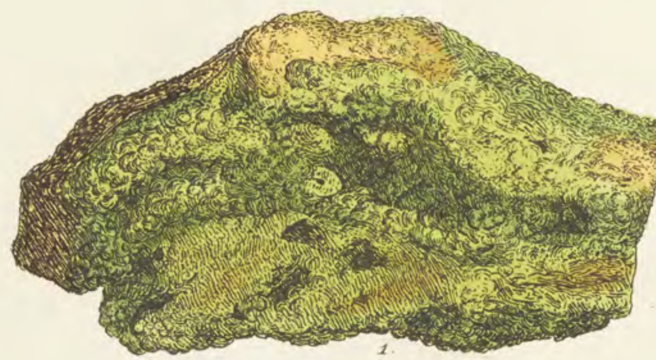
TAB. DXLII.

STANNUM oxygenizatum.

Hœmatitic, or Wood Tin.

In my account of the Hæmatitic oxyde of Tin (vol. 4. p. 95.) I observed the scarcity of specimens attached to the rock: I have now been favoured with permission to figure a magnificent one, the matrix of which is Quartz, mixed with Tourmaline, by Mr. Ashurst Majendie, it is from Trethurgey moor, near St. Austell, where it was found among Stream or Pebble Tin, the only situation in which Wood Tin has ever been found; for although fragments with the matrix are sometimes met with, yet they are always rolled pieces, and the soil in which they occur is probably alluvial, and composed of the debris of rocks no longer remaining, as is evidenced further by the occurrence of Gold with the Stream Tin, which is not found in any rock in Cornwall, at present standing.

I have figured with this, two specimens of what the Miners very aptly call Toad's-eye Tin ore; one was lent me by the same gentleman as the above; the other was Mr. Day's: they are both parts of water worn masses; the Tin in them is a minute variety of the Wood Tin, and they were found in the same situation with it; the matrix is Quartz and Tourmaline.



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TAB. DXLIII.

PLUMBUM phosphatum.

Phosphate of Lead.

Var. mammillated.

THESE varieties of Phosphate of Lead should not be passed over, as they, as well as the Carbonates, no doubt, have occasionally been, by many miners who look for Lead, supposing it only of consequence when like Galæna, (see tab. 24.)

The crystallized Phosphates are better known, and being more attracting as curiosities, were preferred in collections. The upper specimen is from the Lead hills; it has much the appearance of Calamine, but is distinguishable by its greater weight, colour, and fusibility. The lower fine specimen is a rare variety from the same place; its colour is very novel; the matrix is principally Quartz.

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TAB. DXLIV.

FERRUM phosphatum.

Phosphate of Iron.

Div. 1 Crystallized.

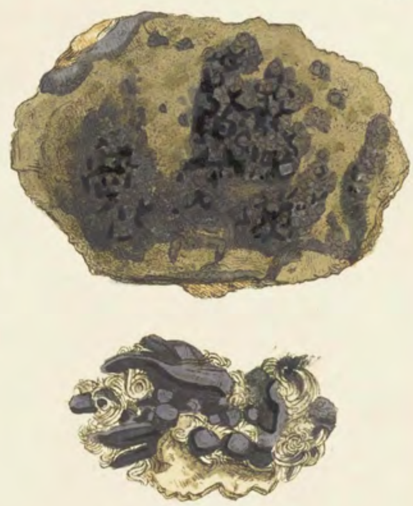
Although I have figured a crystallized Phosphate of Iron in tab. 3 of Exotic Mineralogy, I am pleased, before I finish British Mineralogy, to find it produced in our island, and notice it accordingly. Foreseing such occurrences, I did not proceed with Exotic Mineralogy, but determined to finish British Mineralogy first, that it might include all the species possible.

The crystals are very much elongated laminæ grouped into prisms in varied angles, the ends of the laminæ terminating them somewhat obliquely, but not regular enough for determination; they separate easily into very thin plates that allow of folding and rolling, transversely resembling some of the finest Gypsum, but more pliable; it is tender like it, and easily scratched by the nail; the thin plates, separate, have a lightish blue cast in the thinner parts, and darker when viewed through the thicker edges: the mass appears of a bottle or dark green colour when viewed through the sides, but if viewed endwise or lengthwise, mostly blue: lustre glassy and very great: there is often sufficient space for refracting colours betwixt the laminæ.

The Phosphate of Iron in this specimen is accompanied by Carbonate of Iron in small crystals on Schist with

Quartz, Chlorite, &c. Its external resemblance to Talc was such as to have met with a general consent to its being so; but Dr. Wollaston has proved it to be Phosphate of Iron, and it is truly interesting to see it so accompanied by the Carbonate. Now do we see that Chemistry aids description; and though a substance may be identified without it, yet some of its help is absolutely necessary to warrant conclusions. These specimens are in the possession of my kind friend Mr. Heüland, whom I rejoice to find pleased to lend his most valuable specimens for the benefit of science: they were found about 55 fathoms from the surface in driving an end from north to south in Huel Kine in Cornwall.

543.



TAB. DXLV.

ARGENTUM sulphureum.

Sulphuret of Silver.

Syn. Argentum sulphureum, *Exot. Min. t.* 32.
Mine d'argent vitreuse, *De Lisle,* 3. 440.
Sulphurated Silver Ore, *Kirw.* 2. 115.
Glaserz, *Werner, Emmerl.* 2. 165.
Argentvitreuse, *Lameth.* 1. 120. *Broch.* 2. 134.
Argent sulphuré, *Haüy Tabl.* 74.
Sulphureted Silver, *Aikins' Manual,* 20.

Sulphuret of Silver has been so sparingly found in Britain, that very few cabinets possess specimens of it; in such as have been found it is generally irregularly disseminated among Quartz, Galæna, and Arsenical Pyrites, in a decomposing state, with filamentous Native Silver; such specimens I have from Herland Mine in Cornwall. The crystallized ones now figured are in the possession of Mr. Calley, who obtained them from Huel Dutchy: the upper one has many small cubo-octohedrons, and part of it is covered with a film of pyrites: in the lower specimen the Sulphuret of Silver is accompanied by Hair Silver and Quartz; many of the Crystals are regular cubo octohedrons, but several are so much elongated or compressed, that although derived from the same form the faces are difficult to trace. The characters by which this ore may be discovered, are, its texture, between that of hard wax and lead, colour blacker than lead, with a slight metallic lustre: before the blow-pipe a globule of silver may be obtained.

There is another Silver ore rarely found in the mines of Cornwall, the Red or Antimonial Sulphuret of Silver, figured in Exotic Mineralogy, tab. 33; but the specimens are by no means sufficiently characterized for illustration by a figure. I published both these ores of Silver in Exotic Mineralogy at the same time when I had not seen a British specimen of either.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TAB. DXLVI.

BARYTES sulphata.

Sulphate of Barytes.

Not only very different substances are found in different localities, but the same substances differ so essentially, that some attention and practice are required to recognize them; and when we cannot have the specimen, a figure conveys the best information: thus I thought it blameable to leave the present unnoticed, especially as it is what for many years was not at all expected in Cornwall. It was found in the United mines in Gwennap in that county, I believe in 1815: the very neat specimen figured at the top of the plate was lent me by the friendly and penetrating Mr. Brooke, whose attention to Mineralogy we shall shew is valuable and conspicuous. I add to the plate part of a specimen from Glenmalur in the county of Wicklow, which in colour and crystallization bears a remarkable resemblance to it: this was sent me in 1813 by Mr. J. Moore.

The other varieties of Sulphate of Barytes are tolerably distinct according to their localities and the formation they belong to: thus those of Cumberland are generally tabular, that of Bletchingley prismatic, similar to some which are found in Auvergne, and the present intermediate between them. The pretty somewhat stellated manner in which the crystals are placed, gives us some idea of the Gypsum found in Clay; but this is placed on Quartz, and when the crystals are examined they are soon found to be modifications of Sulphate of Barytes.

Fig. 1 and 2 represent the Crystals upon the Cornish specimen with one or two modifications marked in dots; the terminal faces are primitive. Fig. 3 exhibits the manner in which the groups are formed on the Irish specimen.

Fig. 4 is a kind of macle formed of two crystals, joined side to side; the line of union is strongly marked in the center of the terminal face: many such are found in the masses of prismatic Sulphate of Barytes of Nutfield. I have a group of several small ones sticking upon the side of a large prism. Fig. 5 presents, at one view, all the modifications I have met with among a great number of crystals from Nutfield: I consider that such an outline is sufficient to explain them, and more easily understood than a number of diagrams with the modifications separate, which I promised in Volume V. page 48, as their relative situations are clearly pointed out, and it is pleasant because it is concise. The faces marked with letters have been described by Haüy, and his letters are used. The faces indicated by figures have not been observed by him: of these, figure 1 is a very conspicuous face; it is produced by a decrease of one row of molecules from the obtuse solid angle of the primitive: the other numbered faces are generally too small and dull to measure. The tabular varieties have generally the faces P. r. d. and o. most enlarged; such is the outline of the bottom of tab. 72, and there are but few modifications to be found upon them that are not shown in this outline.

547.

TAB. DXLVII.

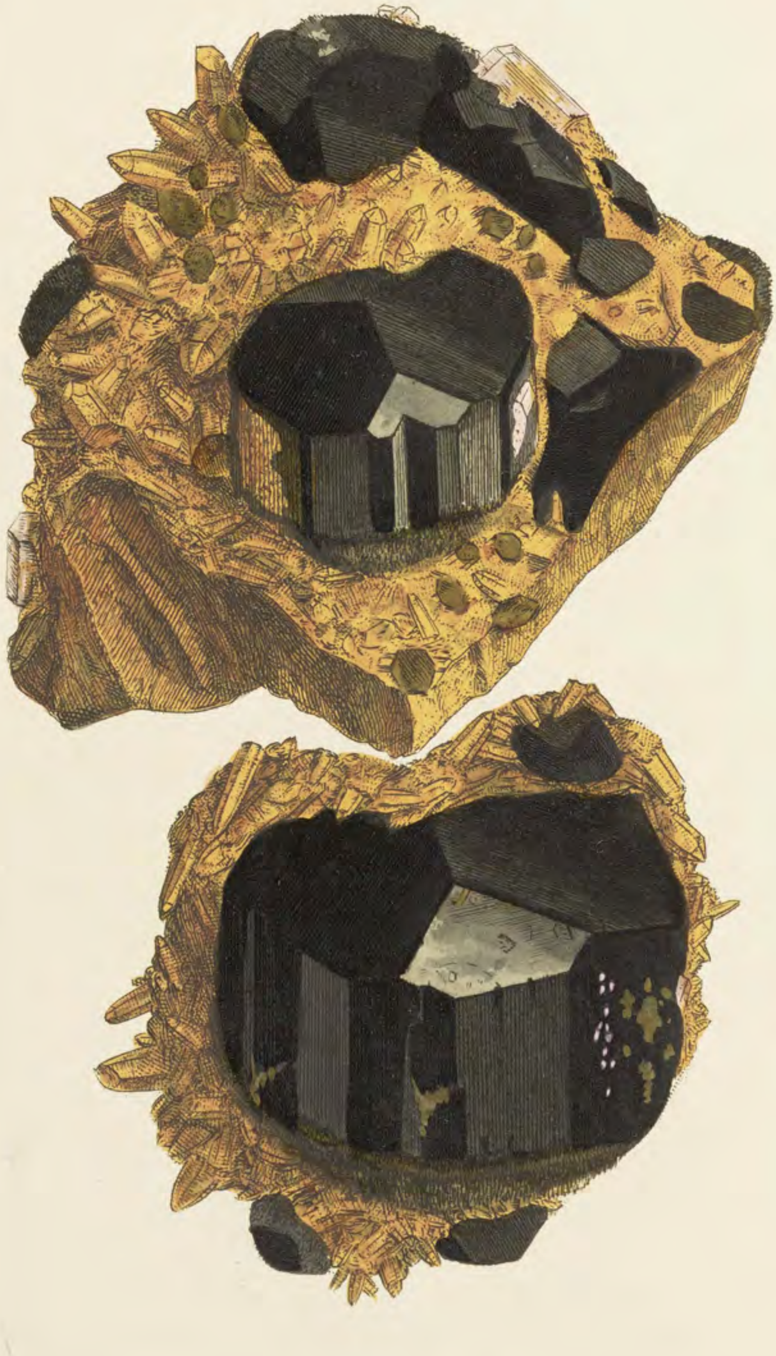
FERRUM arsenitum. ?

Arsenite ? of Iron.

Class 3. Metals.
Gen. 8 Iron. *Spec.* Arsenite.

The kindness of the Rev. W. Gregor was the pleasant cause of my becoming acquainted with this new mineral; he sent me a specimen in Sept. 1808, telling me that he had ascertained it to consist of Oxyde of Iron and Oxyde of Arsenic, but that he had not entered into an examination of it with a view to ascertain the relative quantities: it appears that nothing more has been done since that time, and it is with some hesitation that I publish it as an Arsenite, as it may hereafter possibly be proved to be an earthy Arseniate of Iron: it was found in a mass of rock which appears on a down in the parish of Perran Arwothel, Cornwall. Although it is not very interesting at first sight, yet its variety of colour is sufficiently striking to produce a desire for information, and it will be pleasant to recognise it in some other place.

The substance is in some parts compact, with a dull wax-like lustre, and of a bluish olive green; in other parts it is of an earthy texture and greenish white zoned with the olive green: rounded grains of Quartz are imbedded in it, which prevent the specific gravity from being taken, but it is not very heavy: it is stained here and there with Iron Ochre. The compact parts are harder than Iron, but readily scraped and splintered with a knife; the whiter parts yield to the finger nail: when heated it at first reddens, then melts with ebullition, giving out a slight scent of garlic, and it is at last rendered attractible by the magnet: the facility of its fusion seems to imply that it is not merely a mixture of its component parts, but a combination: its colour probably depends upon its containing water.



TAB. DXLVIII.

ARGILLA electrica.

Tourmaline.

Div. 1. Crystallized.

Before closing this work, it is a pleasure to meet with a triumphant and unexpected example of the produce of a country hitherto but rarely quoted for any thing fine. The magnificent Tourmalines, of which I now figure two specimens, may vie with any thing of the kind brought from foreign climes, and will serve to rouse the attention of collectors, who have, I fear, formerly lost many fine things from want of information respecting them, or diligence in the search for them around their own country. I regret this the more, as it has several times happened that my figures have not been taken from such fine specimens as have since been found: such has been remarkably the case here; for the specimen, tab. 209, was once thought a good one; but although it may afford instruction in the general way, and has crystals of the same form as this, yet it would scarcely be received as an example of the same variety. The spot that has afforded these gems, for surely their beauty entitles them to this appellation, is as I am informed by Mr. Brooke, "a small quarry of red granite near Chudleigh; a barn was built with some of the largest and finest specimens before it was observed by a Gentleman in the neighbourhood, and the walls are yet studded with the large imbedded crystals of Tourmaline, coated with *white-wash.* They occurred in a cavity in the granite rock, the space being filled with a yellow substance resembling Clay."* Had not this been the case it must have presented a most splendid grotto to the view of the discoverer, for the brilliant black of the Tourmaline is in many parts relieved by fine crystals of Phosphate of Lime, of a very pale colour and frequently tinged with lilac: the basis is a dark reddish Feldspar, penetrated and covered by light greyish brown Quartz in tapering crystals: the ochraceous Clay forms a crust that is difficultly cleared from the Tourmaline, and adheres firmly to the rough surfaces of the Quartz and in the crevices; it was this probably that concealed its beauty and value from the workmen who treated it as dirty stone and so roughly as to leave scarcely one crystal of the Phosphate of Lime unbruised, besides breaking almost all those of Quartz. The largest crystal of Tourmaline I have figured measures two inches and a quarter in diameter; larger may possibly have been found, but as I have been favoured with the choice of Mr. Brooke's and Dr. Somerville's specimens, collected on the spot by them together, and also those in the possession of Mr. Mawe, I conceive the two I have figured are very superior ones, the uppermost of which belongs to Mr. Brooke. It is rather curious, but not unfrequently the case, that a particular cavity in a rock will be filled with extraordinary riches, while the most diligent will be foiled in his search after such another treasure, even in the neighbourhood, and it is supposed by those who have visited the spot that it will happen so here.

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* Mr. Loscombe, from whom Mr. Mawe has obtained several specimens, says they are found on the northern declivity of a hill, about a mile and a quarter north of the famous Bovey Coal pit: he observes, that about ten feet below the Tourmaline, is what a Cornish miner would call a kindly gossan (quartz mixed with ochraceous matter) and from the occurrence of Phosphate of Lime along with the Tourmaline, he conceives it would produce Tin ore, which is often found in veins in the neighbouring Granite

TAB. DXLIX.

CALX phosphata.

Phosphate of Lime, Apatite.

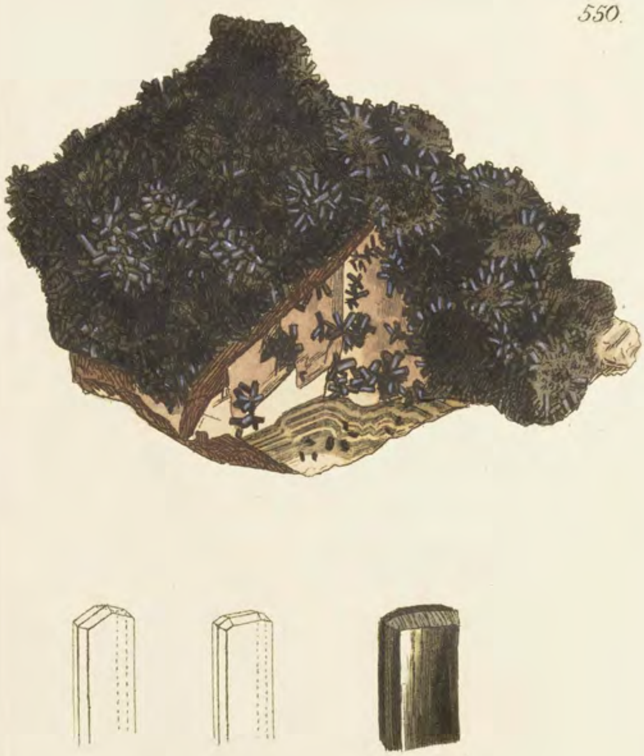
Div. 1. Crystallized.

THE fine specimens of Tourmaline, tab. 548, from near Chudleigh, as I have observed, are accompanied by Phosphate of Lime, of which the crystals are far superior to any before met with in Great Britain: some, it is said, were found more than two inches long, whereas, formerly, half an inch was considered an extraordinary size. Mr. Brooke, who was so fortunate as to obtain several upon the spot, has kindly allowed me to engrave his finest; it forms the front figure in the plate. The upper figure is from a variety found last year at Caldbeck Fell, Cumberland, in a vein of Quartz; it is accompanied by hexahedral laminæ of Mica, Mispickle, Pyrites, and that rare British mineral Sulphuret of Molybdenum, tab. 288, in well-defined hexahedral plates, and considerable abundance.

Phosphate of Lime has been found principally in Cornwall, in several parts of which inferior specimens occur, in general accompanied by Oxyde of Tin; I have one from Saint Michael's Mount, gathered by Mr. E. Davy. Since my former figure was published, I have reason to suspect that the lower specimen exhibited upon plate 205 is foreign, though it was in Mr. Day's collection as British.

I have taken the liberty to represent one or two of the smaller crystals perfect, that were bruised by the ill usage alluded to in the description of the Tourmaline.

550.



TAB. DL.

FERRUM hydratum.

Hydro-oxyde of Iron.

Div. 1. Crystallized.

THIS variety of Hydro-oxyde of Iron, in which the crystals are much more distinct than is common in that substance, was first brought me from Cornwall, about two years since, by Lady Wilson, but the specimen figured possesses more variety; it is in Mr. Brooke's collection. The crystals, as shown at the bottom of the plate, bear a great resemblance to those of Oxyde of Manganese; they differ in the brownness of the black colour and powder: before the blowpipe they become grey and brittle, are difficultly fusible into a black bead attractible by the magnet and being treated with nitre, exhibit indications of Manganese. The matrix is crystallized Quartz, of a brown colour and internally zoned with opaque white. In Lady Wilson's specimen there is massive silical hydro-oxyde of Iron between the crystals and the Quartz, and both of them have minute crystals of Carbonate of Iron scattered about them.

SYSTEMATIC INDEX

TO

BRITISH MINERALOGY.

† 1. stands for Div. 1 crytallized.—† 2. stands for Div. 2 immitative (forms).—† 3. stands for Div. 3 amorphous.

SYSTEMATIC INDEX.

SYSTEMATIC INDEX.

NOTES to the SYSTEMATIC INDEX.

1. *Hydrargillite.*—Found in the Blackrock near Cork, by Dr. Wood, with Quartz and Black Clay Slate: a substance resembling it has been found, also, in the Brown Post of the Newcastle Coal district, sent me by N. J. Winch, Esq.

2. *Granatite.*—Minute crystals accompanying Cyanite and Quartz in Mica Slate were sent me from near Boharm, by the Rev. P. Forbes; it is also mentioned as found in Ireland, by Dr. Fitton, in the Transactions of the Geological Society.

3. *Sulphate of Magnesia* occurs in solution in Epsom and other mineral waters.

4. *Rocksoap.*—See Jameson.

5. *Prehnite.*—In Trap, near Dursley, Mr. Gibbs, in February, 1816; and at Woodbridge, Gloucestershire, Mr. Bakewell.

6. *Aplome.*—Inserted in the Catalogue, upon the authority of the Count de Bournon.

7. *Augite.*—In Basalt, near Edinburgh, in small grains.

8. *Mica Slate and Micaceous Schistus.*—Both published under Mica. Several of the aggregate rocks will be found figured under the respective substances of which they are composed.

9. *Oxyde of Molybdenum.*—Occurs along with the handsome specimens of Sulphuret of Molybdenum in hexangular plates in Quartz, with Phosphate of Lime and Mica, found lately at Caldbeck Fell, Cumberland. See tab. 549.

10. *Octohedral Magnetic Iron.*—Found in Chlorite slate at Cr. Patrick, Ireland, by G. B. Greenough, Esq.

11. *Nickle.*—This metal has been said to occur in Cornwall, I have a specimen of Kupfer-nickel, said to be from the Lead Hills, but I much doubt it.

12. *Mercury.*—A specimen of Sandstone containing this metal in a native state, *said to be found* in Westmoreland, was sold some years ago at a public sale of Minerals, and I became the purchaser, but I much doubt the authenticity.

INDEX

TO

BRITISH MINERALOGY.

INDEX.

INDEX.

INDEX

INDEX.

INDEX.

INDEX.

INDEX.

INDEX.

INDEX.

NOTES AND CORRECTIONS.

Vol.
I. p. 10 *dele* the paragraph commencing with " When we use."
16 We believe the ochraceous globules on the Chalk to be the remains of what some call an Alcyonium, but which, in our opinion, is nearer allied to a sponge: fine specimens of this have lately been sent me by G. A. Mantell, Esq. from Lewes.
21 *l.* 3 *for* " coral form" *read* " coralloid."
44 *l.* 18 *dele* " also another called Tooth Tin," the Tooth Tin of the miners is often Carbonate of Lead.
54 *for* " the sulphuric acid and the argil being by proper means separated and recombined to form," *read* " the sulphuric acid being by calcination separated from the Iron, and combined with the Argil, and an Alkali to form."
59 *dele* note.
69 *l.* 13 *for* " Limestone," *read* " Amorphous Feldspar."
l. 17 *for* " more chalky," *read* " softer."
84 *for* " such as are not primitive sandstones," *read* " such stones as are not primitive."
127 *l.* 4 *from the bottom, dele* " which is."
176 *l.* 4 *for* " of two them," *read* " two of them."
179 *l.* 8 *for* " summits at the apex," *read* " terminal faces."
II. 27 *dele* " consolidated ærial."
37 *l.* 12 *for* " modification," *read* " form."
l. 16 *for* " each crystal," *read* " the crystals."
43 *l.* 15 *for* " green Nephrite or Axestone, nearly approaching that from," *read* " green Serpentine, nearly approaching the Nephrite or Axestone from"
97 *l.* 25 *for* " Phosphorus," *read* " Phosphoric acid."
121 *l.* last *for* " lateral," *read* " transverse."
125 *l.* 15 *for* " tab. 53," *read* " tab. 63."
III. p. 3 *add* " the lower figure is from a botryoidal specimen from the same place."
15 *l.* 18 *for* " whether these or any," *read* " whether the latter or any."
28 *l.* 12 *for* " marrow and bone," *read* " bone with the marrow exposed."
30 *l.* 9 *add* " into" before " hexangular," *dele* " into" before " consequently."
96 *l.* 25 *for* " Potash 40. 0 " *read* " Potash 4. 0."
27 *for* " Water 30. 0." *read* " Water 3. 0."
28 *for* " 162. 0." *read* " 99. 0."

NOTES AND CORRECTIONS.

Vol.

III. p. 96 *l.* 30 *dele from* " The nature of the British Alum" to " foreign mixture, as it," *and read* " the British Alum ore."

l. 40 *for* " it may," *read* " they may."

102 *l.* 12 *for* " give" *read* " gives."

113 In describing the specimen of Adularia, figured in the lower part of plate 257, we have omitted to notice that it is accompanied by small crystals of Oxyde of Tin and Quartz.

121 *l.* 15 *for* " Arsenical Iron or Mispickel," *read* " decomposing Iron pyrites."

173 *l.* 14 *for* " tenuosity," *read* " tenuity."

IV. p. 2 *l.* 5 *for* " 4. 315." *read* " 4315."

3 *l.* 6 *for* " Manganese" *read* " Copper."

27 *l.* 14 *for* " Lime or perhaps Magnesian pearly spar," *read* " Iron or Brown spar."

37 *l.* 3 *for* " coralloid" *read* " coralliform."

p. 77. from a paper lately published in Thomson's Annals, we learn that Mr. Gregor was not the first discoverer of the Carbonate of Bismuth, but that the credit of the discovery properly belongs to Mr. John Mitchell, of St. Austle.

98 *l.* 4 *for* " Ingleton," *read* " Ingleborough."

171 *l.* 10 *for* " tab. 80." *read* " tab. 180."

pp. 9 and 10, *for the purposes of systematic arrrangement, the descriptions of plate* 305 and 306 *are given in this number, on separate leaves.*

pp. 161 and 162, the same of plates 387 and 388.

V. passim, *for* " sulphurate of," *read* " sulphuret of."

p. 9 and 11 *for* " sulphatum" *read* " sulphata."

55 *l.* 10 and 12 *for* " Dublin" *read* " Cork."

70 *l.* 2 *for* " eleven" *read* " nine."

l. 3 *for* " thirty-fifth" *read* " thirty-third."

131 *l.* 19 *for* " sulphate" *read* " sulphuret."

153 *l.* 3 *for* " pinii" *read* " piniensis."

171 *l.* 4 *for* " Gneiis" *read* " Gneüss."

187 *l.* 4 *add* " Cuivre sulfuré, Cuivre vitreux."

200 *l.* *for* " analysis" *read* " analyses."

203 *l.* 9 *add* a comma *after* Blende.

205 *l.* 3 *for* " Hydro-oxygenizatum" *read* " hydratum, *et passim.*"

207 *l.* 12 *from the bottom, for* " remain" *read* " remains."

209 *l.* 14 *for* " tab. 116" *read* " tab. 61."

217 *l.* 4 *from the bottom, for* " one" *read* " ore."

221 *l.* *for* " Lounds" *read* " Lowndes."

225 *l.* 14 *from the bottom, dele* " have been found to."

229 *l.* 4 *for* " 1816" *read* " 186."

239 *l.* 5 *dele* " 65"

248 *l.* 3 *from the bottom, add* a * *to* fig. 3.

251 *l.* 7 *from the bottom, for* " Black oxyde" *read* " Black Hydro-oxyde."

last line, *for* " hydroxyde" *read* " hydro-oxyde."

263 *add* " the specimens figured in this plate are in the Cabinet of the Geological Society."

269 *l.* 17 *dele* " after rolling."