

A MANUAL  
OF  
ORGANIC MATERIA MEDICA  
AND  
PHARMACOGNOSY

AN INTRODUCTION TO THE STUDY OF THE VEGETABLE KINGDOM AND THE VEGETABLE AND ANIMAL DRUGS  
(WITH SYLLABUS OF INORGANIC REMEDIAL AGENTS)

COMPRISING

THE BOTANICAL AND PHYSICAL CHARACTERISTICS, SOURCE, CONSTITUENTS, PHARMACOPOEIAL PREPARATIONS, INSECTS INJURIOUS TO DRUGS, AND PHARMACAL BOTANY

BY

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FOURTH EDITION, REVISED

WITH 302 ILLUSTRATIONS

THE MAJORITY OF WHICH ARE FROM ORIGINAL DRAWINGS  
AND PHOTOMICROGRAPHS

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## PREFACE TO THE FOURTH EDITION

The Ninth Revision of the United States Pharmacopoeia, as in no previous edition, makes it important, and even necessary, that all works of a pharmaceutical character be revised.

The last revision of the Pharmacopoeia has required, on the part of the revisers, very exceptional work directed toward the subject of standards; and inasmuch as the United States Pharmacopoeia, as well as the National Formulary, is mentioned in the statute, known as the Food and Drugs Law, this revision has become of greatest importance.

Recognizing this, great pains have been taken in the revision of the present edition, that the standards, whenever mentioned, shall conform to the legal standard above referred to.

Many changes have been made necessary by the fact that the U.S.P. IX has deleted fifty-three vegetable drugs and has added, or raised to official recognition, but four of well known drugs.

Among the conspicuous changes in U.S.P. IX, is the adoption of "Mil" (singular), "Mils" (plural), for cubic centimeter (cc.). This coined word, Mil—for Milliliter, is more accurate than cubic centimeter, (cc.) for the thousandth of a liter, which the cubic centimeter was intended to express. Throughout this present edition "mil" and "mils" have been used, replacing the less accurate "cc."

The Families of plants yielding organic drugs have been rearranged in the present volume. The order of arrangement adopted is that which is followed by all botanists of any note at the present time, commencing with the Algæ, Fungi, and other cryptogamous growths, the order and sequence of such authors as Engler and Prantl have been practically followed. This has required an entire transposition of the natural orders of the former edition.

The Chapter on Inorganic Chemicals has been enlarged to meet the demand of many students. Added to this is a brief Chapter on Therapeutic Action, which is intended as a suggestion to students of how to expand their knowledge in this direction by reference to other works.

The chapters relating to histological study of plant tissues have been entirely omitted in the present edition in order to economize space for new material, and, secondly, because Professor Stevens, formerly associated in this work, has published an entirely satisfactory volume for class-room work and covered the ground more completely in his "Plant Anatomy."

A Chapter on Serotherapy has been incorporated which, in treatment, while it is concise, it is hoped will meet the present demand of students of Materia Medica, who first must have studied the elements of this very extensive subject.

The author desires to make special mention of valuable service rendered by his associate, Mr. Chas. M. Sterling, who has revised that portion of the work included in the various chapters of Part IV. The author regrets that he has been obliged to reduce rather than lengthen many articles in Materia Medica in order that the present volume should not be unduly expanded.

L. E. S.

## PREFACE TO THE FIRST EDITION

The present volume is, in a slight degree, a revision of a work written by the author in 1879, entitled "Organic Materia Medica and Pharmacal Botany." This work has been out of print a number of years, and until recently the author has had no time to rewrite it in such a manner as seemed necessary to bring it up to the present standard; it has also been deemed advisable to change completely the model of the former work. The task now accomplished presents not so much a revision, as a new treatise.

Two methods of classification of drugs are here brought into use—a classification according to physical characteristics, and a classification according to botanical relationships—both of which are, though, occupying separate divisions of the book, so brought together by a system of numbering that the place of the drug in each of the classes is at once apparent. The author would here suggest that those who make use of the work in connection with a cabinet of specimens, should have the containers in the cabinet numbered to accord with numbers in the book, in order that students may readily find specimens for identification and study.

It is perhaps needless to state that the nomenclature and general character of the text is made to conform with the present standard—The United States Pharmacopoeia; but the capitalization of specific names derived from proper nouns has been discarded, in accordance with present botanical practice. The descriptive heading of each of the official drugs has been in most cases given in the pharmacopoeial language. The unofficial drugs are distinguished in the text by the use of a different type and by a different setting of the article from that which treats of the official drugs. In this connection the author desires to give credit to Mr. George S. Davis, who has aided in the work by placing at the author's disposal most excellent material regarding rare unofficial drugs, and the use of material from his publication, credited under Bibliography.

The scope of the work, it will be seen, embraces not only the official drugs of the vegetable and animal kingdoms, but a vast variety of unofficial drugs, some of which are of rare occurrence in the market. These have been included because of the greater field this inclusion gives for pharmacal and botanical study; the greater variety of forms

presented to the student of pharmacognosy, the wider will be his range of observation. It is hoped that in the 624 drugs mentioned, the student or instructor will be able to make a selection which will be ample to supply material to illustrate the principles of the subject under consideration. In a work of this size an exhaustive treatment of this number of drugs could not be given, but by a brief mention of them material for study is indicated. It may be mentioned in this connection that wherever metric measurements are given, these are stated in millimeters; this has been deemed advisable for the purpose of comparison.

The illustrations included in Part I are taken mainly from Bentley's "Manual of Botany," to the author of which our thanks are due. An exception, however, is found in the drawings of the starches, which were prepared from original specimens. The remaining illustrations, with the exception of those in the Chapter on Animal Drugs, have been prepared under the direction of C. E. McClung, Ph. G., a graduate of the Kansas State University School of Pharmacy, class of '92. All the drawings of the cross-sections are drawn directly from sections prepared by him, the cell contents being first removed by the method described in Appendix C. It has been our aim to present the elements of each drug in their true proportions. As often as possible, the cells in their exact shape and relative size have been drawn, and in no case has meaningless shading been employed. For some of the drawings of the medicinal plants credit is given below in the Bibliography. The illustrator has kindly furnished a Chapter on Pharmacal Microscopy, which will be found in Appendix C.

The author is much indebted to Professor Vernon Kellogg for information concerning animal drugs used in pharmacy; also for Appendix B, in which he treats of insects attacking drugs. The drawings to illustrate the material furnished by Professor Kellogg are hereby credited to Miss Mary Wellman, artist.

For aid in the preparation of, the text in Part I our thanks are due to Mr. A. O. Garrett, who, in his university course, has made botany a special study.

Appendix B, upon the synthetic remedies, is the work of Mr. F. B. Dains, who has made a specialty of organic chemistry and was instructor in this subject in the University of Kansas during the year 1894. In this section the new spelling of chemicals has been adopted only in a few

cases.

To Dr. S. W. Williston, Professor of Physiology and Anatomy, who has aided in the condensed description of therapeutic action; to Mr. O. H. Parker and Mr. William Clark, members of the Senior Class of '94, who assisted in the study of characteristics from crude specimens of drugs in the open market; to Mr. W. O. Strother, of the same class, who supplied a few drawings of cross-sections; and to Mr. W. F. Newton, of the junior Class, who materially aided not only in the study of drug characteristics, but also in arranging the material, our thanks are due.

L. E. S.

# PART I

## A STUDY OF DRUGS

### CLASSIFICATION

Drugs may be arranged in several different ways, to suit the aim and convenience of the student. The prominent systems of classification in common use are as follows:

**I. Therapeutical.**—This system of classification is especially valuable to the student of medicine. Here the physiological action and therapeutical application are made most prominent.

**II. Chemical.**—Classification of organic drugs is not infrequently based upon the character of the constituents. In this way alkaloidal drugs, glucosidal drugs, drugs containing volatile oil, etc., form the subgroups. Other subgroups of chemical classification are:

*Inorganic Chemicals.*—To the pharmacist the chemical action, the crystalline form, the solubility, and other physical properties are of especial value. For mineral substances, therefore, he adopts the classification of the chemist. Some therapeutists, seeing a certain relation between therapeutical action and chemical constitution, adopt the same method of grouping also for these mineral substances.

*Synthetical Remedies.*—This class of remedial agents is most difficult to classify in a manner consistent with science, partly because our materia medica is becoming overloaded with proprietary combinations and mixtures of synthetic medicinal products with various adjuvants to modify their action. These latter have oftentimes certain unscientific names, which give little or no idea of their composition.

**III. Physical.**—According to this method, drugs having allied physical properties are brought together. Roots, leaves, flowers, fruits, and seeds form the principal divisions. Under this head two different arrangements are present in this volume: (a) Classification into subgroups based upon such prominent features as odor, taste, etc. By this means the aromatic, bitter, acrid, sweet, and mucilaginous drugs are brought together. (b) Classification into subgroups based upon structural characteristics. Here drugs having similar structure are found associated. In the table having this arrangement the official drugs only are found. Appended to each there is a physical description in the fewest possible terms—such prominent terms as are used in describing the physical and structural characteristics.

Each drug has a number, so that a ready reference to the same drug in the body of the work is made easy. Here a fuller description is found.

Instructors in pharmacognosy who use this book are recommended to employ this conspectus and to have the students use these numbers. When labeling the drug (or its container) for class work, these numbers should be employed. The experience of the author in teaching the subject under consideration has been most favorable to this method. By the use of the numbers at first, the student quickly grows to learn, not only the drug, but the place in the system to which it belongs. The subject grows in interest until he is able to recognize the drug and to properly classify it.

**IV. Botanical.**—By this arrangement drugs belonging to the same natural order are brought together. In subdividing these orders botanical relationship is emphasized to as large an extent as is practicable in dealing with drugs from a pharmaceutical standpoint. From the point of view of the scientist this is the ideal system. This method has been adopted in the body of this work.

*Geographical.*—Drugs are rarely classified according to the locality of their occurrence. It is, however, instructive to the student to refer individual, or classes of drugs, to their locality. Drugs of ancient times were obtained chiefly from Asia. Many of these have survived, and are official to-day; notably aloes, myrrh, etc. With the discovery of the new world many important drugs were made accessible. Geographical classification is therefore of interest from many points of view. The presentation of this subject is facilitated by outline maps with the drugs indicated in their natural localities. As an example of such a map, see Cinchona.

*Alphabetical Arrangement.*—In all the standard books of reference, such as the “Pharmacopoeia” and the “Dispensatories,” a strictly alphabetical arrangement is followed, no attention being paid to systems of classification. The arrangement is made wholly subservient to quick and ready reference.

In the following order four classifications will be presented: 1. A synopsis of therapeutical agents. 2. Chemical agents. 3. Classification of organic drugs, as indicated under (a) and (b). 4. Botanical arrangement, where drugs will be treated at some length.



# TABLE OF THERAPEUTICAL AGENTS

## I. INTERNAL REMEDIES

### A. *Affecting Nutrition:*

Haematics (Blood Tonics).  
Alkalies. Acids.  
Digestants.  
Antipyretics.  
Alteratives.

### B. *Affecting the Nervous and Muscular Systems:*

#### (a) The Brain—

Cerebral Excitants.  
Cerebral Depressants.  
Narcotics.  
Hypnotics.  
Analgesics.  
Anesthetics.

#### (b) The Spinal Cord—

Motor Excitants.  
Motor Depressants.

#### (c) Nerve Centers and Ganglionic System—

Antispasmodics.  
Tonics.  
Antiperiodics.

#### (d) Heart and Circulatory System—

Cardiac Stimulants.  
Cardiac Sedatives.  
Vascular Stimulants.  
Vascular Sedatives  
Vasoconstrictors.  
Vasodilators.

#### (e) Excretories—

Diuretics.  
Renal Depressants.  
Vesical Tonics and Sedatives.  
Urinary Sedatives.  
Diaphoretics and Sudorifics.  
Anhidrotics.  
Antilithics.

### C. *Affecting Special Organs—Partly through the Nervous System:*

#### (a) Organs of Respiration—

Expectorants.  
Pulmonary Sedatives.  
Errhines.  
Sternutatories.

- (b) Alimentary Canal—
  - Sialagogues.
  - Emetics.
  - Purgatives.
  - Astringents.
  - Stomachics.
- (c) The Liver—
  - Hepatic Stimulants.
  - Cholagogues.
  - Hepatic Depressants.
- (d) Generative System—
  - Ecbolics or Oxytocics.
  - Emmenagogues.
  - Aphrodisiacs.
  - Anaphrodisiacs.
- (e) Eyes (Ciliary Muscle)—
  - Mydriatics.
  - Myotics.

## II. EXTERNAL REMEDIES

### A. *Irritants:*

- Rubefacients.
- Epispastics.
- Pustulants.
- Escharotics.

### B. *Local Sedatives:*

- Demulcents.
- Emollients.

## III. AGENTS WHICH ACT UPON ORGANISMS WHICH INFEST THE HUMAN BODY

- Antiseptics.
- Disinfectants.
- Antizymotics.
- Anthelmintics.
- Antiparasitics.
- Antiperiodics.

## THERAPEUTICAL AGENTS DEFINED

HÆMATICS restore the quality of the blood to normal condition. They exert a direct influence on the composition of the blood: e.g., preparations of iron, of manganese, cod-liver oil, etc.

**ALKALIES** act, in the concentrated form, as caustics (escharotics), but when diluted, as antacids. Dilute alkalies, if given before meals, however, will stimulate the production of the acid gastric juice. The carbonates of potassa and soda and the bicarbonates, also preparations of the alkaline earths, such as lime-water and mixtures of magnesium carbonate, are good examples. Some of the salts of the alkalies have a remote antacid effect, becoming decomposed in the blood and excreted in the urine, which they render less acid.

**ACIDS.**—These have an action opposite to that of the alkalies. When much diluted, they are administered for the purpose of checking hyperacidity of the stomach, by stimulating the production of the alkaline pancreatic juice and checking the acid gastric juice. Examples: Dilute hydrochloric acid, phosphoric acid.

**DIGESTANTS.**—Agents which effect solution (digestion) of food in the alimentary canal. Examples: Pepsin, pancreatin, trypsin, papain, etc.

**ANTIPIRETICS.**—Agents which reduce the temperature of the body, either by reducing the circulation or diminishing tissue change, or metabolism, or favoring the loss of heat through radiation, conduction, etc. Examples: Quinine, aconite, antipyrine, antimony, etc.

**ALTERATIVES.**—A term used to designate a class of agents which alter the course of morbid conditions, modifying the nutritive processes while promoting waste, by stimulating secretion, absorption, and the elimination of morbid deposits; especially used in the chronic diseases of the skin. Employed in the treatment of phthisis, syphilis, gout, neuralgia, asthma, etc. Examples: Arsenious acid, mercury, iodine and the iodides, sarsaparilla, guaiac, colchicum, stillingia, etc.

**CEREBRAL EXCITANTS.**—Agents which increase the functional activity of the cerebrum, without causing any subsequent depression of brain function. Examples: Camphor, valerian, caffeine, cannabis (in small doses), etc.

**CEREBRAL DEPRESSANTS** have an opposite effect to the preceding, lessening brain activity. Some of the drugs of this class are employed as hypnotics or as analgesics.

**NARCOTICS.**—Agents which lessen the sensibility to pain and cause

sleep. A narcotic will abolish pain, while an anodyne will frequently merely overcome wakefulness. Examples: Opium, cannabis indica, belladonna, humulus, etc.

**HYPNOTICS.**—Agents which induce sleep and will often abolish pain and cause neither deliriant nor narcotic effects. Examples: Chloral, sulphonal, trional, the bromides, etc.

**ANALGESICS.**—Agents which relieve pain by their effect upon the sensory centers; the term is synonymous with anodynes. The general anodynes, which taken internally, affect the whole organism; local anodynes affect the part to which they are applied. Examples: Opium, belladonna, hyoscyamus, aconite, antipyrine, acetanilid, aspirin, chloral hydrate, etc.

**ANÆSTHETICS.**—Agents which suspend consciousness and temporarily destroy sensation. The local anæsthetics affect only the part to which they are applied. Examples: Ether, chloroform, nitrous oxide, etc. Local anæsthetics: Cocaine, carbolic acid, ether spray, etc.

**MOTOR EXCITANTS.**—Agents which increase the functional activity of the spinal cord and the motor apparatus, invigorating the action of the heart and lungs. Examples: Nux vomica, strychnine, etc.

**MOTOR DEPRESSANTS** have an opposite effect to the motor excitants, lowering the functional activity of the spinal cord and motor apparatus. Examples: Alcohol, opium, aconite, conium, belladonna, etc.

**ANTISPASMODICS.**—Agents acting on the nervous system in various ways. They prevent or allay irregular action or spasm of voluntary and involuntary muscles. This is accomplished frequently by a sedative influence upon the nerve centers, while a few others exert their influence by stimulating the nerve centers employed to relieve spasms. Examples: Alcohol, ether, valerian, camphor, asafoetida, musk, the bromides, hydrocyanic acid, etc.

**TONICS.**—Agents which increase the vigor and tone of the system by improving the appetite, favoring digestion and assimilation, and adding strength to the circulatory system. Examples: Gentian, columbo, quinine, etc.

**ANTIPERIODICS.**—Agents which prevent or check the return of

diseases which recur periodically, possibly by a toxic action upon the microbes in the blood, which are supposed to cause the disease; but little is known of their mode of action. The typical antiperiodic, quinine, has, however, a decided effect upon the heart and brain, as well as other parts of the nervous system.

**CARDIAC STIMULANTS**, as the name implies, are agents which increase the heart's action, the force and frequency of the pulse. Examples: Ether, alcohol, atropine, sparteine, nitroglycerine, etc.

**CARDIAC SEDATIVES** allay and control palpitation and overaction of the heart. Examples: Aconite, veratrum viride, digitalis, antimony, etc.

**VASCULAR STIMULANTS**.—Agents which dilate the peripheral vessels and increase the peripheral circulation. Members of this class also strengthen the heart's action, and are advantageously employed in debilitated conditions of the central organs of the circulation. Examples: Alcohol, preparations of ammonia, caffeine, digitalis, strophanthus, epinefrin, etc.

**VASCULAR SEDATIVES**.—Agents which lessen the capillary circulation and raise the blood pressure by stimulating the vasomotor center or its mechanism and the walls of the vessels. Examples: Ergot, digitalis, opium, salts of iron, etc.

**DIURETICS**.—Agents which increase the secretion of urine, acting either directly upon the secreting cells of the kidneys or by raising the general or local arterial tension. Employed in acute congestion and inflammation of the kidneys and in dropsies. Examples: Squill, scoparius, triticum, and organic salts of the alkalies.

**RENAL DEPRESSANTS**.—Agents which lower the activity of the renal cells, thereby lessening the urinary secretion. Examples: Morphine, quinine, ergot, etc.

**VESICAL TONICS AND SEDATIVES**.—Agents acting upon the bladder, in the one case increasing the tone of the muscular fibers and in the other lessening the irritability of that organ. Examples: Tonics-strychnine, cantharis, belladonna, etc.; sedatives-opium, buchu, uva ursi, pareira, etc.

**RENAL SEDATIVES**.—Agents which exert a sedative action upon the

whole urinary tract. Examples: Copaiba, cubebs, etc.

**DIAPHORETICS AND SUDORIFICS.**—Agents which increase the action of the skin and promote perspiration. Examples: Dover's powder, jaborandi, camphor, sweet spirits of niter, etc,

**ANHIDROTICS.**—Agents which check perspiration. Examples: Acid camphoric, atropine, zinc salts, acids, alum, etc.

**ANTILITHICS.**—Agents used to prevent the formation of insoluble concretions or to dissolve concretions when formed in the ducts. Examples: Salts of lithia, potassium, benzoic acid, etc.

**EXPECTORANTS.**—Agents which are employed to facilitate the expulsion of bronchial secretions and to modify the character of these when abnormal. Examples: Ammonium chloride, the aromatic balsams, squill, licorice, senega, etc.

**PULMONARY SEDATIVES.**—Agents which allay the irritability of the respiratory center and the nerves of the lungs and bronchial tubes. Examples: Belladonna, opium, hyoscyamus, hydrocyanic acid, etc.

**ERRHINES AND STERNUTATORIES.**—The latter are agents which affect locally the nasal mucous membrane, producing sneezing; the former produce an increase of nasal secretion and discharge. They- also indirectly stimulate the vasomotor centers and at the same time excite the respiratory centers. Examples: Ipecacuanha, sanguinaria, veratrine, etc.

**SIALAGOGUES.**—Agents which promote the secretion and flow of saliva from the salivary glands. Examples: Pyrethrum, mezereum, the mercurials and antimonials, etc.

**EMETICS.**—Agents which cause vomiting, acting directly upon the nerves of the stomach or acting through the blood upon the vomiting center, or by reflex irritation of the vomiting center. Examples: Mustard, zinc sulphate, apomorphine, ipecacuanha, tartar emetic, etc.

**PURGATIVES** produce evacuation of the contents of the intestinal canal by increasing secretion along the tract, by exciting peristaltic action, etc. Examples: Podophyllum, colocynth, jalap, croton oil, magnesium sulphate, etc.

**ASTRINGENTS.**—Agents which produce contraction of muscular fiber, which coagulate albumen and lessen secretion from mucous membranes, arresting discharges. Examples: Tannic and gallic acids, alum, lead acetate, persulphate of iron, etc.

**STOMACHICS.**—Agents which increase the appetite and promote gastric digestion. They also check fermentation and dispel accumulation of flatus. Examples: Peppermint, cardamom, ginger, capsicum, etc.

**HEPATIC STIMULANTS (Cholagogues).**—Agents which excite the liver and increase the functional activity of that organ so that the amount of bile is augmented, etc. Hepatic stimulants increase the activity of the liver-cells, while cholagogues remove the bile from the duodenum. Examples: Podophyllum, aloes, jalap, colocynth, mercurous chloride, etc.

**HEPATIC DEPRESSANTS.**—Agents which reduce the functional activity of the liver, having the opposite effect of the foregoing, that of diminishing the formation of the bile, urea, and glycogen. Examples: Opium, quinine, arsenic, antimony, etc.

**ECBOLICS, OR OXYTOCICS.**—Agents which stimulate the pregnant uterus and produce contraction of that organ, either by direct irritation of the muscles of the womb, or indirectly by affecting the uterine center of the cord. Examples: Ergot, cotton-root bark, savin, cimicifuga, etc.

**EMMENAGOGUES.**—Agents which stimulate the uterine muscular fibers and restore the normal menstrual function. Examples: Ergot, apiol, iron, etc.

**APHRODISIACS.**—Agents used to excite the function of the genital organs when they are morbidly depressed. Examples: Phosphorus, zinc phosphide, salts of iron, gold, or arsenic, etc.

**ANAPHRODISIACS.**—Agents which diminish the sexual desire. Examples: The bromides, camphor, etc.

**MYDRIATICS.**—Agents which cause dilatation of the pupil; used to temporarily destroy accommodation by causing paralysis of the ciliary muscle. Examples: Atropine and homatropine.

**MYOTICS.**—Agents acting in a manner contrary to that of the above,

producing contraction of the pupil by stimulating the circular muscular fibers of the iris and at the same time contracting the ciliary muscle. Examples: Pilocarpine, eserine, etc.

**IRRITANTS.**—Agents which are applied locally to the skin to produce certain effects, as rubefacients (simply reddening the skin); epispastics (blistering); pustulants (causing blebs in which is found pus); escharotics, or caustics (actually destroying the tissue). Examples: Mustard (rubefacient); cantharides (epispastic); croton oil (pustulant); caustic potassa, carbolic acid, and strong mineral acids (escharotics).

**LOCAL SEDATIVES.**—Agents which diminish irritation in the part to which applied, relieving local inflammation. Examples: Acetate of lead, opium, belladonna, etc.

**DEMULCENTS.**—Bland remedies used to allay and mechanically protect inflamed surfaces. They are used also internally for this purpose, as in acute inflammation of the alimentary canal. Examples: Mucilages of acacia, flaxseed, Iceland and Irish moss, elm, etc.

**EMOLLIENTS** resemble the above; are used externally to soften and soothe the irritated and abraded skin. Examples: Lard, olive oil, cocoa butter, etc.

**ANTISEPTICS.**—Agents which arrest putrefaction, either by preventing the growth of micro-organisms causing putrefactive decomposition or by destroying these micro-organisms. Examples: Carbolic acid, corrosive sublimate, etc.

**DISINFECTANTS.**—Some authorities limit the use of this term to those agents which destroy the micro-organisms. The terms antiseptic and disinfectant are frequently used interchangeably. Examples: Corrosive sublimate, carbolic acid, iodoform, zinc chloride, eucalyptol, etc.

**ANTIZYMOTICS.**—A term applied to agents which arrest fermentation. Examples: See above.

**ANTHELMINTICS.**—Agents which destroy such parasitic worms as infest the alimentary canal. Tæniafuges destroy tape-worms; vermifuges expel these intestinal parasites. Examples: Santonin, spigelia, chenopodium, etc. Tæniafuges: Filix mas, pelletierin, cusso, etc.



**ANTIPARASITICS.**—Agents which destroy those parasites which infest the human body externally. Examples: Mercurial preparations, chrysarobin, carbolic acid, cocculus, etc.

**ANTIPERIODICS.**—See above.

Thus far we have only very briefly called attention to therapeutical and physiological action of drugs, giving but a few examples. We will temporarily leave the further consideration of this, and for the time refer to the therapeutical agents themselves.<sup>1</sup>

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<sup>1</sup> Sayre, in order to be comprehensive, briefly defines all chemicals, synthetic or organic, then used in medicine. I have deleted much of this as the primary value and the preponderance of the text is plant and animal drugs,—MM

## PART II DRUG DESCRIPTION

### SECTION I.—ORGANIC DRUGS FROM THE VEGETABLE KINGDOM, DESCRIBED AND ARRANGED ACCORDING TO FAMILIES.

#### CRYPTOGAMS (PLANTS PRODUCING SPORES)

#### ALGÆ

Structure very various, growing for the most part in water, mostly in stagnant water in warm climates, but some on moist rocks or ground, etc. Entirely cellular, producing fronds.

#### I. CHONDRUS.-IRISH MOSS

#### CARRAGEEN

The dried plant **Chon'drus cris'pus** Lyngbye. (Pam. Gigartinaceæ.)

**BOTANICAL CHARACTERISTICS.**—*Thallus* fleshy, cartilaginous, compressed, dividing into short, moniliform filaments. *Antheridia* or *oogonia* in superficial spots. *Chondrus crispus* has four vessels or capsules imbedded in the frond. *Gigartina mamillosa* (*Chondrus mamillosa*) has an oval one raised upon a short stalk, and its frond is slightly channeled toward the base.

**SOURCE.**—These plants inhabit the rocks on the American and European shores of the Atlantic Ocean. In the spring they are collected on the coast of New England and Ireland, the Massachusetts coast yielding about 15,000 barrels annually.

**DESCRIPTION OF DRUG.**—Yellowish or white, horny, translucent; many times forked; when softened in water, cartilaginous; shape of the segments varying from wedge-shaped to linear; at the apex emarginate or 2-lobed. It has a slight seaweed-like odor, and a mucilaginous, somewhat saline, taste.

**TEST.**—When one part of Chondrus is boiled for about ten minutes with thirty parts of water replacing water lost by evaporation, the solution should form a thick jelly upon cooling.

When softened in cold water chondrus should become gelatinous and transparent the thallus remaining nearly smooth and uniform and not swollen except at the tips.

A solution made by boiling 0.3 Gm. in 100 mils of water and filtering gives no precipitate on the addition of tannic acid T.S. (gelatin), and does not give a blue color when cold upon addition of iodine T.S. (starch).

CONSTITUENTS.—The principal constituent (go per cent.) is **mucilage**, which is precipitated by lead acetate; traces of iodine and bromine have also been detected. There seems to be no starch present, but the cell-walls acquire a dark blue color in contact with iodine (Flückiger). Literature rather contradictory as to the nature of its various constituents.

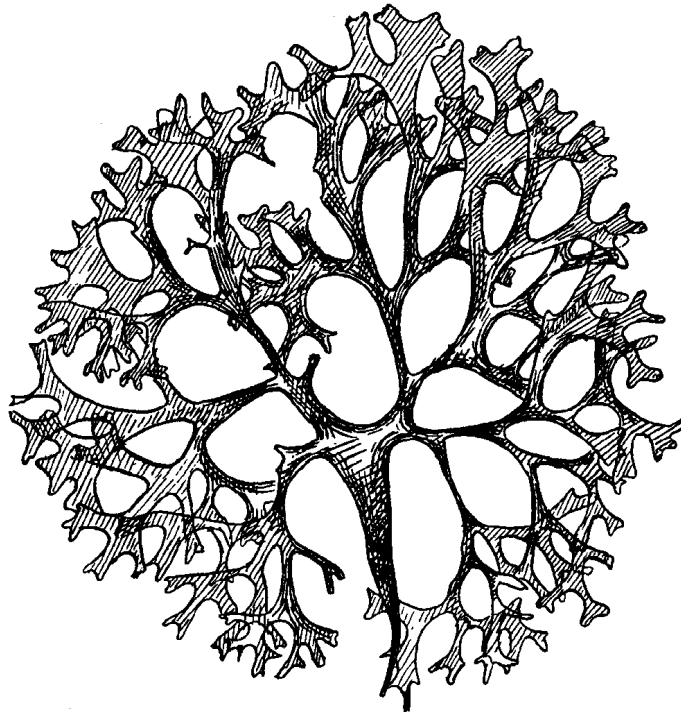


FIG. 1.—*Chondrus crispus*.

ACTION AND USES.—Demulcent and slightly nutritious. A dietetic is specially prepared from the powder, made in the form of jelly with water. Dose: 6 dr. (24 mils) in decoction.

**2. FUCUS VESICULOSUS, N.F.—BLADDER-WRACK.** The whole plant, **Fu'cus vesiculo'sus** Linné, growing on muddy rocks and floating to the shores of the North Atlantic and North Pacific Oceans, consists of long, flattened, branched fronds, upon which are dispersed blackish air-vessels (tubercles) in pairs, one on each side of the

midrib. These cavities contain thin, gelatinous matter, and bear on their inner walls, when young, hair or transparent filiform cells. Odor marine-like; taste mucilaginous and saline. "Wracks" or rock weeds of other species are also collected, such as *Fucus nodosus*. 2a. The medicinal properties probably lie in the inorganic matter, the ash of the plant containing chlorides, bromides, iodides, phosphates, and sulphates; the organic matter is mainly mucilage. The medicinal value of the drug as an alterative has been questioned; it is used in obesity. "The fl'ext. and extract are irrational, preparations, the only form in which to obtain the effects of the plant being the recent decoction (Shoemaker)."

*Fucus*, N.F., constitutes the dried thallus of the above plant, yielding not more than 20 per cent. of ash.

3. **LAMINARIA**.—SEA-GIRDLES or TANGLES. From **Lamina'ria digita'ta** Lamouroux. A dark-spored seaweed having a ribless expansion resembling a leaf-blade. The stipitate portion has been used in gynecology as a substitute for sponge in making sponge tents for dilating the cervical canal. Contains salts, mucilage, and mannite; the latter principle is especially prominent in another species—*Laminaria saccharina*—like the above, abundant on the sea-coast.

4. **AGAR OR AGAR-AGAR** U.S.P. IX.—The dried mucilaginous substance extracted from *Gracilaria* (*Sphoercocus*) *lichenoides*.

*Gracilaria* and other marine Algæ, growing along the eastern coast of Asia, particularly several species of *Gelidium* or *Gloiopeltis* (class Rhodophyceæ). Mostly in bundles 4 to 6 dm. in length, thin translucent, membranous, agglutinated pieces from 4 to 8 mm. in width; externally yellowish-white, shiny; tough when damp, brittle when dry; odor, slight; taste, mucilaginous. Tests show it to be insoluble in cold but slowly soluble in hot water. No gelatin or no starch, etc. TEST.—Practically the same as that for chondrus. Ash, not more than 5 per cent. Average dose, 10 Gm. (2 1/2 dr.).

**ACTION AND USES**.—Agar-agar is practically never used in medicine. It possesses demulcent and emulsifying properties in common with other species of Algæ. It is principally used at present in bacteriological laboratories as a culture medium for micro-organisms.

Agar-agar in the dry state passes through the stomach undigested and on reaching the bowels takes up water and swells considerably, thereby increasing the volume of the evacuations; it is therefore considered a laxative.

## FUNGI

Spore-bearing plants destitute of chlorophyll and reproduced by means of spores, not by true seeds.

## 5. ERGOTA.—ERGOT

### ERGOT. (Ergot of Rye)

The carefully dried sclerotium of fungus **Claviceps purpurea** Tulasne (Pam. Hypocreaceæ), replacing the grains of rye, **Secale cereale** Linné (Gramineae), with not more than 5 per cent. of harmless seeds, fruits and other foreign matter.

DEVELOPMENT.—Sclerotium described: The early stage of the fungus consists of a profuse growth of *mycelium* in the tissues and upon the surface of the young ovary. In the “*sphacelia*” stage, as it is called, a multitude of *conidia* (non-sexual spores) are produced on the ends of the *hyphæ*; after the conidial stage the *mycelium* at the base of the ovary becomes greatly increased and assumes a hard and compact form. It grows with considerable rapidity, and carries upon its summit the old sphacelia and the remains of the now destroyed ovary. The compact, horn-shaped, dark-colored body which results (and is official) is called the *sclerotium*, which occupies the position of the displaced ovary. This sclerotium remains dormant in winter, and in the spring produces spores, as follows: stalked receptacles (Fig. 3) grow up from the tissue of the ergot, in which are developed a number of *perithecia* (Fig. 4). These *perithecia* are somewhat flask-shaped cavities (Fig. 5) filled with *asci* (Fig. 5), the latter containing long, slender spores termed *ascospores* (Fig. 6), which again, by germinating on the rye and other grasses, give rise to a new growth, and to the development of *Claviceps*. Ergot, in short consists in its earliest stage of a mass of mycelium (threads or filaments of fungi) in and upon the growing ovary. Conidia are produced (non-sexual spores) in great abundance which quickly germinate.

Following the conidial stage the mycelium at the base of the ovary assumes a hard and compact form, increases in size, becoming a horn-shaped and dark-colored body, the so-called ergot. Such a compact mass of hyphæ (the vegetative threads or filaments of the fungi) is called a sclerotium.

The official fungus grows on rye, but the ergot also grows on other grasses and some of these ergots from other grasses have been found to be stronger than that of rye. The different grades are *Russian, German, Austrian, Spanish and Swedish*.

PREPARATION AND PRESERVATION.—Ergot should be dried without artificial heat kept in tin or glass containers free from light. A few drops of chloroform or carbon tetrachloride should be added from time to time to prevent development of insects. The powdered drug should not be kept longer than one year. Suggestion for preservation—keep over slaked lime. Dip into ethereal solution of tolu and keep in stoppered bottles. Also by removing the oil from the drug.

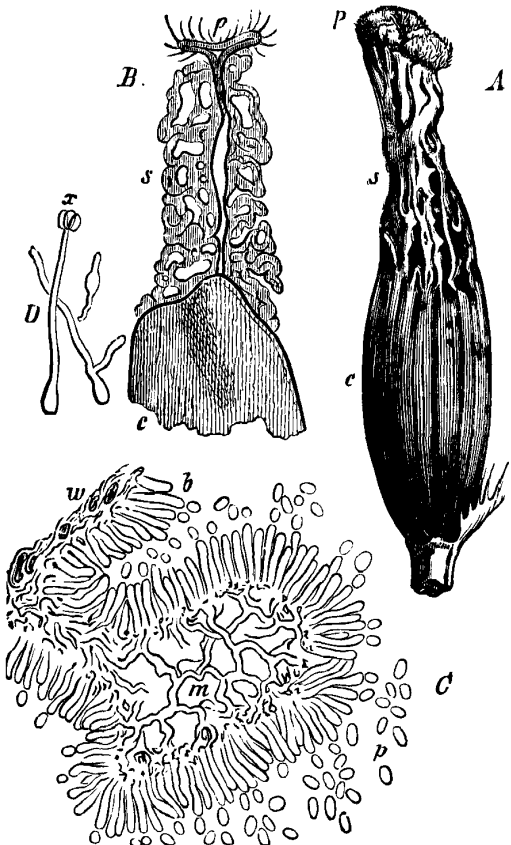


FIG. 2.—*Claviceps purpurea*. A. Young sclerotium, *c*, with old sphacelia, *s*. *p*. The apex of the dead ovary of rye. B. Upper part of A, in longitudinal section, showing sphacelia, *s*. C. Transverse section through the sphacelia, more highly magnified. *m*. The mycelium, surrounded with the hyphae. *b*. Bearing conidia. *p*. Conidia fallen off. *w*. The wall of the ovary. D. Germinating conidia, forming sporidia, *x*.—(Bachs.)

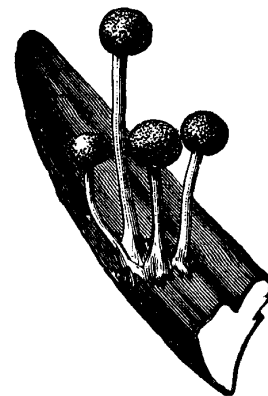


FIG. 3.—Portion of horn-shaped sclerotium of *Claviceps purpurea*, bearing four stalked receptacles.

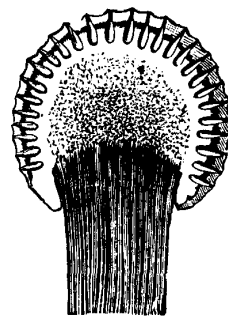


FIG. 4.—Longitudinal section of a receptacle, magnified, showing the perithecia.



FIG. 5.—A single perithecium of *Claviceps purpurea*, magnified, showing the contained asci.

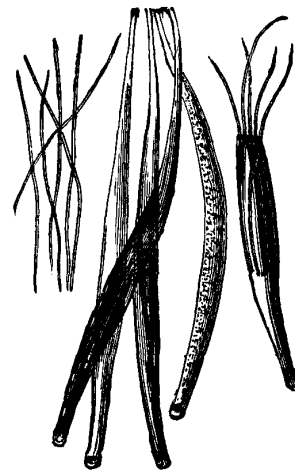


FIG. 6.—Asci containing the long, slender ascospores.

**DESCRIPTION OF DRUG.**—The official ergot of rye is from 10 to 30 mm. ( $\frac{2}{5}$  to  $1\frac{1}{5}$  in.) long and from 2 to 6 mm. ( $\frac{1}{12}$  to  $\frac{1}{4}$  in.) in diameter. On other grasses it is usually of less size. Triangular, slightly curved, tapering toward, but obtuse at, the ends; externally purplish-black, internally whitish with pinkish lines; fracture short (not very brittle). If a portion be macerated in water containing hydrate of potassium or sodium, then carefully crushed under the blade of a spatula, the fragments of mycelium threads are plainly discernible under the microscope. Odor (especially in powder or when treated with an alkali) heavy and unpleasant; taste oily and disagreeable.

When more than one year old, it is unfit for use. Old ergot, which breaks with a sharp snap, is almost devoid of pinkish tinge upon the fracture, is hard and brittle between the teeth, and is comparatively odorless and tasteless, should be rejected.

**CONSTITUENTS.**—The active constituents of ergot are still somewhat in doubt due probably to the amorphous condition in which they exist. Barger and Carr have extracted a substance called ergotoxine (noncrystalline) to which the dangerously poisonous character of ergot is due including the power to produce gangrene. Barger and Dale have shown it to contain amines derived from amino acids. Two of especial physiological activity are:

- 1. p. Hydroxyphenylethylamine or (Tryamine) has action of same type as active constituents of suprarenal glands and substance chiefly concerned in standardization of ergot by rise in blood pressure.
- 2. b. Iminoazolethylamine (Ergamine) has an action of peculiar intensity on plain muscle especially on uterine muscle.

Ergotine an alkaloid thought by some to be identical with ergotonine. Ecboline same as cornutine. Others say ergotine and ecboline are identical. Different samples of ergot may contain very different amounts of the three main constituents. The yield of ash should not exceed 5 per cent.

*Assay of Ergot.*—The physiological test for ergot, originated by E. M. Houghton, consists in feeding the preparation or drug to roosters, and noting the blackened and gangrenous appearance produced in the comb and wattles. The rapidity with which this change takes place and the depth of color produced denote the strength of the drug. An assay of the drug can be made by estimating the proportion of cornutine present, which, according to Beckurts, is as follows: 25 Gm. of the drug are freed from oil by percolation with petroleum spirits, then dried and well shaken with 100 Gm. of ether and 1 Gm. of magnesia, the latter having been suspended in 20 mils of water.

After repeated agitation the mixture is allowed to stand for three or four hours. Then 60 Gm. of the clear ethereal solution (to 15 Gm. of ergot) are shaken four successive times with 25, 10, 10, and 10 mils of dilute HCl (0.5 per cent.), the united solutions rendered alkaline by NH<sub>4</sub>OH, and the alkaloid shaken out with three successive portions of ether. On evaporation, drying, and weighing the somewhat crystalline yellowish-white cornutine the assay is completed. The results of such assay are unsatisfactory, but have proved of value as a check in qualitative estimations.

*Preparation of Ergotin (Wiggers).*—Treat ergot with ether to deprive it of fixed oil, then extract with hot alcohol, evaporate, and purify. It resembles cinchonic red, is soluble in alcohol, but insoluble in ether and water. Bonjeau's ergotin corresponds to a purified extract of ergot (aqueous extract, precipitated by alcohol, filtered, and evaporated); is soluble in alcohol and water.

**ACTION AND USES.**—Produces vascular contraction, especially of the arteries, all over the body. This property is said to be due to its action on the vasomotor centers in the cord. Because it contracts the arterioles it is hemostatic. The flow of urine is also diminished. It is **ecbolic and parturient**, powerfully exciting the pregnant uterus and expelling its contents. Recently it has been discovered to be of value in the treatment of insomnia, the sleep produced being more natural than that from other drugs.

Poisonous symptoms: dimness of vision, local anesthesia, and numbness are sometimes produced, even by medicinal doses. Antidotes: evacuants (stomach-pump, emetics, etc.), stimulants, nitrite of amyl, inhalations, friction, etc. Dose: 20 to 30 gr. (1.3 to 2 Gm.) in freshly prepared powder, wine, or fluidextract; ergotin solution, 1 to 3 gr. 0.65 to 0.2 Gm.)

#### OFFICIAL PREPARATIONS.

**Extractum Ergotæ** Dose: 3 to 12 gr. (0.2 to 0.8 Gm.)

**Fluidextractum Ergotæ,** Dose: 1/2 to 2 fl. dr. (2 to 8 mils)

6. **USTILAGO.**—CORN SMUT. A fungous growth upon **Zea mays**, more particularly upon the inflorescence. Consists of blackish, irregular, roundish masses enveloping innumerable spores; of a disagreeable odor and taste. It contains probably sclerotic acid. Used as a parturient and emmenagogue. Dose: 15 to 30 gr. (1 to 2 Gm.).

7. **AGARICUS ALBUS, N.F.**—LARCH AGARIC. PURGING AGARIC. WHITE AGARIC. From **Polyporus officinalis** Fries. The internal, decorticated portion of the fungus comes in light, colorless, spongy masses of irregular shape. Taste sweetish, acrid, and bitter. In large doses cathartic. In doses of 8 gr., gradually increased to 1 dr., it has been found useful in checking night sweats of phthisis. Surgeon's agaric, from *Polyporus fomentarium* Fries, is used externally as a styptic in hemorrhage.



7a. **FUNGUS CHIRURGORUM.**—Surgeon's Agaric. Same as Polyporus. See above.

8. **CEREVISIÆ** (*Saccharomyces*).—FERMENTUM COMPRESSUM (Compressed Yeast), N.F.—An organized ferment. Yeast is the name applied to the frothy scum that forms on the surface of saccharine liquids and rises from the bungholes of newly brewed beer. Under the microscope this froth is shown to consist of particles which multiply with extraordinary rapidity when placed in a moderately warm temperature. The globular forms are considered as the spores of a fungus belonging to the genus *Torula*, the cells of which are but slightly united, sometimes forming branching chains, the mycelium being almost absent. Yeast is employed in hastening the fermentation of worts and in leavening dough in bread-making. Bottom or sediment yeast is found on the bottom of fermenting vessels. Two quite distinct methods of brewing are produced, depending upon the employment of one or the other of these varieties of yeast. For the purpose of the bakery, yeast is dried and formed into cakes. Beer yeast is official in the B.P. Yeast, under the title of fermentum, was official in the U.S.P., 1820-40, 1860-80, used as a tonic, laxative, etc., but at present rarely employed. As a local remedy, as poultice, in treatment of eruptions of boils, it still finds some favor.

## LICHENES

Consisting mainly of a thallus (often leaf-like), without stem and leaves, wholly cellular. Reproduced by spores.

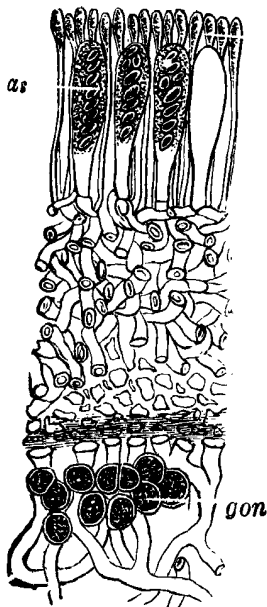


FIG. 7.—Section of thallus of *Cetraria islandica* through an apothecium. *as.* Asci, three of which contain ascospores. *gon.* Gonidia.



FIG. 8.—*Cetraria islandica*.

9. **CETRARIA**.—ICELAND MOSS. The entire plant, **Cetra'riaislan'dica** Acharius. Off. U. S. P. 1890. The crisp, leaf-like lobes are cartilaginous, whitish on the under surface, channeled and fringed at the margins. A strong decoction gelatinizes on cooling; taste mucilaginous and bitter. The Pharmacopoeia calls attention to the fact that the drug is frequently mixed with pine leaves, moss, and other lichens; from these it should be freed. *Constituents*: It is largely composed (70 per cent.) of **lichen starch**, lichenin, and isolichenin, a solution of the latter producing a blue color with iodine. Unlike the gum of chondrus, it furnishes but a trace of mucic acid when treated with nitric acid. Boiling with dilute acids converts the mucilage into sugar solution. A solution of Iceland moss is precipitated by alcohol. The bitter principle, cetraric acid (cetrarin,  $C_{18}H_{16}O_8$ ), forms yellow salts, which are equal in bitterness to quinine; this bitter principle may be removed by prolonged maceration in water, or, still better, by treating the drug with twenty-four times its weight of a weak solution of an alkaline carbonate. Demulcent, nutritive, and, if the bitter principle be present, tonic; used in advanced stages of phthisis when stronger remedies are unsuitable. Dose: 30 to 60 gr. (2 to 4 Gm.).

*Preparation of Cetrarin*: Boil drug with alcohol; express and add acidulated (HCl) water to the filtrate; then allow cetrarin to deposit.

10. **LITMUS**.—A fermented coloring extract from various species of lichens (e.g., *Lecanora tartarea*), other varieties of which also yield the dyes orchil and cudbear. *Habitat*: Northern Europe and African coast, and adjacent islands. Litmus is in about 1/2 to 1 inch rectangular cakes, blue, light, friable, finely granular. Unlike most vegetable dyes, it is not turned green by alkalies. It is turned red by acids, for which it is used as a test in the form of infusion (tincture), or litmus paper, made by dipping unsized paper in the strong infusion.

10 a. **Orchil** is a purplish-red, thickish liquid, with an ammoniacal odor.

10 b. **Cudbear** (Persio, N.F.) is a purplish-red powder, sometimes used to color preparations.

## POLYTRICACEAE

11. **POLYTRICHUM JUNIPERUM** Hedwig.—HAIR-CAP MOSS. This common moss is a powerful diuretic; in full doses given at very short intervals it has proved very beneficial in dropsy. Dose: 1 to 2 dr. (4 to 8 Gm.), in infusion.

## FILICES.—Ferns

Leafy plants with the *fronds* raised on a stipe (petiole) rising from a rhizome, circinate in veneration. The *spore-cases* are found on the under side of the frond. The life history of the fern is as follows:

When the minute spore from the sporangium on the frond drops to the ground, it germinates into a more or less heart-shaped body called a prothallus. The under surface of this body is provided with root-hairs

and also female organs of generation, archeogonia, and male organs, antheridia; the frond-stage is a direct outgrowth from the fertilized archeogonia.

*Synopsis of Drugs from the Filices*

- |                    |                  |                   |
|--------------------|------------------|-------------------|
| A. <i>Rhizome.</i> | C. <i>Hairs.</i> | E. <i>Leaves.</i> |
| ASPIDIUM, 12.      | Cibotium, 14.    | Polypodium, 15.   |
| B. <i>Herb.</i>    | D. <i>Root.</i>  |                   |
| Adiantum, 13.      | Osmunda, 16.     |                   |

12. ASPIDIUM.—ASPIDIUM

MALE FERN.

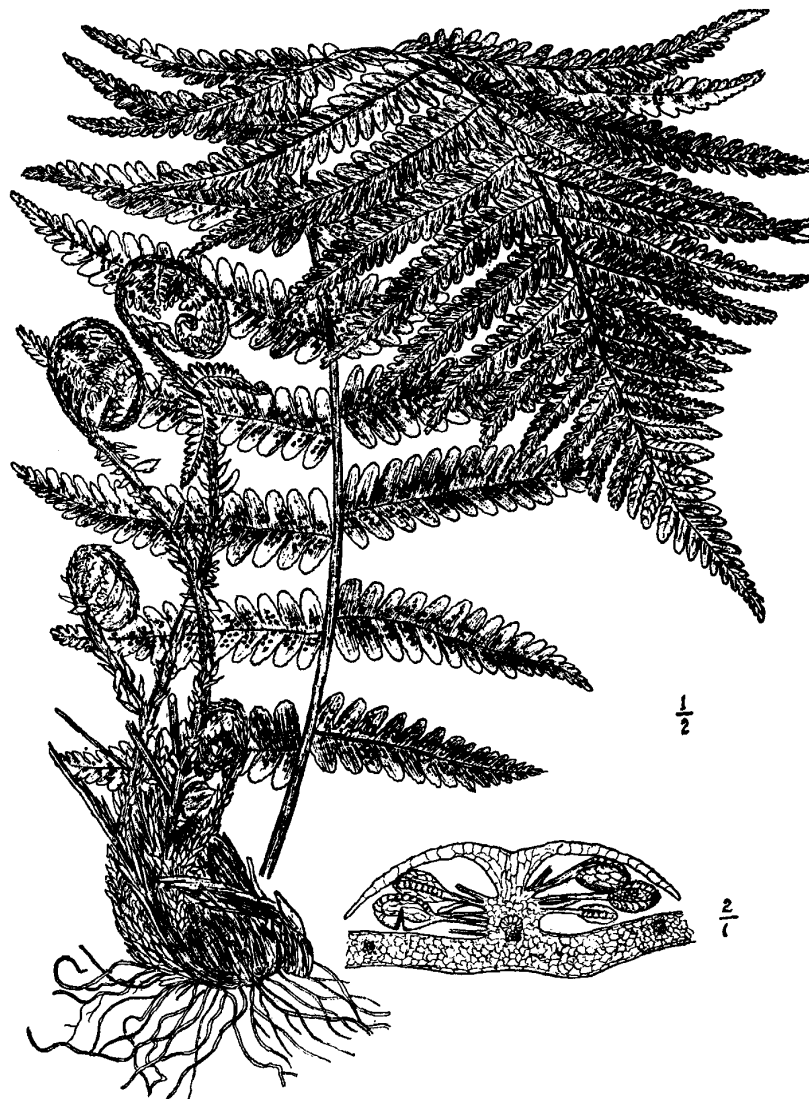


FIG. 9.—*Dryopteris filix-mas*—Plant and section through spore case.

The dried rhizome of **Dryop'teris fil'ix-mas** Schott, and of **Dryop'teris margina'lis** Asa Gray (family Polypodiaceæ). Collected in autumn, freed from the roots and dead portions of rhizome and stipes, and dried at a temperature not exceeding 70°C.

**BOTANICAL CHARACTERISTICS.**—*Fruit-dots* round, borne at the back of the veins; indusium covering the sporangia. Stipe continuous with the root-stock. *Fronde* lanceolate (*A. filix-mas*) or ovate-oblong (*A. marginalis*); fruit-dots in the former nearer the mid-vein than the margin, in the latter nearer the margin.

**HABITAT.**—North America.

**DESCRIPTION OF DRUG.**—As taken from the ground the rhizome consists of a caudex around which are arranged the dark brown, somewhat curved **leaf-stalk remnants or stipes**, about 25 to 50 Mm- (1 to 2 in.) in length, imbricated like the shingles of a roof; at the base they are densely surrounded by **thin, glossy, chaffy scales** of a lighter color and somewhat transparent. The entire rhizome is from 100 to 300 mm- (4 to 12 in.) long, and from 50 to 62 mm. (2 to 2½ in.) thick, flexible, tapering toward one end, usually split longitudinally, roughly scarred with remains of stipe bases or bearing several coarse longitudinal ridges or grooves, pale green when fresh and becoming pale brown and with occasional elongated areas of the still adhering brownish-black outer layers, fracture short, pale green in the inner half, the texture rather spongy and exhibiting from 6 to 12 fibrovascular bundles in a loose and interrupted circle; it generally comes into market

broken into pieces of various lengths; internally pale green, spongy or corky; odor slight and disagreeable; taste sweetish, somewhat bitter and astringent, acrid and nauseous. Only such portions as are still green should be used in making preparations. The deterioration of the root is rapid—loses its activity in one or two years.



FIG. 10.—*Aspidium* rhizome. (½ natural size.) A, Leaf-stalk. (Photograph.)

**MICROSCOPICAL STRUCTURE.**—The prevailing tissue is parenchyma, the polyhedral, porous-walled cells of which contain starch, greenish or brownish tannin-like substances, and drops of a greenish fixed oil. The thin subserous outer layer consists of smaller brown cells. Toward the center of the rhizome is an irregular circle of ten (*A. filixmas*) or six (*A. marginalis*) vascular bundles, outside of which are

smaller scattered bundles. Distributed throughout the tissue are large air pores.

*Powder.*—Microscopical elements of: See Part iv, Chap. I, B.

CONSTITUENTS.—**Filicic acid**,  $C_{35}H_{42}O_{13}$ , filicin (filicic acid anhydrid,  $C_{31}H_{40}O_{12}$ ), aspidin,  $C_{23}H_{27}O_7$ , the latter being poisonous, fixed oil, a trace of volatile oil, and chlorophyll. Ash 3 per cent.

*Preparation of Filicic Acid.*—This principle is deposited as a granular sediment when the oleoresin is allowed to stand.

ACTION AND USES.—**Tæniacuge**. Dose: 1/2 to 2 dr. (2 to 8 Gm.). Theoleo resin is the most efficient preparation.

OFFICIAL PREPARATION.

**Oleoresina Aspidii**, Dose: 1/2 to 1 fl. dr. (2 to 4 mils)

13. **ADIANTUM.**—MAIDENHAIR. **Adian'tum peda'tum** Linné, an indigenous fern which has been used as a pectoral in chronic catarrh and other affections of the air-passages.

14. **CIBOTIUM.**—PENGHAWAR. PAKU-KIDANG. The chaffy hairs collected from the base of the fronds and stems of many varieties of ferns especially of the genus Cibotium, growing in Sumatra and Java. Long, silky, yellowish or brownish, curling filaments (under the microscope flat and jointed), used to stop the flow of blood from capillaries by mechanical absorption of the serum.

15. **POLYPODIUM.**—POLYPODY. The leaves of **Polypo'dium vulga're** Linné, common in Europe and North America. Expectorant in chronic catarrh and asthma. Dose: 1 dr. (4 Gm.), in infusion.

16. **OSMUNDA REGALIS** Linné (order Osmundaceae).—BUCK-THORN BRAKE. A common fern in swamps, the root-stock of which is used as a demulcent, tonic, and styptic. Dose of fl'ext.: 1 to 3 fl. dr. (4 to 12 Mils).

### **EQUISETACEAE.—Horsetail Family**

17. **EQUISETUM.**—SCOURING RUSH. The herb of **Equise'tum hyema'le** Linné. *Habitat:* Northern United States. Diuretic and astringent. Dose of fl'ext.: 15 to 60 drops (1 to 4 mils).

## LYCOPODIACEÆ.—Club-moss Family

Low plants looking like very large mosses, more or less branching, and with the 1- to 3-celled *sporangia* (spore-cases) in the axils of the lanceolate, subulate, or rounded, persistent *leaves*. Spores *homogeneous*.

### 18. LYCOPODIUM.—LYCOPODIUM

#### VEGETABLE SULPHUR

The spores of *Lycopodium clavatum* Linné, and of other species of Lycopodium.

**BOTANICAL CHARACTERISTICS.**—Stem creeping extensively, with ascending very leafy branches. *Leaves* linear-awl-shaped, aristate. *Spikes* 1 to 4 on a slender peduncle 4 to 6 inches long.

**SOURCE AND COLLECTION.**—Europe, Asia, and North America; collected mostly in Russia, Germany, and Switzerland, in July and August, by cutting off tops of the moss, shaking out spores, and sifting.

**DESCRIPTION OF DRUG.**—A **fine, pale-yellowish powder, very mobile**, free from odor and taste. It floats in water without being wet by it (due to the fixed oil), but sinks on being boiled. When slowly heated it burns quietly and should not leave more than 5 per cent. of ash, but when thrown into a flame it **flashes up**. Under the microscope the granules are seen to be tetrahedral, the basal side convex and the other three coming together to form a triangular pyramid. The surfaces are traversed in all directions by ridges which form regular, five- or six-sided meshes; at the points of intersection are small elevations, and along the edges short projections. Like lupulin, lycopodium is one of the interesting objects for microscopic study. Pollen of pine, an illustration of which is shown above, is sometimes used as an adulterant.



FIG. 11.—Spores of Lycopodium, as seen from the top and from bottom of the spore.

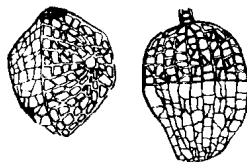


FIG. 12.—Lupulin; a gland viewed in profile and viewed obliquely. See Lupulinum, III, p. 148.

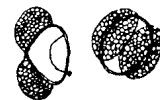


FIG. 13.—Pollen of Pine: a grain seen in profile; another seen from the front side.

**ADULTERANTS.**—These may be easily detected by the microscope or simple tests. Pine pollen consists of an elliptical cell with a globular cell

attached to each end. Starch is detected with iodine; turmeric, by turning reddish-brown with alkalis; inorganic mixtures, by increasing the yield of ash over 5 per cent., and by sinking in carbon disulphide. Dextrin has been found in lycopodium to the extent of 50 per cent.

*Powder.*—Microscopical elements of: See Part iv, Chap. 1, 13.

**CONSTITUENTS.**—**Fixed Oil 47 to 50 per cent.**, volatile bases in very small quantity, and ash containing alumina and phosphoric acid, not exceeding 3 per cent.

**ACTION AND USES.**—Absorbent and protective application to excoriated surfaces; in pharmacy, to facilitate the rolling of pill masses, and to prevent the adhesion of the pills.

## PHANEROGAMS

(Plants producing true seed)

### Pinaceae.—Pine Family

Trees or shrubs with a resinous juice. The wood differs from that of dicotyledons in that it is destitute of ducts, but has instead bordered disks. The leaves are usually fascicled, and are mostly awl- or needle-shaped. Fruit a cone or galbulus.

#### *Synopsis of Drugs from the Pinaceæ*

A. <i>Tops.</i>	*Venice Turpentine,	OLEUM CADINUM,
SABINA, 19.	27 a.	24.
Juniperus Virginiana,	TEREBINTHINA	OLEUM TEREBIN-
20.	CANADENSIS, 29.	THINÆ, 27 b.
Thuja, 22.	Pix Canadensis, 30.	OLEUM PICIS LIQ-
B. <i>Fruits.</i>	PIX LIQUIDA, 28.	UIDÆ, 28 a.
*Juniperus, 23.	Pix Burgundica, 31.	Oleum Succini, 32 a.
C. <i>Barks.</i>	E. <i>Volatile Oils.</i>	F. <i>Resins.</i>
*Pinus Alba, 21.	OLEUM SABINÆ,	RESINA, 27 c.
Tsuga, 25.	19 a.	Succinum, 32.
Larix, 26.	OLEUM JUNIPERI,	Dammara, 33.
D. <i>Oleoresins.</i>	23 a.	Kauri, 34.
*Terebinthina, 27.		Sandaracca, 35.

## 19. SABINA.—SABINA

### SAVINE

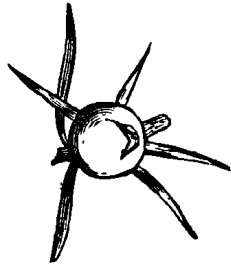


FIG. 14.—Berry (galbulus) and acicular leaves of Juniper.

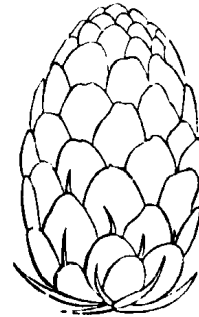


FIG. 15.—Cone of the Larch.

The tops of **Junip'erus sabi'na** Linné. The young and tender green shoots are stripped off in the spring, coming into the market as **short, thin, quadrangular branchlets**, clothed with alternate pairs of minute, opposite, scale-like leaves, appressed (more pointed and divergent in older twigs); each scale has a shallow groove and a conspicuous, depressed oil-gland in the back. The berry-like cone fruit is about the size of a pea, situated on a short, **recurved pedicel**, and covered with a bluish bloom; it is dry, but abounds in essential oil, and contains from 1 to 4 small, bony seeds. Odor strong, balsamic; taste bitter and acrid. Adulteration: Red cedar tops (20).

*Powder.*—Yellowish-brown. The microscopic elements consist of: Tracheids with bordered pits; parenchyma with numerous stomata; long bast fibers and starch grains.

CONSTITUENTS.—Tannin, resin, gum, etc., and a **volatile oil** (19 a) (2 per cent. in tops, 10 per cent. in berries) having the same composition as oil of turpentine.

ACTION AND USES.—Savine is an irritant, acting especially as a **uterine stimulant**; also diuretic, emmenagogue, and vermifuge. Dose: 5 to 15 gr. (0.3 to 1 Gm.). It is used externally in ointment as a stimulant dressing for bruises.

19 a. **OLEUM SABINÆ.**—OIL OF SAVINE. A nearly colorless, sometimes yellow, limpid, volatile oil, having a strong, terebinthinate odor, and a bitterish, intensely acrid taste. It has the same composition as oil of turpentine. Dose: 1 to 5 drops (0.065 to 0.3 mls)



20. **JUNIPERUS VIRGINIANA.**—The tops of the red cedar, or American saivne, are often used to adulterate savine, from which they can scarcely be recognized except by difference in taste and smell. The galbulus of the false variety is borne on an erect pedicel.

21. **Pinus Alba** N.F. Lin.—WHITE PINE. The inner bark of **Pinus strobus** (Weymouth Pine), from eastern and central North America. In flat pieces about 6 inches long by 3 inches in width and 1/24 inch in thickness. Bark brittle, fracture irregular, not fibrous, but showing several woody layers. Reddish-brown streaked with gray outside; inner, yellowish blotched with light brown; bland odor; mucilaginous, slightly bitter and astringent taste.

PROPERTIES.—Those of balsamic preparations generally.

USES.—An emollient and expectorant in chronic affections of air-passages. Dose of fluidextract: 1/2 to 1 fluidrachm (2 to 4 mils) .

21a. **PINUS MONTANA MILLER.**—Pinus Pumilio Haenke—Dwarf Pine. From the fresh leaves of this dwarf pine a volatile oil is obtained which is official in the U.S.P. IX as **Oleum Pini Pumilionis**, Oil of Dwarf Pine Needles. It is employed as an inhalent in catarrh of the respiratory passages, chronic laryngitis and bronchitis; used locally in treatment of chronic rheumatic affections and when added to ether allays irritation and diminishes bronchial secretion.

22. **THUJA N.F.**—ARBOR VITÆ. The leafy tops of **Thu'ja occidenta'lis** Linné, a North American evergreen tree. Small flattened twigs having a scalloped appearance, due to the flat, lateral leaf-scales, each of which has an oilgland near its apex; the other leaves folded lengthwise, boat-shaped, mostly glandless; odor balsamic, somewhat terebinthinate; taste pungently aromatic, camphoraceous, and bitter. The medicinal properties of Thuja depend mainly upon a volatile oil. It resembles savine in its general action. Dose: 15 to 60 gr. (1 to 4 Gm.), in infusion or fl'ext.

23. **JUNIPERUS, N.F.**—JUNIPER BERRIES. The fruit of **Junip'erus commu'nis** Linné, an evergreen shrub or small tree inhabiting the Northern Hemisphere, bearing small cones, the scales of which coalesce in threes, become fleshy, and ripen into the so-called berry. These berries or fruits are globular, about the size of a large pea, with a triangular depression at the top caused by a three-rayed furrow where the scales are united; at the base are a few small scales, remnants of undeveloped whorls; externally of a glossy, purplishblack color, covered with a grayish bloom; they contain a brownish-yellow pulp with oil-glands, in which are imbedded three small, bony, angular seeds, also covered with large oil-glands; odor disagreeably aromatic, balsamic; taste sweetish, warm, and balsamic, slightly bitter. The Smyrna berry from *J. phoenicea* Linné, yields an oil of greater optical activity.

CONSTITUENTS.—**Volatile oil**, most abundant in the full-grown green berries, being partially converted into resins on ripening, entirely so in the dead-ripe, black

berries; also juniperin, sugar (15 to 30 per cent.), wax, fat, proteids, mucilage, etc. Their virtues are extracted by water and alcohol.

**ACTION AND USES.**—Stimulant and **diuretic**, chiefly used as an adjuvant to more powerful diuretics in dropsical complaints. Dose: 15 to 60 gr. (1 to 4 Gm.), in infusion, water spirit, etc., the volatile oil, however, obtained from the wood and branches, being principally used. They are largely used in the manufacture of gin, which owes its diuretic properties to them.

23a. **OLEUM JUNIPERI**, U.S.—OIL OF JUNIPER. A colorless or greenish-yellow volatile oil, with a strong, terebinthinate odor and a hot, acrid taste. Specific gravity 0.850 to 0.865. It consists of pinene, C<sub>10</sub>H<sub>16</sub>, cadinene, and juniper camphor.

OFFICIAL PREPARATIONS.

**Spiritus Juniperi** (5 per cent.)                      Dose: 30 drops (2 mils).

**Spiritus Juniperi Co.** (0.4 per cent.)              Dose: 2 fldr. (8 mils).

24. **OLEUM CADINUM.**—OIL OF CADE  
(Oleum Juniperi Empyreumaticum)

JUNIPER TAR OIL

An empyreumatic, oily liquid obtained from the heart-wood of **Junip'erus oxyce'drus** Linné, by dry distillation in ovens.

**BOTANICAL CHARACTERISTICS.**—A tree 10 to 12 feet high, with spreading top and drooping twigs. Leaves awl-shaped. Fruit globular, reddish-brown, about the size of a filbert.

**HABITAT.**—Mediterranean Basin.

**DESCRIPTION OF DRUG.**—A brownish or dark brown, oily liquid, less thick and more mobile than tar, having a tarry but characteristic odor, and an aromatic, bitter, and acrid taste.

**ACTION AND USES.**—Used mostly externally in the treatment of **cutaneous diseases** and as an insecticide in the form of liniments, ointments, or soaps. Dose: 3 drops (0.2 Mil).

25. **TSUGA CANADENSIS** Carriere.—HEMLOCK SPRUCE. (Bark.) Tonic and astringent. Dose: 15 to 60 gr. (1 to 4 Gm.).

26. **LARIX AMERICANA** Michaux.—TAMARAC. AMERICAN LARCH. (Bark.) Tonic and gently astringent, its chief action being upon mucous membranes. Dose: 1/2

to 2 dr. (2 to 8 Gm.).

## 27. TEREBINTHINA, N.F.—TURPENTINE

### TURPENTINE

A concrete oleoresin obtained from **Pi'nus palus'tris** Miller (Fam. Pinaceae, U.S.P. 1900), and other species of Pinus.

**BOTANICAL CHARACTERISTICS.**—A large tree, 60 to 100 feet, with thin, scaled bark, and hard, very resinous wood. *Leaves* 10 to 15 inches long, in threes, from long sheaths. *Sterile flowers* rose-purple. *Cones* large, cylindrical or conical-oblong.

**SOURCE AND COLLECTION.**—Southern United States, particularly North Carolina. The oleoresin is secreted in the sapwood; some of it flows spontaneously, but it is generally obtained by a process called “boxing,” as follows: During the winter from one to four excavations, each holding from 4 to 8 pints, are cut into the tree through the sapwood. After a few days the bark above these cavities is removed for about a height of 3 feet, and some of the wood is hacked off, the hacks being in the shape of the letter L. The oleoresin begins to flow about the middle of March, and continues until September or October. The turpentine is removed by means of dippers constructed for the purpose, and then usually distilled. That which flows the first year is considered the best, being termed “virgin dip,” and yields about 6 gallons of oil per barrel, and “window-glass rosin;” that of the next and subsequent years is known as “yellow dip,” yielding about 4 gallons of oil per barrel, and medium grades of rosin. The turpentine which hardens on the tree is known as “scrapings,” and yields about 2 gallons of oil per barrel, leaving a dark resin.

**DESCRIPTION OF DRUG.**—In yellowish, opaque, tough masses, brittle in the cold, crumbly-crystalline in the interior, of a terebinthinate odor and taste. In warm weather it is a yellowish, viscid semiliquid when fresh, but ultimately, through exposure to the air, becomes perfectly dry and hard.

**CONSTITUENTS.**—Volatile Oil 20 to 30 per cent. (27b), abietinic anhydride,  $C_{44}H_{62}O_4$ , in rosin (27c), the acid of which, abietic acid,  $C_{44}H_{64}O_5$ , is crystalline, soluble in  $CS_2$ , benzol, alcohol, ether, chloroform, glacial acetic acid, and alkalies.

27a. **Terebinthinae Laricis, N. F.—Venice Turpentine.**—A yellowish or greenish liquid of honey-like consistence, collected in Switzerland and portions of France from *Larix europæa* De Candolle. Obtained by boring holes into the center of the wood and dipping the liquid out as it accumulates. It received its name from having formerly been almost entirely distributed from the Venetian port. Genuine Venice turpentine is comparatively scarce in the markets to-day, most of it being a factitious brown liquid made by dissolving rosin in oil of turpentine.

A number of other turpentines are obtained from various species of pine, larch, and fir, but hardly any of them enter our markets. The turpentines all agree in their medical properties, and differ only slightly in their physical characteristics, all of them being liquid at first, thickening through the evaporation and oxidation of their volatile oil, and ultimately solidifying. They melt by heat, and at a high temperature ignite with a white flame attended with dense smoke.

**CONSTITUENTS.**—**Volatile Oil** 20 to 30 per cent., **resin** (abietic anhydride, crystallizing out as abietic acid), a bitter principle, and traces of succinic and acetic acids.

**ACTION AND USES.**—The turpentines are rarely used internally, the volatile oil, to which the medicinal virtues are due, being used instead. Dose: 15 to 60 gr. (1 to 4 Gm.), in pills. Externally irritant and rubefacient, in ointments and plasters.

27b. **OLEUM TEREBINTHINÆ, U.S.—OIL OF TURPENTINE. SPIRITS OF TURPENTINE.** A volatile oil distilled from turpentine, the markets of the United States being chiefly supplied by the North Carolina forests. A perfectly limpid, colorless liquid when pure, but generally somewhat colored from resin contained, or from oxidation; odor peculiar, strong, penetrating; taste hot, pungent, somewhat bitter. It is very volatile and inflammable. When purified by distilling with caustic soda, it constitutes the *Oleum Terebinthinæ Rectificatum, U.S.*, which is officially directed to be dispensed when oil of turpentine is required for internal use.

**CONSTITUENTS.**—Oil of turpentine consists of several terpene hydrocarbons having the formula  $C_{10}H_{16}$  (pinene), sp. gr. 0.855-0.870. When exposed to the air, it becomes thick from the oxidation of some of these hydrocarbons into resin. When the rectified oil is treated with nitric acid, large crystals of terpin hydrate (Terpini Hydras, U.S.) separate out, having properties similar to the oil of turpentine. Dose, 2 gr. (0.1 Gm.). The European turpentine oil contains pinene and sylvestrine; it forms with hydrochloric acid a crystalline compound,  $C_{10}H_{16}HCl$  (artificial camphor). **Terebenum** is a liquid derived from the oil (consisting chiefly of pinene) by treatment with sulphuric acid, boiling point  $156^{\circ}$ - $160^{\circ}C$ . Dose: 8 drops (0.5 mil).

**ACTION AND USES.**—Stimulant, diuretic, hemostatic, occasionally diaphoretic; in large doses anthelmintic and cathartic; externally rubefacient, in rheumatism, etc. As a stimulant it is often beneficial in low forms of fever, and, when death is inevitable, to prolong life beyond the natural limit. Dose: 5 to 15 drops (0.3 to 1 mil) in emulsion.

OFFICIAL PREPARATIONS.

**Linimentum Terebinthinae** (35 per cent. with resin cerate).

**Oleum Terebinthinae Rectificatum**, Dose, 5 to 15 drops (0.3 to 1 mil) .

**Ceratum Cantharidis**. Emulsum Olei Terebinthinae.

27c. **RESINA**, U.S.—RESIN. ROSIN. COLOPHONY. The clarified residue left after distilling off the volatile oil from turpentine. It has been asserted that **Pinus palustris**, the official species, contains more resin than any other German or American pine. When pure, rosin is of a clear, pellucid, amber color, but the commercial rosin is yellowish-brown, more or less dark, sometimes almost black, the color depending upon its purity and the amount of heat used in its preparation; it breaks with a shining, shallow, conchoidal fracture; odor and taste faintly terebinthinate. White rosin is an opaque variety made by incorporating it with water.

CONSTITUENTS.—Rosin is the anhydride of abietic acid,  $C_{44}H_{62}O_4$ , into which acid it may be converted by warming with dilute alcohol. Ash, 0.05 per cent.

ACTION AND USES.—An important ingredient of ointments and plasters, and is said to have the property of preserving them from rancidity by preventing the oxidation of the fatty base.

OFFICIAL PREPARATION. **Emplastrum Resinae**.

## 28. PIX LIQUIDA.-TAR

### TAR

SOURCE.—An empyreumatic oleoresin obtained by the destructive distillation of the wood of **Pinus palustris** Miller, and of other species of *Pinus*. The pine logs are cut into billets, and built up into a stack and covered with earth, as in making charcoal. Slow combustion is started through an opening in the top of the stack, and the resinous matter, as it melts out and collects in a cavity in the center, is drawn off into barrels.

DESCRIPTION.—A resinous, black semiliquid, of an empyreumatic, terebinthinate odor, and a sharp, bitterish, empyreumatic taste. Acid in reaction. Partly soluble in water.

Birch tar, Dagget, or *Oleum Rusci*, from *Betula alba* Linné, has an odor similar to that of Russian leather.

CONSTITUENTS.—Tar is a very complex substance, varying with the kind of wood, amount of resins present therein, and the care exercised in its preparation, the chief constituents being an empyreumatic volatile

oil, pyrocatechin, acetone, xylol, toluol, cresols (creosote), guaiacol, phenol, etc. The acid reaction which characterizes tar is due to acetic acid, obtained in an impure state as pyroligneous acid by distillation. In the retort is left behind the ordinary solid and fusible pitch of commerce.

**ACTION AND USES.**—Stimulant, irritant, insecticide, similar to, but less irritant than, the turpentine. Dose: 8 to 60 gr. (0.6 to 4 Gm.). The syrup is much used in pulmonary affections.

**OFFICIAL PREPARATIONS.**

**Syrupus Picis Liquidæ** (0.5 per cent) Dose: 1 to 4 fl. dr. (4 to 15 mils)

**Unguentum Picis Liquidæ** (50 per cent.).

28a. **OLEUM PICIS LIQUIDÆ RECTIFICATUM.**—OIL OF TAR. A volatile oil distilled from tar, the residue left being common pitch, *pix nigra*. A nearly colorless liquid when first distilled, but soon acquires a dark, reddishbrown color; it has the characteristic odor and taste of tar, which depends upon it for its medicinal properties. Dose: 1 to 5 drops (0.065 to 0.3 mil), in capsules or emulsion.

29. **TEREBINTHINA CANADENSIS.**—CANADA TURPENTINE

CANADA BALSAM. BALSAM OF FIR

A liquid oleoresin obtained from **A'bies balsam'ea** Linné

**HABITAT.**—Canada, Nova Scotia, Maine, and the mountainous regions further south.

**PRODUCTION.**—The oleoresin is secreted in small vesicles in the bark, collected by puncturing and allowing the liquid to exude into a vessel having a broad and funnel-like lip. The vesicles contain only from a few minims to 1 fluid drachm.

**DESCRIPTION OF DRUG.**—A yellowish or faintly greenish, transparent liquid of honey-like consistence, becoming thicker and somewhat darker with age, but always retaining its transparency, and ultimately drying into a transparent mass; it has an agreeable, aromatic, terebinthinate odor, and a bitterish, feebly acrid, but not disagreeable taste, for which reason it is sometimes erroneously called balm of Gilead (98).

**ACTION AND USES.**—It has medical properties similar to the other turpentine and copaiba, but is rarely employed as a remedial agent. It is most valued for **mounting microscopic objects**, for which its

beautiful and durable, uncrystalline transparency peculiarly fits it.

OFFICIAL PREPARATION.

30. **PIX CANADENSIS**.—CANADA PITCH OR HEMLOCK PITCH. An oleoresin obtained from the North American hemlock spruce, **A'bies canadensis** Carriere. Resembles Pix Burgundica (31) in appearance, properties, and uses; it is somewhat darker red-brown in color and is much more fusible; odor weak, peculiar; taste very feeble. Rosin is a common adulteration.

31. **PIX BURGUNDICA**.—BURGUNDY PITCH. The resinous exudation prepared from *Abies excelsa* Poiret. A reddish-brown or yellowish-brown, opaque or translucent solid when pure, gradually taking the form of the vessel in which it is contained; brittle, breaking with a shining, conchoidal fracture; at body heat it becomes soft and adhesive; odor agreeable, somewhat aromatic, terebinthinate; taste aromatic and sweetish, not bitter. A mixture of common pitch, rosin, and turpentine melted together and agitated with water, is often substituted for Burgundy pitch, but may be detected by its insolubility in warm glacial acetic acid. Terebinthina cocta, a residue from the distillation of turpentine with water, and Resina pini (white turpentine), fused in hot water and strained, are allied products resembling the former, but these later become crystalline. *Constituents*: Volatile oil (smaller proportion than in turpentine), water, and resin. Gentle rubefacient and stimulant, in chronic rheumatism, etc., in plasters.

**Emplastrum Picis Burgundicæ**, U.S.P. 1890.

**Emplastrum Picis Cantharidatum** (92 per cent., with cerate of cantharides), U.S.P. 1890.

32. **SUCCINUM**.—AMBER. A fossil resin from extinct coniferous trees, found in greater or less quantities in every quarter of the globe; the largest deposits occur in the region surrounding the Baltic Sea, where it has been washed upon the shore. In small, irregular pieces, usually light or deep yellowishbrown, sometimes reddish-brown, generally translucent; tasteless and odorless, but emits an agreeable, aromatic odor when heated. It is almost insoluble in water, alcohol, ether, or oils, slightly soluble in chloroform. Used for fumigation, for the preparation of succinic acid and oil of amber, and in the arts.

32a. **OLEUM SUCCINI**.—OIL OF AMBER. A light yellowish-brown or ambercolored liquid (colorless when pure), having a balsamic, empyreumatic odor, and a warm, acrid taste. On exposure to light and air it thickens and becomes darker, ultimately solidifying into a black mass. With fuming nitric acid it acquires a red color, changing after a time into a brown, resinous mass having a peculiar musk-like odor. It is often adulterated with oil of turpentine, which may be detected by its throwing down a solid camphor when hydrochloric acid gas is passed through the mixture. Stimulant, antispasmodic, and irritant. Dose: 5 to 15 drops (0.3 to 1 mil). Externally in liniments.

33. **DAMMARA**.—DAMMAR. GUM DAMMAR. A spontaneous, resinous exudation collected in the East Indies from **A'gathis dam'mara** Richard. Transparent, straw-

colored, rounded masses, almost free from odor and taste, and breaking with a glossy, conchoidal fracture. Used mostly for varnishes.

34. **KAURI RESIN.**—KAURI Gum. A resin dug in large quantities from the soil in New Zealand, where it has exuded from *Dam'mara orienta'lis*. It is in large cream-colored or amber-colored masses. Used as a vulnerary in skin diseases; also used as a substitute for collodion, leaving an adherent, impervious, resinous varnish over the wound.

35. **SANDARACCA.**—SANDARAC. A resin exuding spontaneously from the bark of a North African evergreen tree, **Calli'trisquadrival'vis** Ventenat. Small rounded masses about the size of a pea, of a yellowish color; it resembles mastic somewhat, and is often substituted for it on account of its lower price, but a simple means of distinction is afforded in its becoming pulverulent (not adhesive) when chewed. It was formerly used as a mild stimulant in ointments and plasters, but is now mostly used for varnishes. Its powder is used as a pounce to prevent ink from spreading on paper or cloth.

## GNETACEAE

36. **EPHEDRA.**—The herb **Ephe'draantisiphilit'ica** C. A. Meyer. This plant is a native of Arizona, where it is used in venereal diseases. Dose of fl'ext.: 1 to 2 fl. dr. (4 to 8 mils).

## GRAMINEÆ.-Grass Family

A large order yielding the cereals (wheat, rye, etc.) and sugar cane, the source of most of the sugar of the market. The characteristics of the order are the *hollow stems* (culms), *flowers* in spikelets, and the *fruit*, a caryopsis.

### *Synopsis of Drugs from Gramineæ*

- |                               |                         |                               |
|-------------------------------|-------------------------|-------------------------------|
| A. <i>Rhizome.</i>            | F. <i>Starches.</i>     | G. <i>Fruit.</i>              |
| TRITICUM, 37.                 | AMYLUM, 42.             | Hordei Fructus, 43.           |
| B. <i>Root.</i>               | a. Avenæ Farina.        | H. <i>Decorticated Fruit.</i> |
| Vetiveria, 38.                | b. Sago.                | Hordeum, 43 a.                |
| C. <i>Sugar.</i>              | c. Tapioca.             | I. <i>Germinated Seeds.</i>   |
| SACCHARUM, 39.                | d. Taro.                | Maltum, 43 b.                 |
| D. <i>Styles and Stigmas.</i> | e. Triticum Vulgare.    |                               |
| *ZEA, 40.                     | f. Oryza.               |                               |
| E. <i>Fixed Oil.</i>          | g. Solanum Tuberosum.   |                               |
| Oleum Maydis, 41.             | h. Canna.               |                               |
|                               | i. Maranta.             |                               |
|                               | j. Curcuma Leucorrhiza. |                               |

\* N.F.



## 37. TRITICUM.—TRITICUM

### COUCH-GRASS

The dried rhizome of **Agropyron repens** Beauvois.

**BOTANICAL CHARACTERISTICS.**—Creeping; *root-stocks* slender, numerous. *Spikelets* 4- to 8-flowered, glabrous; *glumes* 3- to 7-nerved; *rachis* glabrous; *leaves* flat.

**HABITAT.**—Europe; naturalized and grows abundantly in North America.

**DESCRIPTION OF DRUG.**—Short, hollow sections from 3 to 6 mm. ( $\frac{1}{8}$  to  $\frac{1}{4}$  in.) long, and about the thickness and color of a straw; odorless; taste sweetish.

*Powder.*—Microscopical elements of: See Part iv, Chap. I, B.

**CONSTITUENTS.**—No active constituent has been discovered in couchgrass; it contains glucose, mucilage, malates, triticin (a gummy substance resembling inulin), and inosit. Ash not to exceed 3 per cent.

*Preparation of Triticin.*—Obtained by exhausting powdered drug with water; neutralize with baryta; concentrate and precipitate with lead subacetate; remove lead; purify with charcoal; neutralize, concentrate, and precipitate with alcohol. It is an amorphous, white powder, inodorous, tasteless, deliquescent, and with  $\text{HNO}_3$  is oxidized into oxalic acid.

**ACTION AND USES.**—Diuretic, demulcent. Dose:  $\frac{1}{2}$  to 3 dr. (2 to 12 Gm.).

**OFFICIAL PREPARATION.**

**Fluidextractum Tritici** Dose: 1 to 4 fl. dr. (4 to 15 mils)

**38. VETIVERIA.**—VETIVERT. The fibrous wiry roots of **Andropogon muricatus** Retzius. Habitat: Eastern India. Tonic and stimulant, but mainly employed as a perfume in sachet powders, etc.

## 39. SACCHARUM—SUGAR

### CANE-SUGAR

The refined sugar obtained from **Saccharum officinarum** Linné, and from various species or varieties of Sorghum, also from one or more varieties of **Beta vulgaris**

Linné (nat. ord. Chenopodiaceæ).

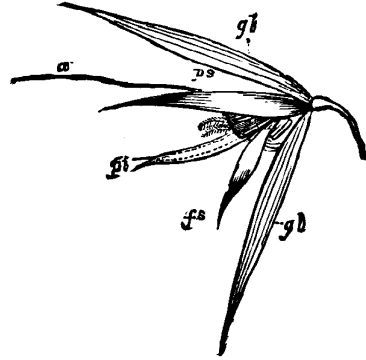


FIG. 16.—Spikelet of the Oat (*Avena sativa*). *gl.* Glumes. *ps. fs.* Paleæ or pales. *a.* Awn. *fl.* An abortive flower.



FIG. 17.—*Triticum vulgare* (Wheat). Plant and flowers (enlarged).

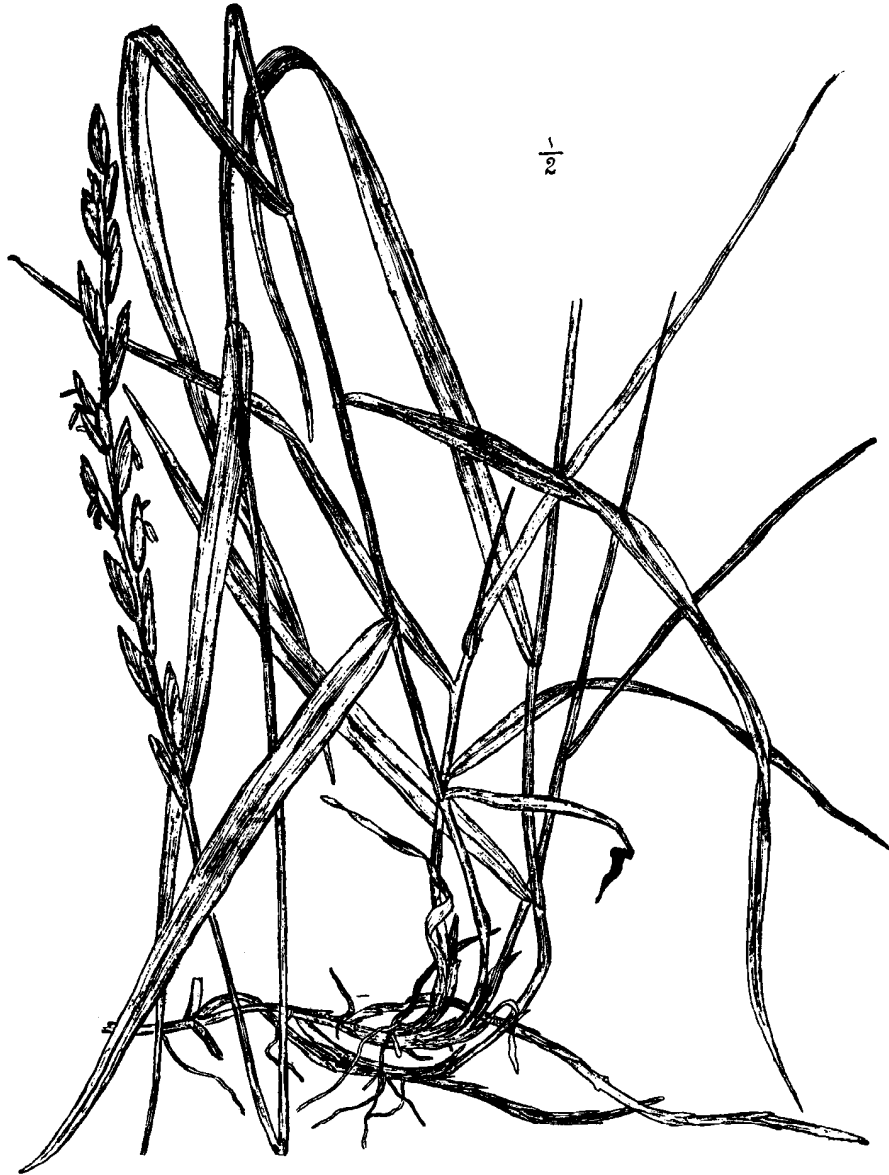


FIG. 18.—*Agropyron repens*.

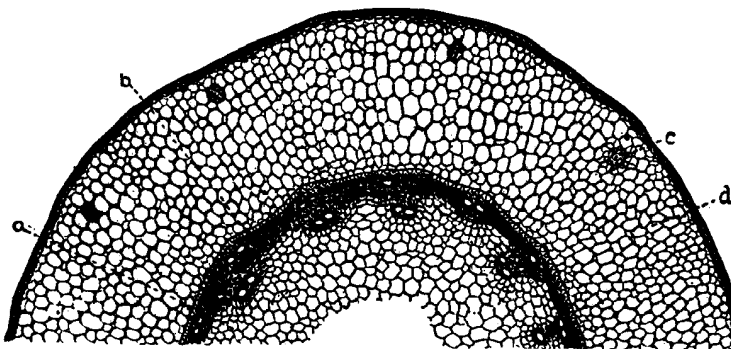


FIG. 19.—Cross-section of couch-grass. (25 diam.) a. Medullary parenchyma. b. Woody tissue. c. Wood-bundles. d. Cortical parenchyma.

**SOURCE AND VARIETIES.**—The sugar cane is extensively cultivated in Africa, East and West Indies (especially Cuba), Brazil, and Southern United States, particularly Louisiana. The sugar beet is extensively cultivated in France and Spain, and has been introduced with varying success into some parts of the United States. Cane-sugar is also a constituent of the sugar maple; of the carrot and turnip, of cassia pulp, etc. The sugar in fresh fruit is mainly cane-sugar; by the action of the fruit acids, or a ferment, it is generally *inverted*, becomes uncrystalline, and influences polarized light in the opposite direction from that of cane-sugar, twisting the ray from right to left. Honey-sugar is probably a mixture of the two varieties—right- and left-handed. It is readily altered to a crystalline and granular mass of *grape-sugar* in dried fruit, as in the raisin, the prune, and solidified honey. This, the common form of grapesugar, is right-handed, and is called dextrose (dextrogyrate), to distinguish it from laevulose. Barley-sugar is made by heating canesugar till it fuses, becoming thus, in a great measure, uncrystalline. Molasses (treacle)—*Syrupus fuscus* (official 1860-1870)—is the result from the evaporation of cane-sugar syrup; it is a mixture of canesugar with uncrystallizable sugar and coloring matter.

**DESCRIPTION.**—Sugar or sucrose,  $C_{12}H_{21}O_{11}$ , is in “white, dry, hard, distinctly crystalline granules, odorless, and having a purely sweet taste. Permanent in the air.” The aqueous solution saturated at 15°C (59°F.) has a sp. gr. of 1.345 and is miscible with water in all proportions, soluble in 175 parts of alcohol.

**OTHER SUGARS. Saccharum Lactis.**—Lactose obtained from the whey of cows' milk and purified by recrystallization.

**SOURCE AND DESCRIPTION.**—It is prepared from cows' milk by evaporating the whey after removing the curd. Cows' milk contains from 4-5 to 4.9 per cent. of sugar. It crystallizes in large hard prisms, has a feebly sweet taste and is soluble in six parts of cold water. It occurs in white, hard crystalline masses or as a white powder feeling gritty to the tongue, odorless, permanent in air. Like cane-sugar it forms compounds with metallic oxides, and reduces alkaline copper solutions. Practically insoluble in alcohol, ether, or chloroform. It is not effected directly by ferments. When heated with mineral acids it forms dextrose and galactose.

**ACTION AND USES.**—When injected into the blood-vessels it appears unaltered in the urine. When taken in the alimentary canal it is perfectly assimilated. When administered in large doses it acts as an active diuretic. Milk loses this diuretic effect on being boiled. Used in making tablet triturates.

**MANNOSE** (from mannite); maltose (from starch by the action of dilute acid or diastase); melitose (from eucalyptus).

**CARAMEL, N.F.** is a name applied to *burntsugar* (*Saccharum ustum*), used in the liquid form as a coloring for spirits, vinegar, etc.

**SACCHARUM UVEUM.**—Grape-sugar. Glucose. Yellowish or whitish masses or granules much less sweet than cane-sugar. Composition  $C_6H_{12}O_6H_2O$

**ACTION AND USES.**—Demulcent and lenitive. Used in making the various syrups and compound syrups of the Pharmacopoeia, etc.

**OFFICIAL PREPARATION.**—Syrupus.

#### 40. ZEA, N.F.—ZEA.

##### CORN-SILK

The dried styles and stigmas of **Zea ma'ys** Linné (our common Indian corn) Yellowish or greenish, soft, silky, hair-like threads, about 150 Mm. (6 in.) long; free from odor, with a sweetish taste. **CONSTITUENTS.**—**Maizenic acid**, fixed oil, resin, sugar, gum, albuminoids, phlobaphene, extractive, salt, cellulose, and water.

**ACTION AND USES.**—Mild stimulant, diuretic. The infusion may be taken *ad libitum*.

**Fluidextractum Zea** (Unofficial)      Dose:  $\frac{1}{2}$  to 2 fl. dr. (2 to 8 mils).

41. **OLEUM MAYDIS.**—MAIZE OIL. A fixed oil expressed from the embryo of the seed of **Zea mays** Linné. A yellow, viscid, transparent liquid, having a peculiar odor like cornmeal, and a bland taste. This oil has become quite valuable commercially, used as salad oil and by hydrogenation yields a valuable vegetable fat. In making of liniments and oleaginous preparations, it is quite equal to olive oil. Demulcent.

## 42. AMYLUM.—STARCH

### STARCH

The starch grains obtained from the fruit of **Ze'a ma'ys** Linné.

**DESCRIPTION.**—Usually in opaque, angular or columnar masses, easily pulverizable between the fingers, with a peculiar sound, into a fine white powder; odorless and tasteless. Under the microscope it is seen to be composed of small granules striated concentrically or excentrically around a nucleus or hilum. Insoluble in cold water, but with boiling water it forms a glutinous paste on cooling. Iodine is the test for starch, the characteristic blue color being produced when only a minute quantity of the latter is present.

**Other starches**—chiefly distinguished by the size and shape of the starch-granules as seen under the microscope:

(a) **AVENÆ FARINÆ.**—Oatmeal. From *Avena sativa* Linné, probably native to Western Asia, but now a common field crop. A grayish-white, not uniform meal, containing the gluten and fragments of the integuments; bitterish. Demulcent and nutritive (due to the gluten contained).

(b) **SAGO.**—Pearl Sago. Globular, pearl-like grains, white or brownish, prepared from *Metroxylon sagu*, *M. rumphii*, and other species growing in the East India Islands.

(c) **TAPIOCA.**—Cassava Starch. Yielded by the rhizomes of Brazilian plants, *Manihot utilissima* and *M. aipi*, nat. ord. Euphorbiaceae. White and opaque, irregular lumps.

(d) **TARO.**—Taro Flour. A starch prepared from the corm of *Colocasia esculenta* Schott, the food (poi) of the natives in Hawaii and the West Indies. Recommended as a diet for dyspeptic and consumptive patients.

Starches from the underground parts of *Triticum vulgare* and *Oryza sativa*, Gramineae; *Solanum tuberosum* (potato starch), Solanaceae; *Canna edulis*, *Maranta arundinacea*, and *Curcuma leucorrhiza*, Scitamineae.

*Powder.*—Microscopical elements of: See Part iv, Chap. I, B.

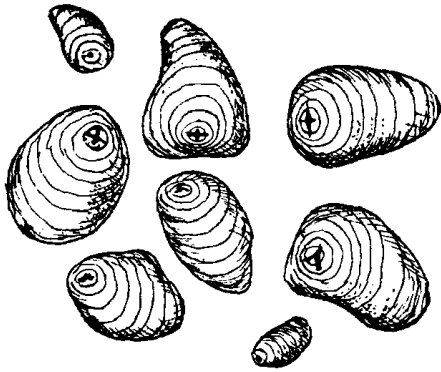


FIG. 20.—Maranta Starch. (× 250).

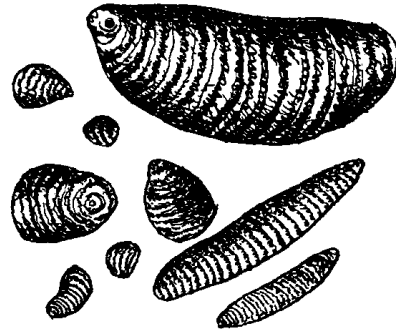


FIG. 21.—Curcuma Starch. (× 350).



FIG. 22.—Wheat Starch. (× 250).



FIG. 23.—Rice Starch. (× 250).



FIG. 24.—Potato Starch. (× 250).

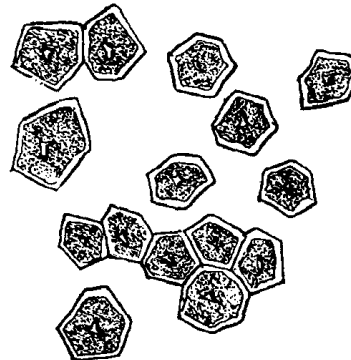


FIG. 25.—Corn Starch. (× 500).

See also Starches of Drugs, Part iv.

**CHEMICAL COMPOSITION.**—Starch is the basis of that class of organic compounds termed carbohydrates. Its composition is  $C_6H_{10}O_5$ . By hydrolysis it is converted into a gummy principle, dextrin, and glucose. Ferments convert it into alcohol and carbon dioxide— $C_6H_{10}O_5 = 2C_2H_5OH + 2CO_2$ . Ash. Not more than 0.5 per cent.

**ACTION AND USES.**—Nutritive and demulcent.

## OFFICIAL PREPARATION.

**Glyceritum Amyli** (10 per cent.).

**Dextrinum Album**, N.F. (White dextrine should not yield more than 0.5 per cent. of ash.)

43. **HORDEI FRUCTUS**.—BARLEY. The fruit of **Hor'deum dis'tichum** Linné, a common cultivated cereal indigenous to Western Asia. About 15 mm. ( $\frac{3}{5}$  in.) long, tapering at the ends, on one side traversed by a longitudinal groove along which the grayish-yellow palea or husk is coalesced with the smooth, pale brown testa; underneath the testa is a layer of gluten surrounding the central starchy parenchyma. Nutritive.

43a. **HORDEUM**, or pearl barley, is the fruit deprived of its brown integuments.

43 b. **MALTUM**.—MALT (U.S.P.IX). Prepared from the fruit of **Hordeum distichum** Linné by soaking, and then allowing fermentation to proceed until the young embryo is nearly the length of the fruit; the fruit is then dried in the sun and afterward kiln-dried in order to kill the germ. The object of this process is to develop the greatest possible amount of diastase, a peculiar ferment which has the property of converting starch into sugar. Malt occurs in yellowish or ambered-colored grains crisp when fractured with a whitish interior. Its odor is agreeable and characteristic. The taste is sweetish due to the conversion of some of the starch into maltose by the diastase present. Malt should float in cold water. Malt is demulcent and nutrient, given in the form of the extract.

**ACTION AND USES**.—Demulcent and nutritive given in conjunction with other substances chiefly.

**PREPARATION**. **Extractum Malti** (liquid, of honey-like consistence).

## **CYPERACEÆ.—Sedge Family**

44. **CAREX ARENARIA** Linné.—RED SEDGE. **RADIX SARSAPARILLÆ GERMANICÆ**. This sedge grows in the coast regions of Central and Northern Europe, where its rhizome is used as an alterative like sarsaparilla.

45. **ADRUE**.—GUINEA RUSH. The rhizome of **Cy'perus articula'tus** Linné, used in its native country to check vomiting and as a tonic. Dose of fl'ext.: 30 drops (2 Mils).

## **PALMÆ.—Palm Family**

### *Synopsis of Drugs from the Palmæ*

A. *Seed.*

Areca, 46.

B. *Fruit.*

**SABAL**, 47.

C. *Root.*

Carnauba, 48.

D. *Resin.*

Draconis Resina, 49.

E. *Fixed Oils.*

Oleum Palmæ, 50.

Oleum Cociois, 51.



46. **ARECA**.—ARECA NUT. BETEL NUT. The seed of an East Indian tree, **Are'ca cat'echu** Linné. Roundish-conical, about 25 mm. (1 in.) long, flattened at the base; externally deep brown, varied with fawn-color, giving it a longitudinally-veined appearance; internally brownish-red with white veins. It abounds in tannin, and contains three alkaloids upon which its taenifuge properties depend, arecoline, arecaine, and a trace of an undetermined alkaloid. Mixed with the leaves of *Piper betel* it forms the "betel" chewed so largely by the natives. It is strongly recommended as a taenifuge and vermifuge. Dose: 2 to 3 dr. (8 to 12 Gm.).

#### 47. SABAL

##### SABAL. (SAW PALMETTO)

The dried ripe fruit of **Sereno'a serrula'ta** (R. and S.) Hooker filius.

Irregularly spherical to oblong-ovoid; 10 to 25 mm. long, 10 to 15 mm. in diameter; externally blackish-brown, shrivelled, somewhat oily; epicarp thin, sarocarp about 1 mm. thick, greenish-yellow, soft, spongy, endocarp thin, friable; seed hard, chocolate-brown; odor aromatic; taste sweetish, acrid and oily. Tonic, diuretic, expectorant, and sedative, used in neuralgic affections to allay irritation of mucous membranes, and in pulmonary affections. Dose of fl'ext.:  $\frac{1}{2}$  to 2 fl. dr.

OFFICIAL PREPARATION.—Fluidextractum. Dose: 1 mil (15 drops).

*Powder*.—Microscopical elements of: See Part iv, Chap. I, B.

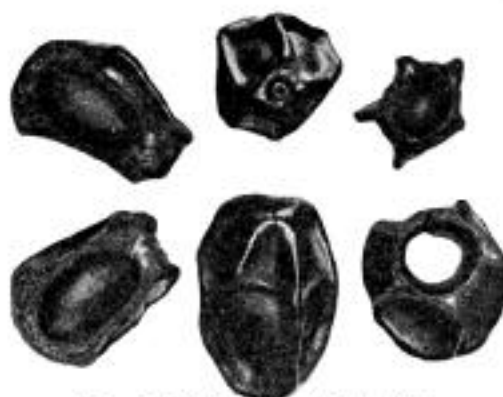


FIG. 26.—Sabal. Fruit. (Photograph.)

48. **CARNAUBA**.—The root of **Coper'nica cerif'era**) Martius, used in Brazil, where the plant grows, as an alterative like sarsaparilla, stillingia, etc. Dose: 1.5 to 60 gr. (1 to 4 Gm.).

49. **DRACONIS RESINA**.—DRAGON'S BLOOD. A spontaneous resinous exudation from the ripening fruit of **Cal'amus dra'co** Willdenow. *Habitat*: East Indies, Siam, and the Molucca Islands. A dark brownish-red, internally brighter red resin, coming

into market in various forms, small granules, oval pieces in bead-like strings, sticks, and the poorer varieties in cakes and disks; breaks with a dull, irregular fracture; tasteless and almost odorless, but when heated emits a benzoin-like odor due to the benzoic acid which it contains. The red resin, constituting 90 per. cent., has been termed draconin.. The use of dragon's blood is almost entirely confined to the manufacture of paints and varnishes.

50. **OLEUM PALMÆ.**—PALM OIL. A fixed oil expressed from the fruit of **Elæ'is Guineen'sis** Jacquin, a West African palm cultivated in tropical America. A solid fat, harder than butter, of an orange-red. color, bleaching upon exposure to light or heat. When fresh, it has a violet-like odor and a bland taste, but it rapidly becomes rancid and of an acrid taste. It is used principally in the manufacture of soaps and candles, occasionally in ointments.

51. **OLEUM COCOIS.**—COCOANUT OIL. A fixed oil expressed from the seeds of the tropical palm, **Co'cos nucif'era** Linné. A white solid, of the consistence of butter, and with a disagreeable odor. It is mostly used in soaps.

### **AROIDÆ.—Arum Family**

Herbs with an exceedingly acrid, colorless juice, and having a fleshy corm or rhizome. *Inflorescence* a spadix usually surrounded by a spathe. *Fruit* a berry.

#### *Synopsis of drugs from the Aroideæ*

A. *Rhizomes.*

**CALAMUS**, 52.

Symplocarpus, 53.

B. *Corms.*

Arum, 54.

Arisæma Dracontium, 55.

### **52. CALAMUS.—CALAMUS**

#### **SWEET FLAG**

The dried rhizome of **Acor'us cal'amus** Linné (Fam. Araceæ, U. S. P. 1900).

**DESCRIPTION OF DRUG.**—Grows in swamps, and along the banks of streams and ponds. Subcylindrical sections of various lengths, about 20 mm. ( $\frac{4}{5}$  in.) thick; externally reddish-brown, deeply wrinkled, marked below with rootlet scars (little elongated dot-like rings) in wavy, longitudinal lines, above with leaf-scars; fracture short, corky, showing a pinkish or whitish **interior** dotted with yellowish or brownish dots, both in the thick cortical layer and in the spongy central column; **odor** aromatic; **taste** peculiar, very bitter. Although the unpeeled rhizome is directed, the **pinkish-white sections** deprived of the corky layer are often met with in market.

**STRUCTURE.**—The tissue is chiefly parenchyma, traversed by yellowish fibrovascular bundles, most abundant just within and near the nucleus sheath. The

cells of the parenchyma are filled with starch and volatile oil, the latter most abundant in the cortical layer. The spongy appearance of the central portion is due to large air-cells, as in all aquatic plants.



FIG. 27.—*Acorus calamus*.

CONSTITUENTS.—Volatile oil 1 to 2 per cent., having the smell and taste of calamus, a bitter glucoside termed acorin (syrupy, yellow liquid), calamine, choline, resin, starch, and mucilage.

*Isolation of Acorin.*—A concentrated decoction of the drug is deprived of gum by precipitating with alcohol. The liquid is then treated with lead subacetate. The lead is removed by H<sub>2</sub>S. The resulting liquid, after neutralization, is shaken with chloroform, which leaves on evaporation a thin, yellow, aromatic liquid, acorin. This splits into oil and sugar by hydration; by oxidation the resin and acoretin are obtained.

**ACTION AND USES.**—Tonic and carminative, and a feeble aromatic stimulant. Dose: 15 to 60 gr. (1 to 4 Gm.).

53. **SYMPLOCARPUS.**—SKUNK CABBAGE. The rhizome and roots of an indigenous herb, **Symplocar'pus foe'tidus** Salisbury, so called from the disagreeable odor (depending upon a volatile oil) which is emitted by all parts of the fresh plant, and by the dried rhizome when triturated. It has an acrid taste, but the acrid principle has not yet been isolated. Stimulant, antispasmodic, and narcotic, causing nausea and vomiting, together with vertigo, headache, and dimness of vision. It has been used in asthma, whooping-cough, nervous and convulsive affections, and hysteria; also in chronic catarrh, chronic rheumatism, and bronchial and pulmonary affections. Dose: 10 to 20 gr. (0.6 to 1.3 Gm.).

54. **ARUM.**—INDIAN TURNIP. The corm of **Arisæ'ma** (Arum) **triphyl'lum** Torrey (Jack-in-the-pulpit or wake-robin). *Habitat:* North America, in rich woods. Depressed-globular, about 25 to 50 mm. (1 to 2 in.) in diameter, covered with a loose, wrinkled, brown epidermis; it often comes into market in **white, starchy, transverse slices**; inodorous; **very acrid**. This acrid principle is volatile, the fully dried corm being nearly inert. Arum has been used as a stimulant to the secretions in asthma, whooping-cough, chronic catarrh, and rheumatism. Dose: 8 to 15 gr. (0.5 to 1 Gm.).

55. **ARISÆMA DRACONTIUM** Schott.—GREEN DRAGON. *Habitat:* United States, west to Kansas. (Corm.) Diaphoretic and expectorant in dry, hacking coughs attended with irritation. Dose of fl'ext.: 1 to 10 drops (0.065 to 0.6 mil).

### **COMMELINACÆ.—Spiderwort Family**

56. **COMMELINA.**—ASIATIC DAY FLOWER. From **Com'melina com'munis**. This plant has recently been brought to notice as one of medicinal value. It is claimed to have peculiar hemostatic and healing properties. An account of the plant and a report of a chemical examination of it is found in the "Am. Jour. of Pharm.," July, 1898, p. 321.

### **BROMELIACÆ.—Pineapple Family**

57. **ANANASSA.**—PINEAPPLE. The fruit of **Ananas'sasati'va** Schultz. The fresh juice contains the digestive ferment, bromelin, which is a powerful and rapid digestant of albumen, both animal and vegetable, acting in the presence of either acid or alkaline carbonates, but most energetically in neutral solutions. It is more nearly related to trypsin than to pepsin.

## LILIACEÆ.—Lily Family

Herbs (rarely woody) with flowering stems springing from bulbs or corms, with the leaves parallel-nerved, except in the tribe Smilaceæ, where they are netted veined. The *perianth* consists of six divisions; *anthers* introrse; *ovary* superior, usually 3-celled.

### *Synopsis of Drugs from the Liliaceæ*

- |  |  |   |
|--|--|---|
| A. <i>Root.</i><br><b>SARSAPARILLA</b> ,<br>58.  | C. <i>Bulbs.</i><br>* <b>Allium</b> , 66.<br><b>SCILLA</b> , 67.     | F. <i>Inspissated Juices.</i><br><b>ALOE</b> , 70.<br>Aloe Barbadensis,<br>70 a.<br>Aloe Capensis, 70 b.<br>Aloe Socotrina, 70 c. |
| B. <i>Rhizomes.</i><br>* <b>Convallaria</b> , 59.<br><b>VERATRUM</b> , 60.<br>Veratrum Album,<br>60 a.<br>Polygonatum, 62.<br>Chamæirium, 63.<br>* <b>Trillium</b> , 64.<br>Asparagus, 65. | D. <i>Corm.</i><br><b>COLCHICI COR-</b><br><b>MUS</b> , 68.          | G. <i>Resin.</i><br>Xanthorrhœa, 71.  |
|  | E. <i>Seeds.</i><br><b>COLCHICI SEMEN</b> ,<br>69.<br>Sabadilla, 61. | H. <i>Leaves.</i><br>Erythronium, 72.   |

### 58. SARSAPARILLA.—SARSAPARILLA

#### SARSAPARILLA

The dried root of **Smi'lax officinalis** Kunth, **Smi'lax medica** Chamisso et Schlechtendal, **Smilax papyra'cea** Duhamel, **Smilax ornata** Hooker, and of other undetermined species of Smilax.

**BOTANICAL CHARACTERISTICS.**—Evergreen, climbing, shrubby plants. *Stem* prickly. *Leaves* alternate, netted-veined, coriaceous, ovate-oblong, with a cordate base, 1 foot long and 4 to 5 inches broad. *Flowers* in axillary clusters, dioecious; *stigmas* 3, sessile. *Fruit* a globular, 1- to 3-seeded berry.

**HABITAT.**—Tropical America, in swampy forests.

**DESCRIPTION OF DRUG.**—The varieties used in medicine have a thick, knotty rhizome (which, if present, should be removed) from which grow in a horizontal direction the fleshy roots. These appear in the market several feet in length, cylindrical, about the thickness of a quill, very flexible; externally longitudinally wrinkled, of various colors, depending upon the variety, generally ash-colored, grayishbrown, or reddish-brown; internally whitish, horny, or occasionally mealy; nearly inodorous; taste mucilaginous, bitter, and acrid.

**STRUCTURE.**—A transverse section shows a thin, easily removed epidermis overlaying a thick cortical layer; this inner bark consists of loose parenchyma, the cells of which, when not devoid of solid contents,

are filled with starch-granules or paste, and occasionally calcium oxalate raphides; a brownish ring (nucleus sheath) separates it from the woody center, which is made up of elongated woody cells. A small pith runs through the center of this woody zone.



FIG. 28.—*Smilax officinalis*—Portion of vine and rhizome.

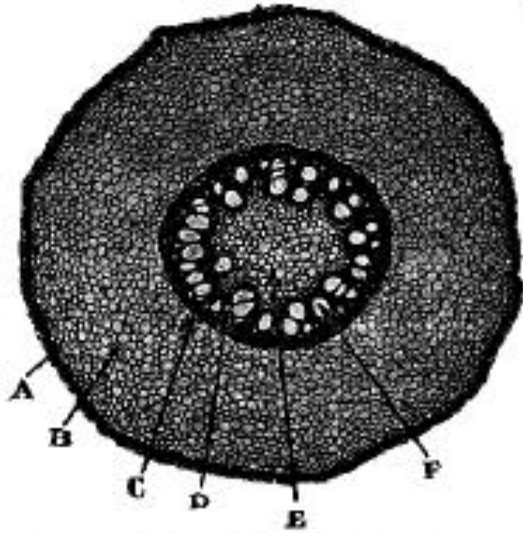


FIG. 29.—Sarsaparilla, Honduras—Cross-section of root. (18 diam.) A, Epidermis. B, Parenchyma of cortex. C, Endodermis. D, Wood parenchyma and fibers. E, Medulla. F, Water tube (Photomicrograph.)

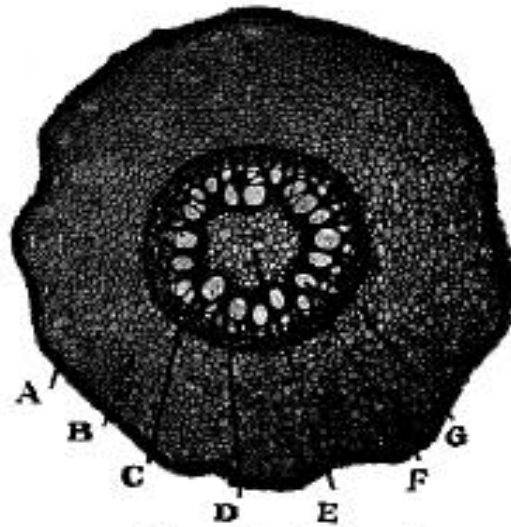


FIG. 30.—Sarsaparilla, Jamaica—Cross-section of root. (21 diam.) A, Epidermis. B, Parenchyma of cortex. C, Endodermis. D, Wood parenchyma and fibers. E, Medulla. F, Water tube. G, Phloem. (Photomicrograph.)

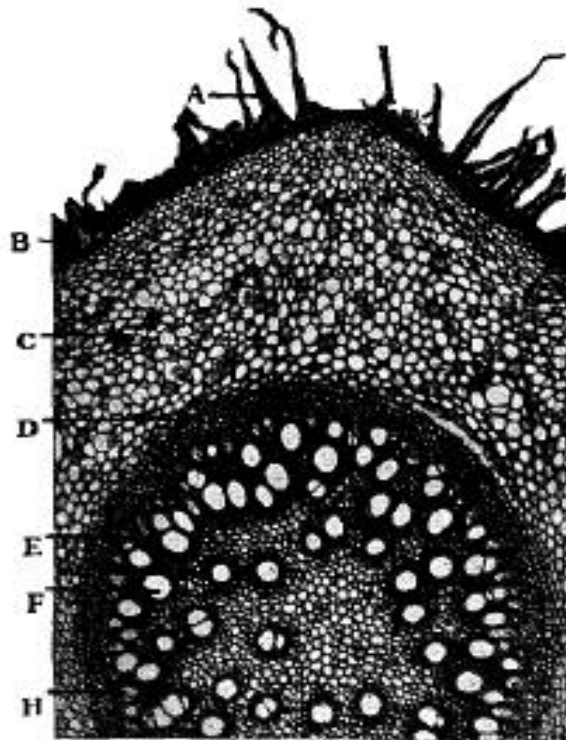


FIG. 31.—Sarsaparilla Mexican—Cross-section of root. (32 diam.) A, Root hairs. B, Cork. C, Parenchyma of cortex. D, Endodermis. E, Wood parenchyma and fibers. F, Water tube. H, Phloem. (Photomicrograph.)

VARIETIES.—There are four principal varieties of sarsaparilla, differing somewhat in appearance, and especially in the condition of the starch.

(a) Mealy-starch in granules (see Part iv).

The Honduras sarsaparilla is the kind most generally used in this country. It is grayish or grayish-brown from adhering dirt, beset with a few fibers, and comes in compact cylindrical bundles 2 or 3 feet long.

Brazilian sarsaparilla (Rio Negro, Para, or Lisbon sarsaparilla). Considered to be the finest variety. Dark brown or blackish-brown, with a thick cortical layer and pith, and a narrow, woody zone.

(b) Pasty-starch in a paste.

Jamaica or red sarsaparilla is of a reddish color externally; it is said to be the richest in extractive and to contain the best quality of starch. The name bearded sarsaparilla has been applied to it, from the numerous fibers attached.

Mexican sarsaparilla is deeply wrinkled, and brownish-gray from adhering earth. The woody zone and pith are about equal in thickness, each being about half as broad as the cortical layer.

*Powder.*—Characteristic elements: See Part iv, Chap. I, B.

**CONSTITUENTS.**—The activity of sarsaparilla depends upon an acrid glucoside, **parillin**,  $C_{26}H_{44}O_{10} + 2\frac{1}{2} H_2O$  (variously termed smilacin, parillinic acid, pariglin, etc.), frothing with water and otherwise closely resembling saponin in action. Kobert states that two other glucosides are present, saponin (sarsaparilla saponin),  $5(C_{20}H_{32}O_{10})-2\frac{1}{2}H_2O$ , and sarsa-saponin,  $12(C_{22}H_{36}O_{10}) + H_2O$ . These two latter differ from parillin in their being soluble, while parillin is insoluble. The latter constituent is the most poisonous. Ash, not exceeding 10 per cent.

*Preparation of Parillin*—Exhaust with warm alcohol and concentrate the liquid to a syrup; add  $1\frac{1}{2}$  times its weight of water; macerate for several days, when a yellow precipitate will form; decant and mix with alcohol, and wash on a filter with 20 per cent. alcohol.

**ACTION AND USES.**—The efficiency of sarsaparilla as a remedial agent has been and is still much questioned, some declaring it almost inert, others ascribing to it valuable alterative and antisypilitic properties. Preparations from good, well-preserved specimens are perhaps beneficial remedies in scrofulous affections, and as general bloodpurifiers. Dose: 30 to 60 gr. (2 to 4 Gm.) .



OFFICIAL PREPARATIONS.

<b>Fluidextractum Sarsaparillæ</b> ,.....	Dose: 30 to 60 ℥ (2 to 4 mils).
<b>Syrupus Sarsaparillæ Compositus</b> (fl'ext. 20 per cent., with the fluidextracts of glycyrrhiza and senna, and the oils of sassafras, anise, and gaultheria),.....	2 to 4 fl. dr. (8 to 15 mils).
<b>Fluidextractum Sarsaparillæ Compositum</b> (75 per cent., with glycyrrhiza, sassafras, and mezereum),.....	½ to 1½ fl. dr. (2 to 6 mils)

59. CONVALLARIA.—(C. FLORES AND C. RADIX, N.F.)

LILY OF THE VALLEY

The dried rhizome and roots and dried inflorescence of **Convallaria majalis** Linné.

**BOTANICAL CHARACTERISTICS.**—A low, perennial, glabrous herb with slender, running root-stocks. *Leaves* 2, oblong, bright green, and shining. Scape bearing a one-sided raceme of white, bell-shaped *flowers*. *Fruit* a few-seeded red berry.

**HABITAT.**—North America, Europe, and Northern Asia.

**DESCRIPTION OF "ROOT."**—In pieces from 50 to 75 MM. (2 to 3 in.) long, and about 3 mm. (1/8 in.) thick, the upper end gnarled and wrinkled, and with the remnants of the scape and petioles attached, tapering at the small end; annulate nodes beset with a circle of eight or ten long, branching, gray rootlets; externally white, fracture white, tough, and fibrous. Odor distinct; taste sweetish, somewhat bitter and acrid. C. Flores—see N.F.

**CONSTITUENTS.**—Two glucosides, **convallarin**, C<sub>34</sub>H<sub>62</sub>O<sub>11</sub> (the emetocathartic principle), acrid prisms, scarcely soluble in, but foaming when shaken with water; and **convallamarin**, C<sub>23</sub>H<sub>44</sub>O<sub>12</sub>, the cardiac acting principle, a sweetish, afterward bitter, crystalline powder.

**Preparation of Convallamarin.**—The estimation of the value of the drug is based upon the separation of this constituent. The drug is extracted with alcohol, the tincture treated with subacetate of lead, and filtered; excess of lead removed by careful addition of H<sub>2</sub>SO<sub>4</sub>; filter, distil off alcohol, add water, neutralize carefully with Na<sub>2</sub>CO<sub>3</sub>, add solution of tannin. The precipitate of tannin compound is dissolved in 60 per cent. of alcohol, decolorized with animal charcoal, decomposed with zinc oxide. The filtrate is then evaporated to dryness.

**ACTION AND USES.**—Convallaria was introduced as a safer **cardiac tonic** than digitalis. Its absence of cumulative action was pointed out by therapeutists. "It does not disturb the stomach or cerebro-spinal functions if preparations free from convallarin are used." It is one of the most active **diuretics**, especially in cardiac

dropsies. Dose: 5 to 30 gr. (0.3 to 2 Gm.); of convallamarin  $\frac{1}{2}$  to 2 gr. (0.0324 to 0.13 Gm.).

## 60. VERATRUM VIRIDE

### AMERICAN HELLEBORE

The dried rhizome and roots of **Vera'trum vir'ide** Aiton (American).

**BOTANICAL CHARACTERISTICS.**—*Roots* fibrous; *stem* 2 to 7 feet high, stout and very leafy, somewhat pubescent. *Leaves* broadly oval, clasping. *Flowers* in dense panicles, yellowish-green. *Capsule* many-seeded.

**HABITAT.**—North America and Europe.

**DESCRIPTION OF DRUG.**—Usually in small pieces or large slices. When entire, obconical, from 50 to 75 mm. (2 to 3 in.) long, truncate at the base, tufted above with the inert stem-remnants and leaf-stalks, and beset on all sides with light yellowish-brown rootlets about the thickness of a knitting needle; externally blackish. A transverse section shows a dingy white surface dotted with darker colored dots and wavy lines within the nucleus sheath. The larger part of the tissue consists of parenchyma containing starch and calcium oxalate; nucleus sheath wavy, wood-bundles numerous. Rootlets have a thick, cortical parenchyma. Inodorous; taste bitter, very acrid, causing a tingling, benumbing sensation in the tongue. The powder is sternutatory. Starch grains of Veratrum, see Fig. 283.

*Powder.*—Characteristic elements: See Part iv, Chap. I, B.

**CONSTITUENTS.**—Veratrum viride contains the alkaloids **jervine**,  $C_{26}H_{37}NO_3$  (to which the depressant action on the circulation is partly due) and **protoveratrine**,  $C_{32}H_{51}NO_{11}$ . This, the most important of the Veratrum alkaloids, occurs in colorless shining crystals, belonging to the monoclinic system, which are permanent in air and melt at  $245^{\circ}$  to  $250^{\circ}$ . Insoluble in water, benzene and petroleum benzin, and dissolves with difficulty in most other solvents. Chloroform and boiling 96 per cent. alcohol are its best solvents. Its alcoholic solution rapidly changes red litmus to blue. It forms a greenish colored solution with concentrated  $H_2SO_4$  which gradually changes to blue and finally to violet.

If dissolved in diluted alcohol, it will usually be obtained in the form of a

colored syrupy residue upon evaporation of the solvent, only a small portion crystallizing.

**Jervine** is a depressant to the respiratory center, to the vasomotor center and to the heart muscles.

**Rubijervine** stimulates the cardio-inhibitory centers, but appears to depress the respiratory center.



FIG. 32.—*Veratrum viride*—Branch and rhizome.

There is no physiological relationship between protoveratrine and veratrine. The latter is the active principle of *ASAGRÆA officinalis*, (61).

**ACTION AND USES.**—The action of *veratrum viride* closely resembles that of aconite, being a powerful cardiac depressant and spinal paralyzant, but in addition it has a strong emetocathartic action, and consequently overdoses are less likely to prove fatal; death occurs by



*Veratrum viride*: a, young; b, flower; c, embryo of plant at its early age.

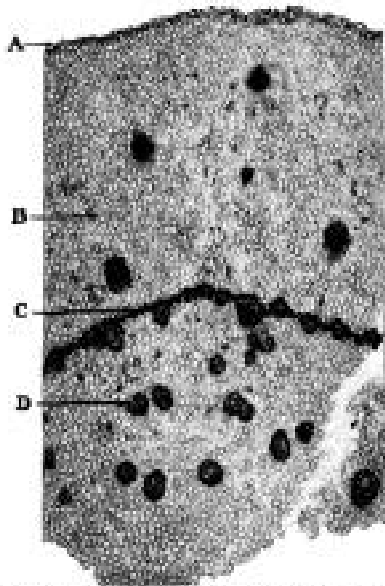


FIG. 11.—*Veratrum viride*.—Cross-section of rhizome. (14 diam.) A, Cork; B, Parenchyma of ground tissue; C, Endodermis; D, Vascular bundle. (Photomicrograph.)

paralysis of the heart. Dose: 1 to 5 gr. (0.065 to 0.3 Gm.).

#### OFFICIAL PREPARATIONS.

##### **Tinctura Veratri Viridis**

(10 per cent.), Dose: 1 to 5 drops (0.065 to 0.3 mil).

##### **Fluidextractum Veratri Viridis**

Dose: 1 to 5 drops (0.065 to 0.3 mil).

61. **SABADILLA**.—**CEVADILLA**. The seeds of **Veratrum sabadilla** Schlechtendal, and of **Asagrae officinalis** Lindley. *Habitat*: Mexico. They occur in commerce mixed with the fruit, which consists of three thin, papery, acuminate follicles, nearly erect, united at the base, opening by a ventral suture, and appearing like a single three-celled capsule. Each follicle contains one or two narrow, oblong or lance-linear seeds, about 6 mm. ( $\frac{1}{4}$  in.) long, dark brown or blackish, longitudinally shriveled, slightly winged, flat on one side, convex on the other, somewhat curved; apex pointed; the thin testa incloses a discolored, oily albumen, in the broader end of which is the small, linear embryo; inodorous; taste bitter, oily, strongly and persistently acid.

**CONSTITUENTS**.—Sabadilla is the principal source of **veratrine**,  $C_{37}H_{53}NO_{11}$  (Veratrina), a white powder, intensely acrid and sternutatory. The commercial veratrine is impure; it is a mixture of the alkaloid veratrine with other alkaloids extracted along with it, cevadine,  $C_{32}H_{49}NO_9$ , cevadilline,  $C_{34}H_{53}NO_8$ , sebadine,  $C_{29}H_{51}NO_8$ , and sabadinine.

*Preparation of Veratrine*.—Remove resin and oil from alcoholic tincture by adding water q.s. Decompose native salt (veratrate of veratrine) in

filtrate by means of KOH. Take up alkaloid with alcohol. Purify by converting into sulphate, decolorizing, and reprecipitating.

**ACTION AND USES.**—Sabadilla is rarely used except for the extraction of veratrine. It is a powerful irritant and is sometimes used to kill vermin in the hair.

62. **POLYGONATUM.**—SOLOMON'S SEAL. The rhizome of **Polygonatum biflorum** Elliott, and of **P. giganteum** Dietrich. *Habitat:* North America. A pale brownish-yellow or whitish root, annulate and jointed, each joint being surmounted by an obscurely seal-like stem-scar, which gives to the plant its name; internally whitish, spongy; inodorous; taste sweetish, mucilaginous, with an acrid, bitterish after-taste. Tonic, mucilaginous and mildly astringent; formerly much used in skin diseases and as a vulnerary, and has been recommended in gout and rheumatism. Dose: 1 to 2 dr. (4 to 8 Gm.), in fl'ext.

63. **CHAMÆLIRIUM LUTEUM** Gray. Helonias, N.F.—HELONIAS DIOICA Pursh. FALSE UNICORN. *Habitat:* United States. The rhizome, which is the part employed, is greenish-brown externally, closely annulate, about 25 mm. (1 in.) long, and 6 mm. ( $\frac{1}{4}$  in.) thick, beset on the lower side with numerous wiry rootlets; internally whitish, horny; bitter. Transverse surface is dirty white in hue and of a horny texture, and exhibits a well-defined central column occupying about one-third the diameter. It has been used as an adulterant for sanguinaria. Tonic, diuretic, anthelmintic. Dose: 15 to 60 gr. (1 to 4 Gm.).

64. **TRILLIUM**, N.F.—BIRTHROOT. WAKE-ROBIN. The rhizome of **Trillium erectum** Linné, and other species of *Trillium* growing in the United States. Emmenagogue and emetic. Dose: 15 to 60 gr. (1 to 4 Gm.).

65. **ASPARAGUS.**—The rhizome of **Asparagus officinalis** Linné. Cardiac sedative or palliative, diuretic, laxative. Dose: 30 to 60 gr. (2 to 4 Gm.).

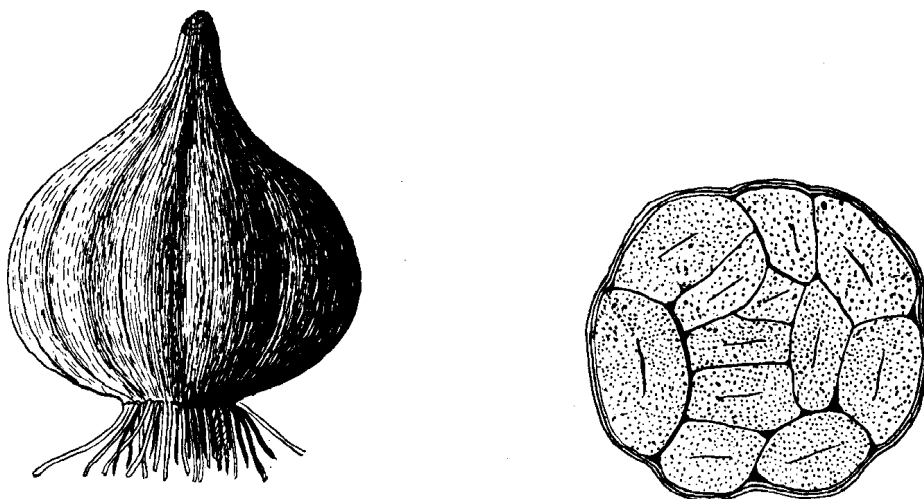


FIG. 34.—Allium.—Bulb and cross-section of same (twice natural size).

66. **ALLIUM**, N.F.—GARLIC. The bulb of **Allium sati'vum** Linné. Official in U.S.P. 1890. A compound, subglobular bulb, flattened at the base, pointed at the apex, where several inches of the stem remains; it consists of five or six (in commercial garlic about eight) small, oblong, somewhat curved bulbs or "cloves" arranged around the central axis, each with a distinct coat, and internally whitish, moist, and fleshy; the whole bulb is inclosed by a dry, white, membranous coat, consisting of several delicate laminæ; odor pungent and disagreeable (alliaceous); taste warm, acrid. Used in the fresh state. Commercial garlic is a hybrid between *A. sativum* and *A. porrum* Linné. *Constituents*: Mucilage 35 per cent., albumen, fibrous matter, and moisture. The peculiar odor and taste are due to volatile oil, composed of the sulphide and oxide of allyl. Stimulant and expectorant, also diaphoretic and diuretic. Dose: 30 to 60 gr. (2 to 4 Gm.).

**Syrupus Allii** (20 per cent., with the addition of dilute acetic acid) (U.S.P. 1890)  
Dose: 1 to 2 fl. dr. (4 to 8 mils).

## 67. SCILLA.—SQUILL

### SQUILLS

The inner freshly scaled bulb of the white variety **Urgin'eamaritima** (Linné) Baker, cut into slices and dried.

**BOTANICAL CHARACTERISTICS.**—*Bulb* semisuperficial. *Leaves* lanceolate, all radical, appearing after the flowers. *Scape* 2 to 4 feet high, terminated by a dense raceme of yellowish-green *flowers*, each one of which is accompanied by a long bract; *ovary* with 3 nectariferous glands at the apex.

**HABITS OF PLANT.**—Grows in sandy places near the coast. The plant flowers in autumn, the leaves appear in the following spring. Bulb only half immersed in the soil.

**HABITAT.**—Mediterranean shores, in dry, sandy places near the coast.

**DESCRIPTION OF DRUG.**—Squill comes into the market in **narrow horny segments** about 50 mm. (2 in.) long, often more or less contorted; color varying from white or yellowish-white to a reddish tint, slightly translucent; when dry, it is brittle and pulverizable, but by exposure to a moist atmosphere it becomes flexible. Occasionally vertical slices, sometimes adhering at the base, are met with. Odor slight; taste mucilaginous, bitter, nauseous, and acrid.



$\frac{1}{2}$



FIG. 35.—*Urginea scilla*.

The fresh bulb is inversely pear-shaped, fleshy, varying in size from that of a man's fist to a child's head. There are two kinds, differing only in color, one being entirely white, and the other reddishbrown externally, internally rose color, with white parenchyma. In preparing for market the outer scales are removed and the bulb is then sliced transversely, the central scales being also rejected as being too fleshy and mucilaginous; they lose about four-fifths of their weight in drying.

TEST.—If made into the official tincture and assayed biologically, the

minimum lethal dose should not be greater than 0.006 mil of tincture or the equivalent in tincture Of 0.000005 Gm. of ouabain, for each gram of body weight of frog.

*Powder.*—Characteristic elements: See Part iv, Chap. I, B.

CONSTITUENTS.—Merck's analysis shows three active principles, **scillipicrin** (a bitter principle acting upon the heart), **scillitoxin**, glucoside (bitter, burning, also acting upon the heart), **scillin**, crystalline (producing numbness, vomiting, etc.), with mucilage, sugar, sinistrin, C<sub>6</sub>H<sub>10</sub>O<sub>5</sub>, like dextrin, and calcium oxalate crystals. Later investigations point to the probability of the above principles being alkaloids, and they are named scillapicine, scillamarine, and scillamine respectively. Jamersted's scillain is a poisonous glucoside of a yellow color. Ash, not exceeding 8 per cent.

ACTION AND USES.—**Expectorant, diuretic**, in large doses emetic and cathartic. As an expectorant it is usually combined with tartar emetic or ipecac; as a diuretic, with stimulant expectorants. It is **very rarely given as an emetic** because of its uncertainty, having often proved fatal from its irritant action on the stomach and intestines, and by causing hypercatharsis, death occurring by arrest of the heart in systole. Dose: 1 to 3 gr. (0.065 to 0.2 Gm.).

OFFICIAL PREPARATIONS.

Acetum Scillæ (10 per cent.), . . . . .	Dose: 10 to 30 ℥ (0.6 to 2 mils).
Syrupus Scillæ (45 per cent. of the acetum), . . . . .	30 to 60 ℥ (2 to 4 mils).
Fluidextractum Scillæ, . . . . .	1 to 4 ℥ (0.065 to 0.25 mil).
Syrupus Scillæ Compositus (fl'ext. 8 per cent., with fl'ext. senega 8 per cent., and tartar emetic 2 per cent. or 1/8 gr. to the teaspoonful), . . . .	15 to 60 ℥ (1 to 4 mils); 1 to 2 fl. dr. (4 to 8 mils).

COLCHICUM.—MEADOW SAFFRON

The corm and the seed of **Colchicum Autumnale** Linné.

BOTANICAL CHARACTERISTICS.—*Col'chicum autumnal'e* Linné, *Corm* fibrous-rooted. *Leaves* about a foot long. *Flowers* several, lilac or purple, appearing in the autumn without the leaves.

HABITAT.—Europe and North Africa.

HABIT OF PLANT.—Flowers in autumn; the leaves appear in the spring.



In the latter part of spring a new corm begins to form at the expense of the old one. In September the upper portion of the flower emerges from the spathe just above ground unaccompanied with leaves. The rudimentary fruit at the base of the flower, below ground, in the following spring rises upon a stem above the surface, in the form of a 3-celled capsule. At the same time the leaves appear; so that, in fact, the leaves follow the flower, instead of preceding it. During the development of the fruit the new corm has been developing at the expense of the old parent one. It will be seen that the medicinal virtues depend upon the time of collection. Early in the spring it is too young, and late in the fall the parent corm has become exhausted by the nutriment furnished to the new plant. The proper period for collection, therefore, is said to be from June to the month of August, although April roots have been found to be of superior efficacy.

## 68. COLCHICI CORMUS

### COLCHICUM CORM

The dried corm of **Col'chicum Autumnal'e** Linné, yielding by the official process not less than 0.35 per cent. of colchicine.

**DESCRIPTION OF DRUG.**—An ovoid corm about 25 to 40 mm. (1 to 1 <sup>3</sup>/<sub>5</sub> in.), long flattened and deeply grooved on one side; when dried and deprived of its outer membranous covering it is wrinkled and of a brownish-gray color; internally whitish. It often comes into market in **transverse starchy slices having a reniform outline**, due to the lateral groove; inodorous; taste sweetish, bitter, and somewhat acrid. A very deep or large notch in the slices indicates that the corm has been partially exhausted by the offset which springs from the base.

**Powder.**—Microscopical elements: See Part iv, Chap. I, B.

**CONSTITUENTS.**—**Colchicine**, a methyl derivative of colchiceïn as will be seen from the following: Colchiceïn,  $C_{15}H_9(NHCOCH_3)(OCH_3)_3-COOH$ ; colchicine,  $C_{15}H_9(NHCOCH_3)(OCH_3)_3COOCH_3$ . With mineral acids colchicine yields colchiceïne and methyl alcohol. Starch, gum, resin, fat, and sugar are also present.

*Preparation of Colchicine.*—Exhaust with alcohol, dilute with water, filter; add lead subacetate to precipitate coloring matter; add sodium phosphate to remove lead; precipitate solution with tannin, wash the precipitate and digest with lead oxide, dry, and dissolve out colchicine with alcohol. Occurs in whitish amorphous powder or crystals; odor saffron-like, taste bitter.

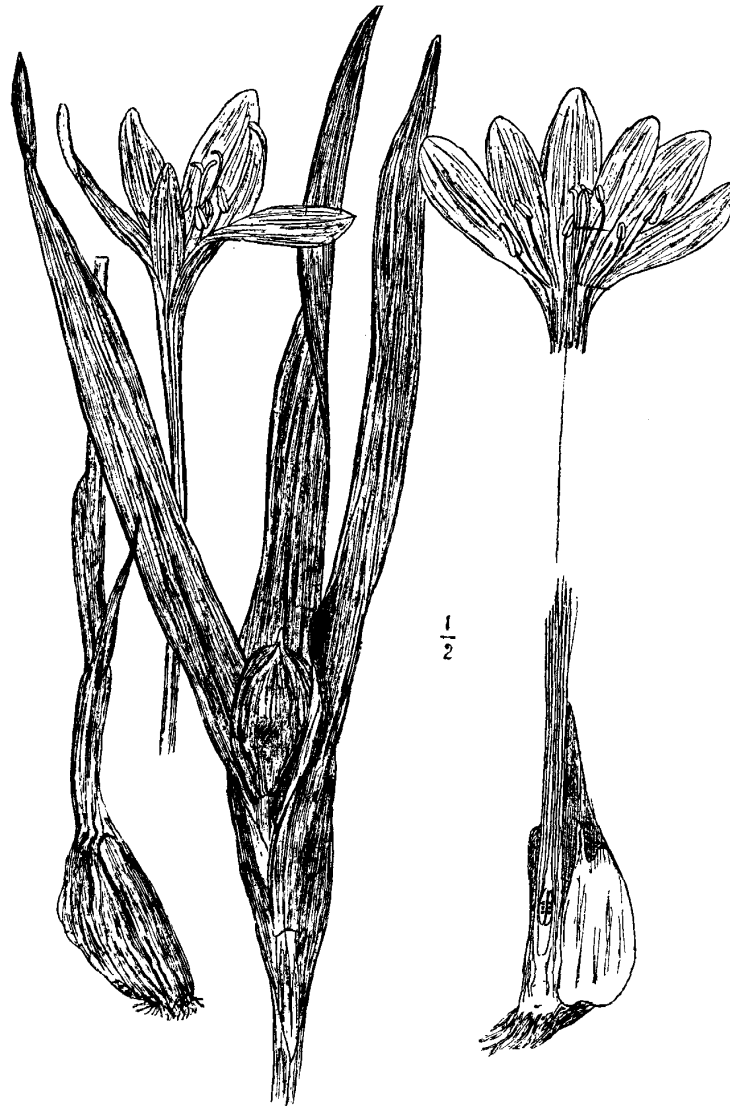


FIG. 36.—*Colchicum autumnale*.

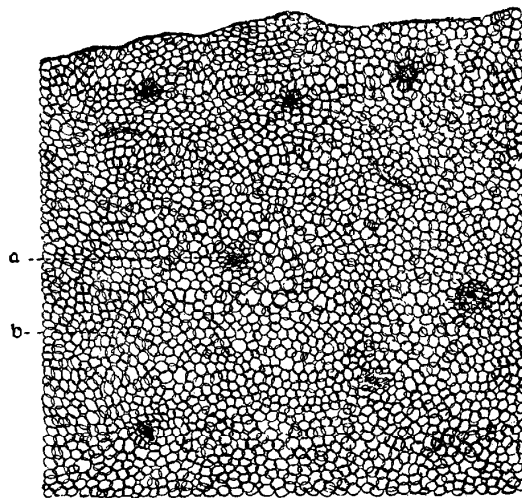


FIG. 37.—Cross-section of *Colchicum* root—outer portion. a, Vascular bundle. b, Parenchyma.

**ACTION AND USES.**—Colchicum is a gastro-intestinal irritant; the larger therapeutic doses sometimes cause nausea, vomiting and diarrhea. In poisoning there is intense gastro-intestinal irritation, bloody stools, irritation in the kidneys, sometimes an ascending paralysis. It is chiefly employed in gout and rheumatism, in which it is said to be very efficacious. Dose: 2 to 8 gr. (0.13 to 0.5 Gm.).

**OFFICIAL PREPARATION.**

**Extractum Colchici Cormi,** Dose: 4 gr. (0.25 Gm.).

## 69. COLCHICI SEMEN

### COLCHICUM SEED

The seed of **Colchicum autumnale** Linné, yielding by the official process not less than 0.55 per cent. of colchicine.

**DESCRIPTION OF DRUG.**—These seeds have the same constituents and the same medicinal action as the roots, and are given in about the same doses. They are hard, reddish-brown, subglobular, 3 mm, ( $\frac{1}{8}$  in.) in diameter, somewhat pointed at the hilum and with a slight projection or caruncle on one side. Testa thin, somewhat scurfy, closely adhering to the white albumen, which fills the entire seed and which is characterized by its **extreme hardness**; embryo small, nearly opposite the hilum; inodorous; taste oily, bitter, and somewhat acrid. Dose: 3 gr. (0.2 Gm.). Ash not exceeding 8 per cent.

*Powder.*—Characteristics: See Part iv, Chap. I, B.

**OFFICIAL PREPARATIONS.**

**Tinctura Colchici Seminis** (10 per cent.), Dose: 10 to 60 drops (0.6 to 4 mils).

**Fluidextractum Colchici Seminis** Dose: 1 to 5 drops (0.065 to 0.3 mil).

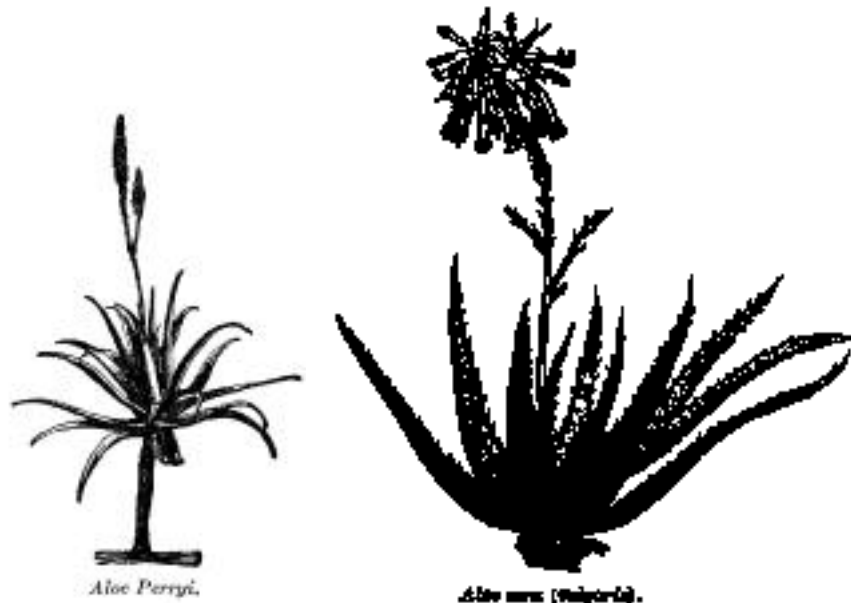
## 70. ALOE.—ALOES

*Ger.* ALOE

The inspissated juice of the leaves of **Aloe Perryi** Baker, yielding Socotrine Aloes; or **Aloe vera** Linné, yielding Curaçoa Aloes; or of **Aloe ferox** Miller, yielding Cape Aloes, U.S.P.

**BOTANICAL CHARACTERISTICS.**—Succulent plants with spicate inflorescence; *perianth* tubular; *style* equal in length to the stamens, or almost wanting. *Capsule* membranous, scarious; *seeds* in two rows, flattened or 3-cornered, winged. Cape of

Good Hope, etc. The American aloe, or century plant (*Agave americana*), is a plant quite similar to the above.



COLLECTION.—The bitter, yellow, succulent portion of the leaf (which, when inspissated, constitutes the aloes of commerce) is found in thinwalled ducts near the surface. The thick leaves are cut off near the base (March and April) and stood up in the sun to drain upon skins. Impurities are removed by skimming with a ladle, etc. Artificial heat is sometimes used for evaporation. When of proper consistence, the evaporate is transferred to kegs, monkey skins, or boxes, and shipped by way of Bombay and Zanzibar.

Socotrine (Zanzibar) is a highly esteemed article, comes in yellowish-brown masses, sometimes soft, odor aromatic, saffron-like, never fetid or putrid and a nauseous and bitter taste, easily broken into pieces with conchoidal fracture and sharp edges, readily splinters. Does not possess any crystalline characteristics under the microscope.

Curaçoa, from the Dutch West Indies, is preferred by some to Socotrine. This variety comes in orange to blackish-brown, opaque masses, fracture surface, uneven, waxy, somewhat resinous; odor, characteristic but not aromatic as in the socotrine variety.

Cape Aloes, the South African Aloes, comes in reddish-brown or olive-black masses, usually covered with a yellowish dust, in thin fragments, transparent and of a reddish-brown color; fracture, smooth and glassy; odor, quite characteristic.

**CONSTITUENTS.**—The active principle of these different aloes is a bitter neutral principle having the general name of **aloin**, but slightly differing in each variety, forming possibly a homologous series; these aloes may be distinguished by their characteristic reactions with different reagents. It should be stated that the various processes of assay for aloes thus far proposed give discordant results. A small percentage of emodin is found in various varieties. Cape aloes contains 0.8 per cent. of this principle. Ash, not exceeding 4 per cent.

70a. **ALOE BARBADENSIS.**—**BARBADOES ALOES.** Prepared from the leaves of **Aloe chinensis**, Steud and A. Vera, L. by boiling the juice or by making a decoction of the leaves; it is inferior to the other varieties. Its color varies, but it is usually **dark brown, approaching to black**, opaque even at the edges, and with a dull fracture; it is further distinguished by its **nauseous** odor. A solution of 1 part in 100,000 of distilled water produces a fine rose color on the addition of gold chloride or tincture of iodine, all the others, except Natal aloes, producing only a slow change, a feeble color, or no color whatever.

**TESTS.**—**SOCOTRINE.** The powder (dark brown) when mounted under the microscope in almond oil, shows yellowish- to reddish-brown, irregular or angular fragments; upon addition of nitric acid yields a yellowish to reddish-brown solution.

**CURAÇOA.**—Powder (deep reddish brown) when treated as above shows numerous blackish brown more or less opaque and angular fragments; with nitric acid, yields a deep red liquid immediately.

**CAPE.**—Powder (greenish-yellow changing to light brown on aging). When treated as above and mounted under microscope it shows numerous distinctly angular bright yellow fragments. Nitric acid produces a reddish-brown liquid changing to purplish brown and finally greenish.

**GENERAL TEST.**—Intimately mix 1 Gm. of Aloes with 10 mls of hot water and dilute 1 mil of this mixture with 100 mls of water; a green fluorescence is produced upon the addition of an aqueous solution of sodium borate (1 in 20). Dilute 1 mil of the original aqueous mixture of Aloes with 100 mls of water, and shake it with 10 mls of benzene; upon separating the benzene solution and adding to it 5 mls of ammonia water a permanent deep rose color is produced in the lower layer, U.S.P. IX.

In the case of liquids it is best to evaporate about 10 mls, more or less,

to a pasty consistency in a porcelain dish, acidulate, and extract from the dish with about 10 mils of ether by stirring with a glass rod and pouring off the ether into a test-tube. With pills or other solid material it is necessary only to powder, acidulate and extract as described. To this extract an equal volume of saturated borax solution is added, etc., U.S.D.A.

*Preparation of Aloin.*—From some varieties of aloes it is obtained by digesting in alcohol for twenty-four hours; then boil, filter, and set aside to crystallize. Can also be obtained by dissolving aloes (Barbadoes or Curaçoa) in acidulated boiling (HCl) water, and, when cold, resin will deposit; decant, evaporate, and set aside for two weeks, when aloin will crystallize. Shaking the crystals with acetic ether removes adhering resin. Dose: 2 to 5 gr. (0.12 to 0.32 Gm.). (See also 70 e.)

**ACTION AND USES.**—**Cathartic and emmenagogue.** As a cathartic aloes is slow in action but certain, having a peculiar affinity for the large intestine; it has produced beneficial effects as a cholagogue; as an emmenagogue it is extensively employed in amenorrhea. Dose: 2 to 5 gr. (0.13 to 0.3 Gm.).

**OFFICIAL PREPARATIONS.**

<b>Extractum Aloes</b> ,.....	Dose: 3 to 10 gr. (0.2 to 0.6 Gm.).
<b>Tinctura Aloes</b> (10 per cent. with glycyrrhiza 20 per cent.),.....	5 to 10 ℥ (0.3 to 0.6 mil); ½ to 4 fl. dr. (2 to 8 mils).
<b>Tinctura Benzoini Composita</b> (2 per cent. of aloes),.....	10 to 40 ℥ (0.6 to 2.6 mils).
<b>Extractum Colocynthis Compositum</b> (50 per cent.),.....	5 to 25 gr. (0.3 to 1.6 Gm.).
<b>Pilulæ Aloes</b> (about 2 gr. in each pill)	2 to 5 pills.
<b>Pilulæ Rhei Compositæ</b> (aloes 1½ gr. in each pill),.....	1 to 3 pills.

70e. **ALOINUM.**—ALOIN (U.S.P. IX). A neutral principle from several varieties of aloes, chiefly Barbadoes aloes (yielding barbaloin), C<sub>17</sub>H<sub>20</sub>O<sub>7</sub>, and Socotra or Zanzibar aloes (yielding socaloin), C<sub>15</sub>H<sub>16</sub>O<sub>7</sub>, U.S.P. Nataloin, C<sub>16</sub>H<sub>18</sub>O<sub>7</sub>, while not official, is a similar product. Minute acicular crystals, or a microcrystalline powder, yellow to yellowish-brown, of a slight odor and characteristic bitter taste. Barbaloin, soluble in 470 parts of ether; socaloin, soluble in 380 parts of ether. Both soluble in water and alcohol. It is rapidly decomposed in alkaline solution. Dose: 1 gr. (0.6 Gm.). Ash, not more than 0.5 per cent.

71. **XANTHORRHOEA.**—GUM ACAROIDES. BOTANY BAY RESIN. GRASS-TREE RESIN. A spontaneous resinous exudation from the stems of different shrubby Australian plants of the genus **Xanthorrhoea**. The yellow variety, from *X. hastitis* R. Brown, resembles gamboge in appearance; externally reddish yellow, internally a lighter yellow; odor agreeably balsamic, especially when heated, when it

emits a tolu-like odor; taste balsamic, somewhat acrid. The red variety, from *X. australis* R. Brown, resembles dragon's blood in appearance, being externally deep brown-red; internally bright red; fracture glossy.

CONSTITUENTS.—Resin, benzoic and cinnamic acids, and a trace of volatile oil.

ACTION AND USES.—Resembles storax and tolu in medical properties. Dose: 8 to 30gr. (0.5 to 2 Gm.). Chiefly used as a substitute for shellac, and for making colored varnishes.

72. **ERYTHRONIUM AMERICANUM** Smith.—ADDER'S TONGUE. DOG-TOOTH VIOLET. *Habitat*: United States. (Leaves.) Alterative. Sometimes applied as a poultice to scrofulous tumors.

### **HÆMODORACEÆ (Liliaceæ N.F.).—Bloodwort Family**

73. **ALETRIS**, N.F.—COLIC ROOT. STARWORT. The rhizome of **Alet'risfarino'sa** Linné. *Habitat*: United States. Small, crooked, about the size of a quill, flattened and tufted above and beset with wiry, white rootlets below. Alcohol extracts its bitter principle. Bitter tonic, diuretic, and vermifuge; used extensively in the treatment of uterine diseases. Dose: 10 to 30 gr. (0.6 to 2 Gm.).

### **DIOSCORIACEÆ.—Yam Family**

74. **DIOSCOREA**, N.F.—WILD YAM. COLIC ROOT. The rhizome of **Diosco'rea villo'sa** Linné. *Habitat*: United States. Expectorant, diaphoretic, antispasmodic, and a stimulant to the intestinal canal. It is a valuable remedy in bilious colic. Dose: 15 to 60 gr. (1 to 4 Gm.), it; fluidextract.

### **IRIDEÆ.-Iris Family**

Perennial herbs, with equitant, 2-ranked leaves, the flowering stem arising from a rhizome or corm.

75. **IRIS**, N.F.—IRIS VERSICOLOR. N.F. BLUE FLAG. (1890.) A horizontal, jointed rhizome, generally cut into longitudinal slices; externally brown, closely annulate from the leaf-sheath remnants, and near the broad flattened end crowded with long, simple rootlets. *Constituents*: Acrid resin 25 per cent., fixed oil, starch, gum, tannin, sugar, iridin, and indications of a brownish, viscid, amorphous alkaloid. *Preparation of Iridin*: Obtained by precipitating hot alkaline solution by an acid. The eclectic method of preparation is to precipitate concentrated alcoholic tincture with water; mix dried precipitate with equal quantity of licorice root. Cholagogue, cathartic and alterative. Dose: 10 to 30 gr. (0.6 to 2 Gm.).

**Fluidextractum Iridis** (U. S. P. 1890), Dose: 10 to 30 drops (0.6 to 2 mils).

**Extractum Iridis** (U.S.P. 1890) Dose: 1 to 3 gr. (0.065 to 0.2 Gm.).

76. **IRIS FLORENTINA**.—ORRIS ROOT. The rhizome of *Iris florenti'na*, *Iris pallida*, and *Iris germanica* Linné. *Habitat*: Northern Italy. In clubshaped pieces or joints, from 75 to 125 mm. (3 to 5 in.) in length, a broad depression or scar terminating the broad end. Externally white, peeled; fracture short, mealy, faintly yellowish white; **odor** violet-like; taste mealy, bitterish, and somewhat acrid. It contains iridin, irone,  $C_{13}H_{20}O$ , a ketone of violet odor, acrid resin, starch, mucilage, bitter extractive, and orris camphor, consisting of a fat impregnated with volatile oil. Cathartic, diuretic. Dose: 5 to 15 gr. (0.3 to 1 Gm.). Chiefly used in tooth-powders and perfumes. (Highly magnified starch grains of *Iris*, see Fig. 286.)



FIG. 38.—*Crocus sativus*—Plant, flower, and stigma.



77. **CROCUS**, N.F.—SAFFRON. The stigmas of *Cro'cus sati'vus* Linné. Asia Minor and Greece; cultivated for market in Spain, France, and other temperate countries of Europe; also cultivated in the southeastern counties of Pennsylvania. Commercial saffron is mostly of French or Spanish origin; a product of the Cape of Good Hope known as Cape saffron, resembling the genuine in odor, is a flower of a small plant belonging to the Scrophulariaceæ (“Pharm. Journal,” VI, 462, 1865). “American saffron” consists usually of safflower. The commercial or “hay saffron” consists of **orange-brown stigmas**, separate, or united (three) to the top of the style, about 30 mm. ( $1\frac{1}{5}$  in.) long, almost filiform, enlarging toward the top, which is toothed; their edges are rolled in, giving them a flattish-tubular appearance; crisp and somewhat elastic; orange-brown; odor peculiar, aromatic; taste pungent, bitterish. In selecting saffron the above characteristics should be borne in mind; the drug should not emit an offensive smell when thrown upon live coals. If it has a musty flavor or a black, yellowish, or whitish color, it should be rejected. If the cake saffron be purchased, those should be selected which are close, tough, and firm in tearing. Owing to its high price, saffron offers a great field for adulteration, which is done in various ways. The commonest is to mix the stigmas with the styles, which may be distinguished by their lighter color. Old saffron and that deprived of its coloring matter leaves an oily stain when pressed between paper, due to the fixed oil with which they are covered to conceal their false nature. The florets of other flowers, as calendula, carthamus, and arnica, may be detected by dropping them into water, when their characteristic forms will come out. Mineral adulterants, which are sometimes found to the extent of 20 per cent., will subside to the bottom when the suspected drug is placed on water; carbonate of lime will effervesce when a drop of acid is placed on the suspected drug. *Constituents*: An orange-red coloring matter, which gives to saffron its chief value; a glucoside, usually called crocin,  $C_{44}H_{70}O_{28}$ , but formerly called polychroit, because of the many different colors it gives with acids; crocetin,  $C_{34}H_{46}O_9$ , and a volatile oil,  $C_{10}H_{16}$ , upon which its medicinal virtues depend. Saffron has fallen into almost complete disuse among practitioners of the United States and Great Britain, but it is occasionally used in domestic practice in the form of a tea, to promote eruption in measles, scarlet fever, and other exanthematous diseases. Dose: 5 to 30 gr. (0.3 to 2 Gm.). Chiefly used for **coloring preparations**.

**Tinctura Croci** (10 per cent.). (U.S.P. 1890),. Dose: 1 to 2 dr. (4 to 8 mls).

### **SCITAMINEÆ.-Banana Family**

A tropical order, many species of which have a pungent principle in their rhizome or root; other species yield an abundance of starch and coloring matter.

#### *Synopsis of Drugs from the Scitamineæ*

- |  |   |
|--|---|
| <p>A. <i>Rhizomes.</i><br/> <b>ZINGIBER</b>, 78.<br/>           *Galanga, 79<br/>           *Zedoaria, 80.<br/>           Curcuma, 81.</p> | <p>B. <i>Fruit.</i><br/> <b>CARDAMOMUM</b>, 82.<br/>           C. <i>Seeds.</i><br/>           Granum Paradisi, 83.</p> |
|--|---|

## 78. ZINGIBER.—GINGER

### GINGER

The dried rhizome of **Zin'giber officina'le** Roscoe (Fam. Zingiberaceæ, U.S.P. 1900), deprived of periderm.

**BOTANICAL CHARACTERISTICS.**—*Root-stock* biennial, creeping; *stem* 3 to 4 feet high; *leaves* linear-lanceolate, smooth. *Spikes* radical, each flower bracteate; *lip* 3-lobed; *stamens* 3, 2 abortive; *capsule* 3-celled, 3-valved.

**HABITAT.**—Africa, Hindustan; cultivated in the West Indies and tropics.

**DESCRIPTION OF DRUG.**—A flattened rhizome, from 25 to 100 Mm. (1 to 4 in.) long, with large **club-shaped lobes on one side**; deprived of the corky layer by scraping, and bleached, leaving a **pale buff-colored**, striate surface, sometimes covered with a white powder of calcium carbonate from being steeped in milk of lime; fracture mealy and rather fibrous, showing a whitish interior dotted with numerous small, orange-colored oil and resin-cells. Transverse sections show a parenchymatous medullium containing scattered resin-cells and numerous fibrovascular bundles, which latter are less abundant outside of the nuclear sheath. The central cylinder is quite broad as compared with the cortical layer; **aromatic and spicy; pungent.**

**VARIETIES.**—The above-described root, Jamaica ginger or white ginger, (deprived of corky layer), is the finest variety, yielding 5 per cent. oleoresin. African ginger is shorter, with broadly linear or oblong lobes, and is not deprived of its light brown, corky layer. Chinese ginger is also a coated rhizome, but has short stumpy lobes. East India ginger is scraped on the flat side, leaving the cork remaining on the edges. It yields 8 per cent. of oleoresin. Green ginger consists of the rhizome sent to market without drying; black ginger, of the rhizome steeped in boiling water before drying, after which it has a black, horny structure. The preserved ginger is an article on the market which consists of soft, yellowish-brown pieces, obtained by steeping the fresh ginger in hot syrup and carefully bottling.

*Powder.*—Characteristic elements: See Part iv, Chap. I, B.

**CONSTITUENTS.**—**Volatile oil**, 1 to 2 per cent. (consisting of camphene and phellandrene), and gingerol, the former probably giving

to it its aromatic properties, and a resinous, viscid, inodorous extractive its hot, pungent taste; also resin, starch (20 per cent.), and mucilage. Jamaica ginger yields about 5 per cent. of oleoresin, the East India ginger about 8 per cent. Ash, not exceeding 8 per cent.

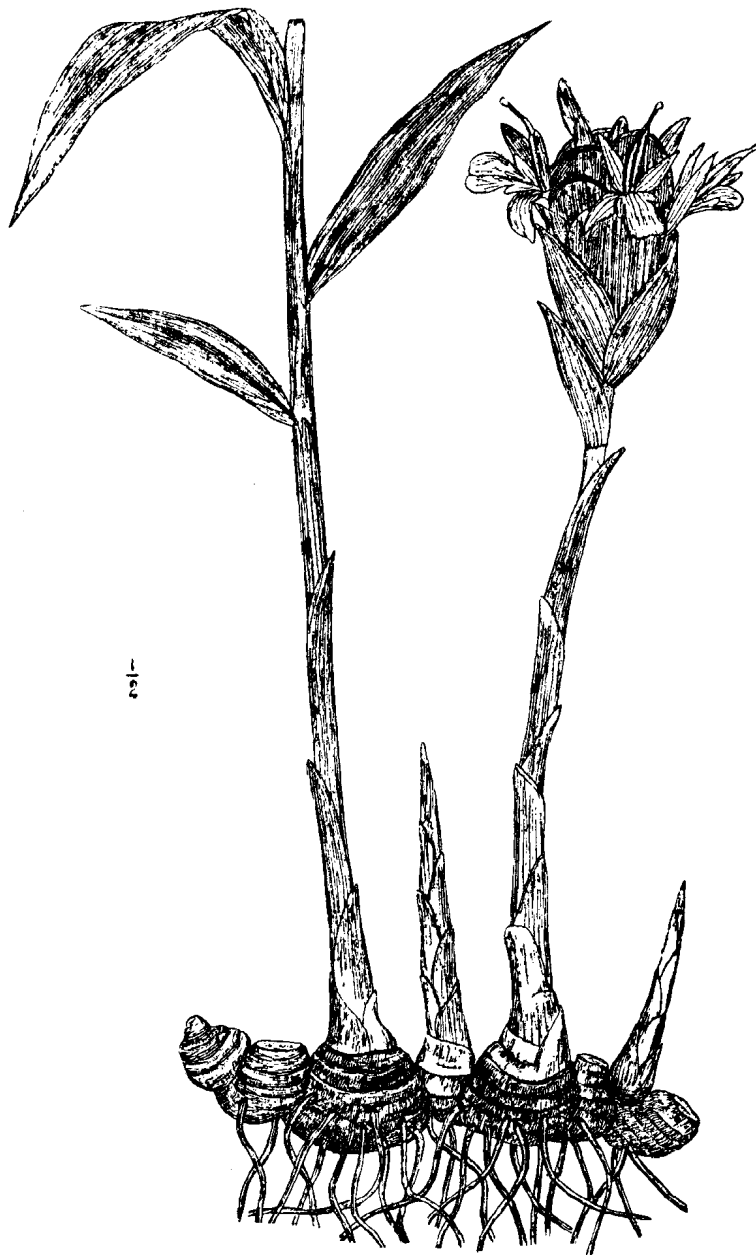


FIG. 39.—*Zingiber officinale*.

**ACTION AND USES.**—**Stimulant**, carminatives and stomachic, often used as an adjuvant to bitter, tonic preparations. When chewed it stimulates the secretion of the saliva and if snuffed into the nostrils in powder it occasions sneezing. It relieves abdominal cramp due to flatus and is useful to diarrhea mixtures, bitter tonics, and to preparations

given to correct indigestion. As a rubifacient it is made into a cataplasm either alone or in combination with other species for the relief of colic, headache, myalgia, neuralgia, etc. Dose: 8 to 30 gr. (0.5 to 2 Gm.).

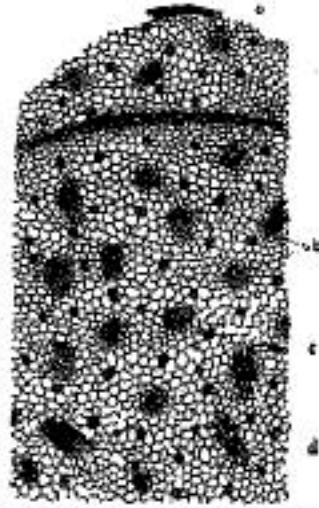


FIG. 40.—Cross-section of ginger, outer portion of peeled rhizome. a. Fragment of cork. b. Fibro-vascular bundles. c. Resin cell. d. Parenchyma. (15 diam.)



FIG. 41.—Ginger—Jamaica, showing lobes of rhizome, peeled and unpeeled. (1/2 natural size.) (Photograph.)



FIG. 42.—Ginger—China sliced and peeled. (1/2 natural size.) (Photograph.)



FIG. 43.—Ginger—Africa, half peeled. (1/2 natural size.) (Photograph.)

OFFICIAL PREPARATIONS.

Tinctura Zingiberis (20 per cent.), . . . . .	Dose: 15 to 60 ℥ (1 to 4 mils).
Fluidextractum Zingiberis, . . . . .	8 to 30 ℥ (0.5 to 2 mils).
Fluidextractum Aromaticum, . . . . .	8 to 30 ℥ (0.5 to 2 mils).
Syrupus Zingiberis (3 per cent.), . . . . .	2 to 6 fl. dr. (8 to 24 mils).
Pulvis Aromaticum (35 per cent.), . . . . .	10 to 30 gr. (0.6 to 2 Gm.).
Pulvis Rhei Compositus (10 per cent. of ginger), . . . . .	1 to 3 dr. (4 to 12 Gm.).
Oleoresina Zingiberis, . . . . .	½ to 2 ℥ (0.0324 to 0.13 mil).

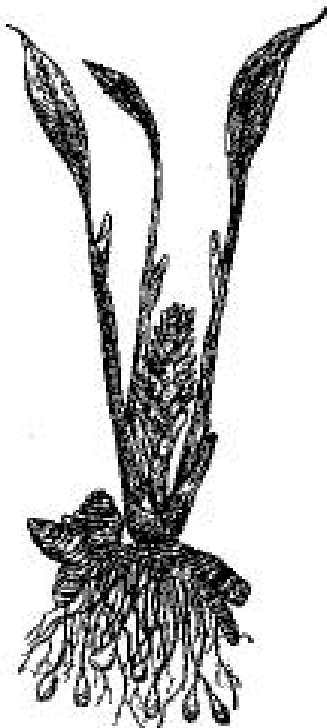


FIG. 44.—*Curcuma longa*.

79. **GALANGA.**—GALANGAL. N.F. The rhizome of *Alpi'nia officina'rum* Hance. *Habitat:* China. **Reddish-brown**, cylindrical, branched, about 100 mm. (4 in-) long, and about the thickness of the thumb, marked with circular-or diagonally **annular, whitish rings**, the remains of former leaf-sheaths; internally orange-brown, dotted with numerous brownish-yellow resin-cells; **odor and taste ginger-like**. Small galangal, or galanga minor, does, not exceed the little finger in size, is darker in color, and has a stronger taste and odor. Like ginger, their activity is due to a volatile oil and a resin, and they have the same medicinal action. (Highly magnified starch grains, see Part iv.)

80. **ZEDOARIA,** N.F.—ZEDOARY. The rhizome of *Cur'cumazedoar'ia* Roxburgh. There are two kinds, the long and the round, both coming from the East Indies. Externally grayish-white, internally brown, hard, compact; odor aromatic; taste spicy, camphoraceous. The drug comes into market in slices and disks. It is used as an aromatic stimulant, and possesses properties similar to but inferior to those of ginger. Dose: 10 to 30 gr. (0.6 to 2 Gm.).

81. **CURCUMA.**—TURMERIC. The rhizome of *Cur'cuma lon'ga* (Linné). *Habitat:* Southern Asia and East Indies, the best coming from China. Cylindrical pieces (*Curcuma longa*), about as thick, but not so long, as the finger, tuberculated and somewhat contorted; externally yellowish-gray, internally- deep orange-yellow, with a darkish ring marking the circular nucleus sheath; hard, compact, breaking with a glossy, waxy fracture; odor feeble but peculiar; taste aromatic, pungent, bitter.

*Curcuma rotunda* is round or oval, about the size of a pigeon's egg, or larger, marked externally with annular rings. Both forms of root are derived from the same plant, one being a modification of the other.

CONSTITUENTS.—Volatile oil, a viscid oil, a pungent resin, pasty starch, and a peculiar yellow coloring matter called curcumin, **turned brownish by alkalies**,

becoming violet on drying; with boracic acid it produces an orange tint, changed to blue by alkaline solutions. Stimulant and tonic, but rarely used in that way, except in India, where it is used as a condiment, like ginger. It is used in pharmacy for **coloring ointments and tinctures**, and for preparing turmeric test-paper.

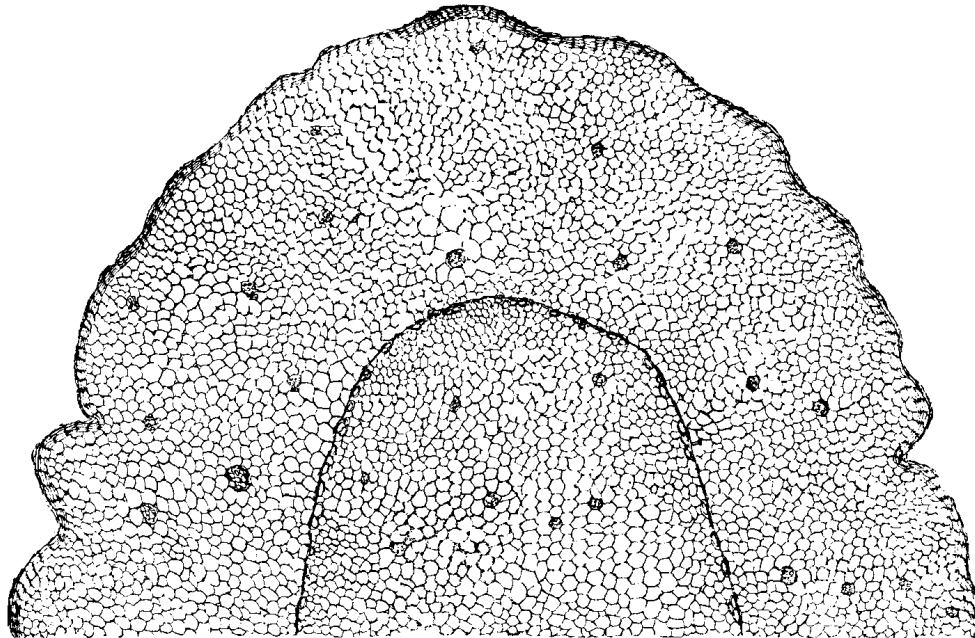


FIG. 45.—*Curcuma longa*—Cross-section of the rhizome.

*Preparation of Curcumin.*—Obtained pure after removing the oil by exhausting the residual powder with ether, evaporating and recrystallizing from alcohol. Crystals yellow, with a vanilla-like odor.

## 82. CARDAMOMI SEMEN.—CARDAMOM SEED

### CARDAMOM

The dried seed recently removed from capsules of **Elettaria Cardamomum** (White et Maton). (Pam. Zingiberaceæ.)

**BOTANICAL CHARACTERISTICS.**—Rhizome fleshy-fibrous. *Stem* 6 to 9 feet high. *Leaves* lanceolate, pubescent above, silky beneath. *Flowers* borne on scapes; anthers 2-lobed. *Capsules* 3-celled, 3-valved.

**HABITAT.**—Malabar; cultivated in India.

**DESCRIPTION OF FRUIT.**—**Triangular-ovate**, from 12 to 37 mm- ( $1/2$  to  $1\frac{1}{2}$  in.) long, with flat, ribbed sides, in the center of which are longitudinal furrows marking the positions of the cell-partitions; valves three, opening longitudinally at the rounded angles; central placenta.

**The pericarp** is of a yellowish or buff color, leathery, and nearly tasteless. **Internally** 3-celled, each containing from 5 to 7 reddish-brown, irregularly angular, rugose seeds, having an aromatic odor and taste; these seeds form 75 per cent. of the fruit in the best varieties. The inert pericarp is rejected in making preparations. The seeds are mostly agglutinated in groups of from 5 to 7, the individual seeds are oblong ovoid in shape 3- or irregularly 4-sided convex on the dorsal surface, longitudinally grooved on one side, about 3 to 4 mm. in length, externally reddish-gray to brown, coarsely tubercled, and of ten with adhering portions of the membranous aril moderately hard but easily crushed, odor aromatic, taste aromatic and pungent. Seeds may be kept in the capsules until wanted for use.

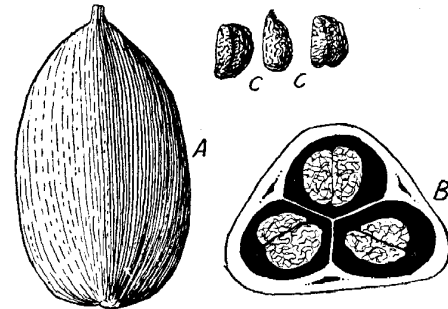


FIG. 46.—Cardamomum. A. Whole fruit enlarged. B. Cross-section. C. Seed.

**Powder.**—Greenish-brown, consisting chiefly of coarse angular fragments of cells of the reserve layers and seed coat.

Endosperm and perisperm of seeds filled with compound starch grains fragments of seed coat with dark brown stone cells, which are polygonal in surface view and about 0.020 in diameter.

Fragments of spiral tracheæ with accompanying bast fibers which are very slightly if at all lignified, relatively few or absent.

**VARIETIES.**—Malabar, the choicest, plump, light, and buff color; Aleppo, mostly short and greenish. These two kinds are mostly imported into the United States. Besides these, there are Madras cardamom, oblong, alternated above, pale in color; Ceylon, from *Elettaria major*,  $1\frac{3}{5}$  in. (40 mm.) long, triangular, prolonged into a beak, dark gray and brown. This latter variety is of inferior flavor. Round cardamom, from *Amomum cardamomum* of Siam and Java, and *A. globosum* and *A. aromaticum* (Bengal cardamom) are known; also winged Java cardamom, from *A. maximum*. This latter variety has from 9 to 12 wings from the base of the apex, but the Bengal has 9 wings near the apex.

**Powder.**—Pale brownish-gray (of seed). Characteristic elements: (Powder of whole

fruit.) Parenchyma of pericarp, thin-walled with prismatic calcium oxalate crystals; the pericarp valueless as an aromatic; parenchyma of endosperm with oil, proteid granules and starch, spherical or angular, simple or compound (1 to 4  $\mu$  in diam.); seed coat with dark brown stone cells (15 to 20  $\mu$  in diam.), inner wall thickened; pericarp has bast fibers very slightly lignified; outer epidermal cells elongated (20 to 30  $\mu$  in diam.), tangential walls thickened; oil cells with suberized walls; Ceylon differs from Malabar in containing trichomes and in the measurements of the elements.

**CONSTITUENTS.**—The pericarp is almost inert, consisting chiefly of lignin. The seeds abound in a fixed oil (10 per cent.) and a **volatile oil** (4.6 per cent.), consisting of terpene, diterpene, and terpineol, with rhombohedric masses of albuminous matter, gum. Ash, not exceeding 8 per cent.

*Powder (of seed).*—Characteristics: See Part iv, Chap. 1, B.

**ACTION AND USES.**—Aromatic, stimulant, stomachic, and carminative, used principally in this country as an **adjuvant**. Dose: 5 to 15 gr. (0.3 to 1 Gm.).

**OFFICIAL PREPARATIONS.**

**Tinctura Cardamomi** (20 per cent.), Dose: 1 to 2 fl. dr. (4 to 8 mls).

**Tinctura Cardamomi Composita** (2.5 per cent., with cassia cinnamon, caraway, and cochineal) Dose: 1 to 3 fl. dr. (4 to 12 mls).

**83. GRANUM PARADISI.**—GRAINS OF PARADISE. GUINEA GRAINS. The seeds of **Amo'mum gra'na paradi'si** and **Amo'mum melegue'ta**. Small, roundish, somewhat cuneiform; externally finely warty, reddish-brown; internally white. When rubbed, they emit a feebly aromatic odor; taste hot and peppery. Action somewhat resembles pepper.

## **ORCHIDACEÆ.-Orchis Family**

Perennial herbs, sometimes parasitic, with perfect, irregular, and usually showy *flowers*, the *stigma* having a broad, glutinous surface (except in *Cypripedium*); the (usually single) *anther* is sessile on the style; it is 2-celled, each cell containing one or more waxy masses of pollen, pollinia (Fig. 115) .

### *Synopsis of Drugs from the Orchidaceæ*

A. *Rhizomes.*  
\***Cypripedium**, 84.  
Corallorrhiza, 85.

B. *Tuber.*  
Salep, 86.  
C. *Fruit.*  
\***Vanilla**, 87.





FIG. 47.—Cypripedium—Leaf and flower. (Photograph.)

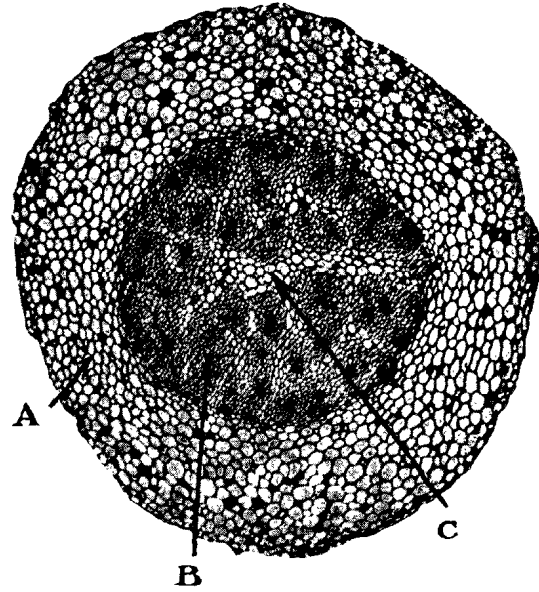


FIG. 48.—Cypripedium—Cross-section of rhizome. (20 diam.) A, Cortex. B, Vascular bundle. C, Ground tissue. (Photomicrograph.)

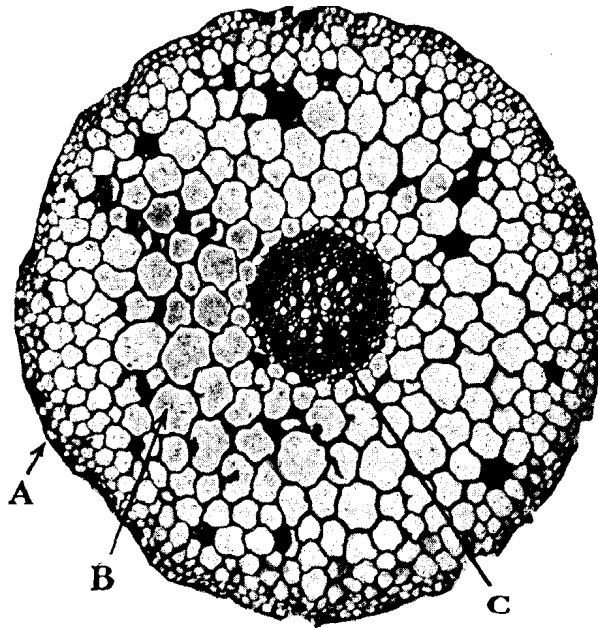


FIG. 49.—Cypripedium—Cross-section of rootlet. (30 diam.) A, Epidermis. B, Parenchyma of cortex. C, Xylem. (Photomicrograph.)

## 84. CYPRIPEDIUM.—CYPRIPEDIUM, N.F.

### LADIES' SLIPPER ROOT

The dried rhizome and roots of *Cypripedium hirsutum* Miller, and *Cypripedium pubescens* Willdenow and *Cypripedium parviflorum* Salisbury.

HABITAT.—North America, in swampy regions.

DESCRIPTION OF DRUG.—A horizontal, somewhat curved rhizome, about the thickness of a quill and 100 mm. (4 in.) or less in length, of a dark brown or light orange-brown color; on the upper side it is closely covered with **deeply concave stem-scars** about the width of the rhizome, and on the lower side with **smooth, simple, wavy rootlets, abruptly descending**, varying in length from 100 to 500 mm. (4 to 20 in.); cortical parenchyma thick, wood-bundles and nucleus sheath indistinct; fracture of rhizome short, of roots fibrous; odor somewhat valerian-like, diminishing with age; taste sweetish, bitter, somewhat pungent at the last.

*Cypripedium parviflorum* has the rhizome bent two or three times, almost at right angles, and is of a brighter orange-brown color; the rootlets are shorter and less wavy.

CONSTITUENTS.—Volatile oil (a trace), a volatile acid, resins, tannin, sugar, starch, and fixed oil. The active principle has not yet been isolated, but the virtues of the drug are supposed to reside in the volatile oil and a bitter principle (probably a glucoside). Ash, not more than 12 per cent.

ACTION AND USES.—Diaphoretic, nerve **stimulant, and antispasmodic**, less powerful than valerian. It is valuable as a substitute for opium in the treatment of children. Dose: 8 to 30 gr. (0.5 to 2 Gm.).

85. **CORALLORRHIZA ODONTORRHIZA** Nuttall.—CRAWLEY. CORAL ROOT. The rhizome of a parasitic, leafless herb growing throughout the United States east of the Mississippi. "A prompt and powerful diaphoretic, with sedative properties. A combination with blue cohosh is a good emmenagogue." Dose: 15 to 30 gr. (1 to 2 Gm.).

86. **SALEP**.—SALEP. The tubers of **Or'chis mas'cula** and **Orchis morio** Linné. *Habitat*: Europe. Frequently comes in powder. It is a farinaceous, gummy substance, somewhat analogous to tragacanth in composition. Demulcent and nutritive.

## 87. VANILLA, N.F.

### VANILLA

The full-grown but immature fruit of **Vanil'la planifo'lia** Andrews, cured in the customary manner. Yielding to dilute alcohol 12 per cent. of extractive. Ash, 6 per cent.

BOTANICAL CHARACTERISTICS.—A fleshy, climbing orchid with long, smooth, dark green stem sending out at the nodes aerial rootlets which fasten it to the tree or other support. *Leaves* sessile, fleshy, tough, veinless. *Flowers* pale yellowish, in loose axillary racemes. *Fruit* a pod.

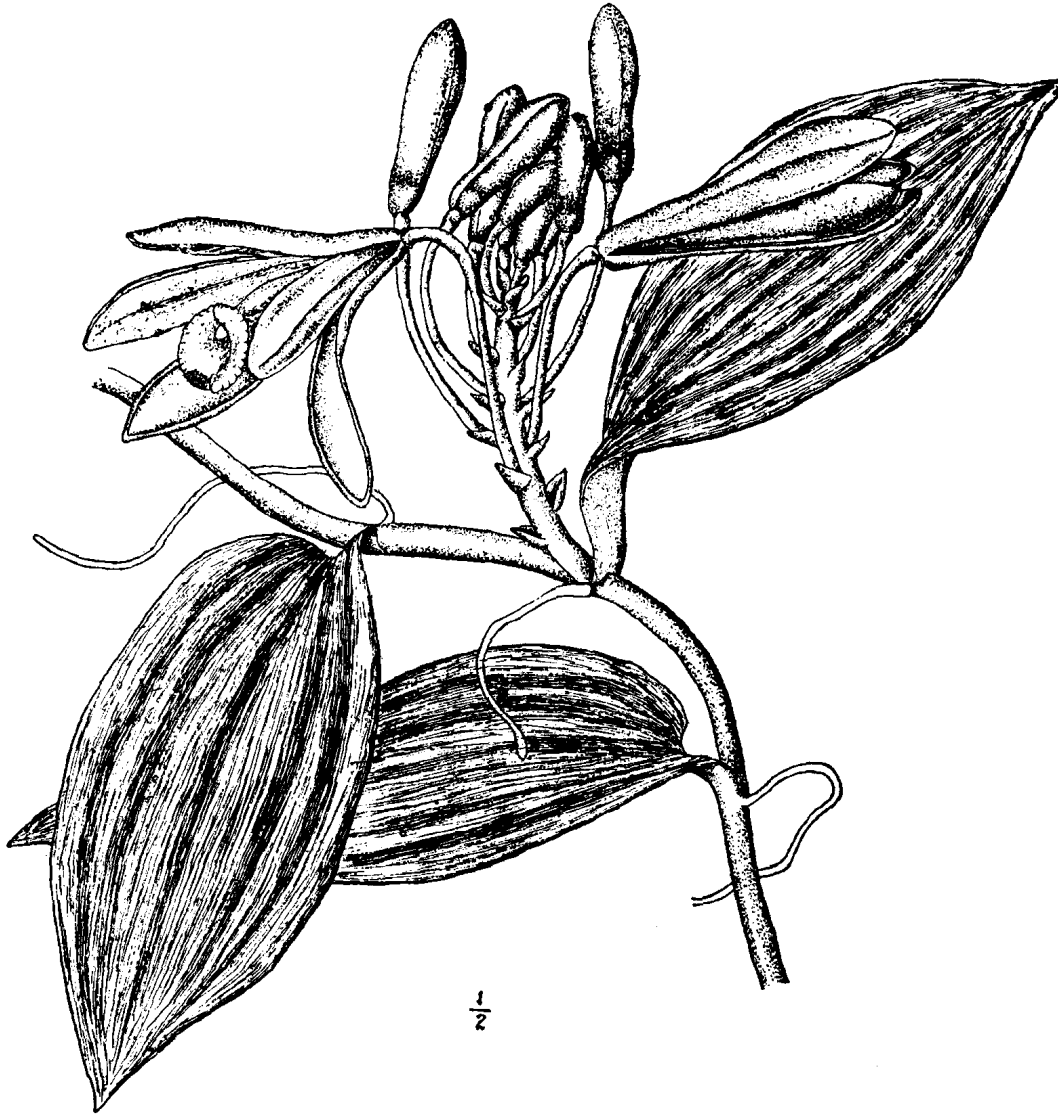


FIG. 50.—*Vanilla planifolia*—Branch showing leaf and flowers.

**SOURCE AND VARIETIES.**—Of the genus *Vanilla* there are some twentythree species recognized, a few only of which are used and cured as the commercial vanilla, a product of cultivation mainly. The fruit is chiefly cultivated in Mexico and Bourbon, and to a greater or less extent in the West Indies, Java, Mauritius, Ceylon, the Fijis, and Straits Settlements.

**COLLECTION AND CURING.**—The fruits are collected before they are ripe, just as they begin to turn yellow, then placed between woolen blankets in a sweating-box and left there for thirty-six hours, being afterward exposed to the noonday sun just long enough to dry off the perspiration which was thus produced. This process is repeated until the

fruit has a uniform blackish chocolate color, until the curer determines the process finished and the fruit ready for packing.

**ARTIFICIAL POLLENIZATION OR FECUNDATION.**—In Mexico and Guinea fertilization is left to natural influences, as by insects and by the wind; but in Reunion (Bourbon) artificial fecundation is resorted to because there is a total lack of the necessary insect life. Pollenization consists in holding the flower with the thumb and finger of the left hand, and, with a splinter of wood or bamboo held in the right hand, raising up the labellum between the pollen and the stigma, then with the forefinger of the left hand pressing the former down upon the latter. Transversely are seen several rib-like processes extending inward. These are the placentæ which support the numerous minute seeds. Projecting into the central cavity and borne on the inner cell-wall are unicellular papillose hairs; these secrete oil and resin, which elaborate vanillin.

**DESCRIPTION OF DRUG.**—Linear, somewhat triangularly compressed pods from 150 to 250 mm. (6 to 10 in.) long, 8 mm. ( $\frac{1}{3}$  in.) thick, attenuated at the base, where they are curved more or less into a hook; flexible; externally finely furrowed longitudinally, dark brown, shining, unctuous, often covered with an incrustation of fine, acicular crystals of vanillin;<sup>2</sup> they split lengthwise into two unequal valves, showing numerous minute, lenticular, glossy black seeds imbedded in a black, oily pulp, which also contains shining, acicular crystals. The peculiar, strong, aromatic odor resides chiefly in the pulp; taste warm, aromatic, sweetish.

**CONSTITUENTS.**—The aroma of vanilla, chiefly depends upon a crystalline principle, **Vanillin 87a** (U.S.P.) ( $C_6H_3.OH.OCH_3.CHO$ , *m*-methoxyp-oxybenzaldehyde), which does not exist in the green pods, but is developed during the process of curing, and forms the frosty inflorescence upon their surface. It is found in many other plants, being first made artificially from coniferin, a glucoside found in the cambium of the pine; it is now largely made from oil of cloves by reactions upon the eugenol.

*Preparation of Vanillin.*—Treat alcoholic extract with ether, evaporate, and treat residue with boiling water, when needles of vanillin are deposited. Prepared artificially on large scale from coniferin,  $C_{10}H_{22}O_8 +$

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<sup>2</sup> An adulteration of benzoic acid crystals can be detected by the latter having rhomboidal form as well as characteristic reactions.

2H<sub>2</sub>O, a compound occurring in the sap of the cambium in the Coniferæ. This is first fermented and finally oxidized.



FIG. 51.—Bourbon Vanilla.

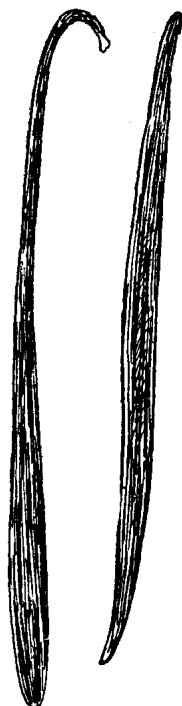


FIG. 52.—Mexican Vanilla.



FIG. 53.—Tahiti Vanilla.

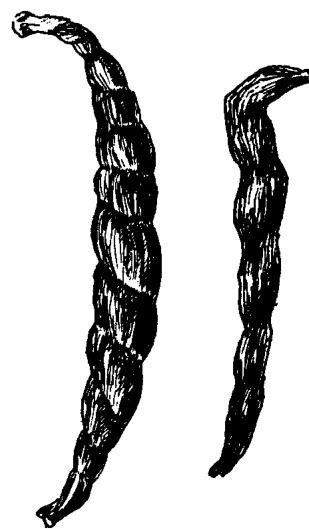


FIG. 54.—Wild Vanilla.

**ACTION AND USES.**—Carminative, stimulant, aphrodisiac, anti-hysteria.

Dose: 5 to 30 gr. (0.3 to 2 Gm.). It is rarely employed medicinally, being principally used as a **flavor**.

87a. **VANILLINUM** (U.S.P. IX) is described as methylprotocatechnic aldehyde. Should contain not more than 0.05 per cent. of ash.

## PIPERACEÆ

Herbaceous or shrubby tropical plants, with jointed stems, and flowers, destitute of floral envelopes, arranged in spikes or spicate racemes. The entire order possesses pungent and aromatic properties, due to the presence of volatile oil and resin.

### *Synopsis of Drugs from the Piperaceæ*

A. *Fruits.*

**CUBEBA**, 88.

**PIPER**, 89.

Piper Album, 90.

Piper Longum, 91.

B. *Volatile Oil.*

**OLEUM CUBEBÆ**,

88 a.

C. *Leaves.*

\***Matico**, 92.

D. *Roots.*

Yerba Mansa, 93.

Jambu Assu, 94.

Methysticum, 95.

## 88. CUBEBA.—CUBEB

### CUBEBS

The dried unripe but fully grown fruit of **Pi'per cube'ba** Linné filius.

**BOTANICAL CHARACTERISTICS.**—*Stem* climbing, rooting at the joints. *Leaves* 4 to 7 inches long, petiolate, oblong to ovate. *Flowers* dioecious, in spikes opposite the leaves. *Fruit* larger than black pepper, globose, on pedicels about  $\frac{1}{2}$  of an inch long.

**SOURCE.**—Java, Sumatra, Borneo; also in West Indies. It grows extensively in coffee plantations or in grounds reserved for that purpose. The fruit after gathering is sent to Java, thence to Singapore, where it enters the market.

**DESCRIPTION OF DRUG.**—The official cubebs are picked while green, becoming **brown or black and reticulately wrinkled** on drying; they are about the size of a pea, **still attached to the slender stalk**; this stalk is longer than the fruit, and is formed by the downward lengthening of the pericarp, continuous with the prominent raised ridges on the surface of the berry. The shell or pericarp is hard, almost ligneous, and incloses a central cavity or a black, shrunken seed; **odor and taste** aromatic, spicy, pungent.

*Powder.*—Characteristic elements: See Part iv, Chap. 1, 13.

**ADULTERATIONS.**—Frequently adulterated with stems. Black pepper and other piperaceous fruits are often met with, but these are rarely intentional adulterants. *Rhamnus catharticus* (buckthorn berries) is sometimes used as an adulterant and may be readily distinguished by its four-seed fruit.

**CONSTITUENTS.**—**Volatile oil** (5 to 18 per cent.), cubebin,  $C_{10}H_{10}O_3$ , cubebic acid,  $C_{14}H_{18}O_4$ , resin, fat, wax, and starch. Cubebin is a colorless principle and forms the greater portion of the sediment which deposits from the official oleoresin on standing. Cubebic acid is the principle upon which depends the diuretic action of cubebs; the volatile oil is stimulating. Ash, not exceeding 8 per cent.

*Preparation of Cubebin.*—Precipitates from oleoresin, upon standing, in white, crystalline form; inodorous and bitter.



FIG. 55.—*Piper cubeba*—Fruiting branch and fruit (enlarged).

**ACTION AND USES.**—Stimulant, carminative, and diuretic. Its **especial** action is on the mucous membrane of the genito-urinary tract  
Dose: 15 gr. to 2 dr. (1 to 8 Gm.).

**OFFICIAL PREPARATIONS.**

**Oleoresina Cubebæ**

Dose: 5 to 30 drops (0.3 to 2 mils).

**Trochisci Cubebæ** (3/5 gr. of oleoresin in each troche) Dose: 1 or 2 troches.

88a. **OLEUM CUBEBAE**, U. S.—OIL OF CUBEB. A greenish volatile oil, becoming yellowish with age (colorless upon rectification), having the odor and taste of cubeb, but less pungent, and a warm, camphoraceous, aromatic taste. It has about the consistence of almond oil and is lighter than water. It is said not to preexist in the fruit, but to be formed by the prolonged action of the air. The oil consists of dipentene, cadinene, and cubeb camphor. Dose: 5 to 15 drops (0.3 to 1 mil).

## 89. PIPER.-PEPPER

### BLACK PEPPER

The dried unripe fruit of **Pi'per ni'grum** Linné.

**BOTANICAL CHARACTERISTICS.**—Aromatic shrub, with knotted, pointed branches *Leaves* alternate, entire. *Flowers* spicate, perfect, each supported by a scale. *Berry* 1-seeded.

Pepper should not yield less than 6 per cent. of non-volatile ether extract, not less than 25 per cent. of starch.

The yield of total ash should not exceed 7 per cent. The amount of ash insoluble in diluted HCl should not exceed 2 per cent.

Not more than 2 per cent. of stems and foreign matter may be included.

**HABITAT.**—India and Cochin-China; cultivated in the East Indies.

**DESCRIPTION OF DRUG.**—A **black, reticulated, berry-like**, fruit, resembling cubeb in size and general appearance, except that it is **destitute of the foot-stalk**. It is hollow inside and contains a single, small, undeveloped seed. Odor aromatic and sternutatory; **taste** sharp, burning, and acrid.

*Powder.*—Characteristic elements: see Part iv, Chap. I, B.

**CONSTITUENTS.**—The aromatic and stimulant properties of pepper depend upon its **volatile oil**,  $C_{10}H_{16}$ , but the pungent taste and medicinal activity are mainly due to a **soft, pungent resin, chavicin**; a neutral principle, **piperine**, is also present which is decomposed by alkalis into piperidine,  $C_5H_{11}N$ , and piperic acid,  $C_{12}H_{10}O_4$ . The latter yields piperinal (heliotropine) by oxidation.





FIG. 56.—*Piper nigrum*—Branch and fruit.

*Preparation of Piperine.*—It is deposited almost pure from freshly made oleoresin; usually has pungent resin associated with it, giving it a biting taste. It is in pale yellow prismatic crystals; odorless, with sharp, bitter taste.

**ACTION AND USES.**—Stimulant and carminative, its principal use being as a condiment. The principle piperine has been used as an antiperiodic. Dose of pepper: 5 to 20 gr. (0.3 to 1.3 Gm.).

OFFICIAL PREPARATION.

**Oleoresina Piperis**      Dose: 1/4 to 2 drops (0.016 to 0.13 mil).

Commercial oil of pepper is an oleoresin from which the piperine has crystallized out.

90. **PIPER ALBUM.**—WHITE PEPPER. The ripe fruit from which the epidermis has been removed by macerating in water and rubbing off. It is usually somewhat larger than black pepper and has a smooth surface with about ten distinct lines running from base to apex; the seed fills the whole inner cavity. It contains the same principles as black pepper; is seldom used except as a condiment.

91. **PIPER LONGUM.**—LONG PEPPER. The fruit of **Pi'per lon'gum** Linné, and of **Pi'per officina'rum** De Candolle. *Habitat:* Southeastern Asia. It consists of cylindrical spikes of the fruits, 25 mm. (1 in.) or more in length; in the market they are of an earthy, grayish-white appearance, but exhibit their deep reddish-brown color when washed. The individual berries are ovoid, about 2.5 mm. ( $\frac{1}{10}$  in.) long, with a nipple-like point at the apex and a bract at the base; they are arranged spirally on the axis. Medical properties same as those of black pepper, but they are inferior and seldom used.

92. **MATICO.**—MATICO, N.F.

MATICO

The leaves of **Pi'per angustifo'lium** Ruiz et Pavon, are readily recognized by the prominent veining of their under surface; upper surface dull green, tessellated or checkered. Odor slight, taste aromatic; contains volatile oil (2 per cent.), resin, tannin, a bitter principle and artanthic acid. Used as an aromatic, stimulant, tonic and styptic. Special action on mucous membrane. Dose:  $\frac{1}{2}$  to 2 dr. (2 to 8 Gm.).

93. **YERBA MANSA.**—The root of **Houttuy'nia (Anemopsis) califor'nica** Benthham and Hooker. Stimulant, tonic, and astringent; used with good results in malarial fevers. Dose of fl'ext.: 15 to 60 drops (1 to 4 mils)

94. **JAMBU ASSU.**—The root of **Pi'per jaboran'di** Vell. Used in its native country, Brazil, as a sudorific like pilocarpus. Dose: 15 to 30 gr. (1 to 2 Gm.).

95. **KAVA, N.F.**—(KAVA- KAVA). The root of **Pi'per methys'ticum**, obtained from a shrub indigenous to the Sandwich Islands. A large, woody, but spongy root, having a thin, grayish-brown bark and a yellowish medullium which is radiate; usually comes in whitish segments. Odor fragrant, like a perfume rather than a spice; taste pungent, slightly benumbing. Used as a remedy in the treatment of diseases of the mucous membrane, as tonic to the digestive organs, and stimulant to the nerves; also as a diuretic. It perhaps has some reputation as a remedy in gonorrhœa.

## SALICACEÆ.-Willow family

Dioecious trees or shrubs with both kinds of flowers in catkins; fruit bearing numerous seeds furnished with long, silky down.



FIG. 57.—*Salix alba*—Branch.

96. **SALIX.**—WILLOW. The bark of **Sa'lix al'ba** Linné, and of other species of *Salix*. *Habitat*: Europe; naturalized in North America. The best bark is that collected from the older branches, coming in thin fragments or quills, the thin brownish or yellowish periderm of which overlays a greenish parenchymatous layer. The bark from the trunk is deprived of the outer layer, pale cinnamon-brown, exfoliating; fibrous. Inodorous; taste bitter and astringent. Two varieties—white willow and purple willow, *S. purpurea* (see below).

CONSTITUENTS.—Tannin about 12 per cent., most abundant in the white willow, and a bitter neutral principle, **salicin**, which is the active glucosidal constituent, occurring and coming into market in silky, shining, white needles, or grains; it exists most abundantly in the purple willow, but may be extracted from various other species and from various species of *Populus*, where it is combined with populin (benzoyl salicin). The degree of bitterness in the barks is probably the best criterion of the value of the several species,

96a. **SALICINUM** (U.S.P. IX).—It occurs in white, shining, bitter crystals, soluble in 28 parts of water and 68 parts of alcohol. Boiled with sulphuric acid it is converted into saligenin or saligenol,  $C_7H_8O_2$ , and glucose, according to the following formula:  $C_{13}H_{18}O_7 + HO = (C_6H_4)(OH)CH_2OH + C_6H_{12}O_6$ . By oxidation with potassium bichromate and sulphuric acid, salicylic aldehyde,  $C_6H_4O.H.CO$ , is formed, having the fragrant odor of the oil of meadowsweet (*Spiræa ulmaris*) and of heliotrope. Tonic, astringent, **febrifuge**. Dose: 15 to 60 gr. (1 to 4 Gm.). The bark itself is rarely employed, however, salicin being used instead in doses of 10 to 30 gr. (0.6 to 2 Gm.). Ash, not more than 0.05 per cent.

*Preparation of Salicin.*—Obtained by adding lead subacetate to a decoction of the bark, precipitating the excess of lead with  $H_2S$ . Evaporate liquid. Add, near the end of the process, sufficient quantity of animal charcoal to decolorize; filter the liquid while hot. Upon cooling, salicin will deposit in crystalline form.

97. **POPULUS**.—WHITE POPLAR. AMERICAN ASPEN. The bark of **Pop'ulus tremuloi'des** Michaux. Tonic and febrifuge. Its active principle, populin, is analogous to the salicin of salix (96). Dose of fl'ext.: 30 to 60 drops (2 to 4 mils).

98. **POPULUS BALSAMIFERA**.—BALM OF GILEAD BUDS. The buds of **Pop'ulus balsamif'era** Linné, variety **candicans** Gray. Populi Gemmæ (Balsam Poplar buds, Balm of Gilead buds, N.F.). *Habitat*: Northern North America and Siberia. These buds, as well as those of other species of *Populus*, are covered with a resinous exudation which is impregnated with a fragrant volatile oil, and is very similar in medicinal action to the turpentine oleoresins. Dose of fl'ext.: 30 to 60 drops (2 to 4 mils).

### **MYRICACEÆ.—Sweet-gale Family**

99. **MYRICA**, N.F.—BAYBERRY BARK. WAX MYRTLE. The bark of **Myri'ca ceri'fera** Linné, an indigenous plant growing on seashores, the fruit of which is covered with a layer of white vegetable wax. This bark is occasionally used in medicine as a tonic, and as an astringent gargle in sore throat, etc. Dose of fl'ext.: 15 to 30 drops (1 to 2 Mils).

100. **COMPTONIA**.—SWEET FERN. The leaves of **Compto'nia asplenifo'lia** Aiton, an indigenous herb. They are linear-lanceolate, with deep, alternate, rounded lobes, and have a spicy odor, especially when rubbed. Stimulant and astringent. Dose: 15 to 30 gr. (1 to 2 Gm.).

## JUGLANDACEÆ.-Walnut Family

A small family of trees with monoecious flowers and the fruit a nut.

101. **JUGLANS, N.F.**—BUTTERNUT. The root-bark of **Jug'lans cine'rea** Linné, collected in autumn. Off. U.S.P. 1890. Corky layer very thin, smooth, grayish, easily removed, leaving a smooth, deep-brown surface; inner surface pure white when the bark is first removed from the tree, but changes to deep brown on exposure. In the market it is found in flat or curved pieces about 4 of an inch (5 mm.) thick, the outer surface dark gray and nearly smooth, or, deprived of the soft cork, deep brown, the inner surface striate. Fracture short, whitish-and-brown checkered; medullary rays somewhat diagonal; odor feeble; taste bitter, somewhat acrid. The leaves and bark of **Juglans nigra (101a)** (black walnut) have been used as an alterative and deobstruent, and the bark of **Carya alba (101b)** (shellbark hickory) as a tonic and antiperiodic. The kernels of the nuts of all these trees yield about 25 per cent. of a pale greenish fixed oil (Oleum Juglandis, or nut oil), used as a demulcent. *Constituents:* Bitter oily extractive, in large proportion juglandic acid,  $C_{10}H_6O_8$ , tannin (?), two other acids, one of them volatile, with potassium, sodium, and other salts. A mild cathartic, especially valuable in habitual constipation. It was much used in the army during the Revolutionary War. Dose: 1 to 2 dr. (4 to 8 Gm.).

## CUPULIFERÆ (Fagaceae).-Oak Family

An important order on account of its valuable wood. It is characterized by alternate leaves and monoecious flowers, the sterile ones in catkins, the fertile in clusters or spikes, and the fruit a 1-seeded nut, with or without a woody, scaly involucre (cupule).

### *Synopsis of Drugs from the Cupuliferæ*

A. <i>Bark.</i>	B. <i>Excrescence.</i>	C. <i>Leaves.</i>
* <b>Quercus</b> , 102.	<b>GALLA</b> , 105.	* <b>Castanea</b> , 106.
<b>Alnus</b> , 103.	<b>ACIDUM TANNI-</b>	<b>OLEUM BETULÆ</b>
<b>Fagus</b> , 104.	<b>CUM</b> , 105 a.	<b>VOLATILE</b> , 107.
	<b>ACIDUM GALLI-</b>	D. <i>Heart-wood.</i>
	<b>CUM</b> , 105 b.	<b>Ostrya</b> , 108.
	<b>PYROGALLOL</b> , 105 c.	

## 102. QUERCUS, N.F.—WHITE OAK

### WHITE OAK

The bark of **Quer'cus al'ba** Linné, collected from trunk or branches ten to twenty-five years of age and deprived of the periderm.

DESCRIPTION OF DRUG.—Flat pieces about 6 mm. ( $1/4$  in.) thick, deprived of the thick, corky layer; pale brown; coarsely fibrous; inner surface traversed by prominent longitudinal ridges; fracture coarse, fibrous (the tissue contains groups of stone cells

and crystals of calcium oxalate); odor faintly tan-like; taste very astringent. It is usually found in the shops as a coarse, fibrous powder.



FIG. 58.—*Quercus alba*—Branch.

*Powder.*—Pale brown. Characteristic elements: Parenchyma of cortex, rather thin-walled, pale brownish rosy hue, some with brown resin or irregular brownish-yellow tannin masses; calcium oxalate, aggregate or prisms (10 to 20  $\mu$  in diam.); sclerenchyma with stone cells (25 to 40  $\mu$  in diam.), thick-walled; bast fibers 15 to 30  $\mu$  thick, long, rather large, thick-walled; crystal fibers with aggregate and prismatic crystals of calcium oxalate (10 to 20  $\mu$  in diam.); cork cells, pentagonal or hexagonal (20 to 30  $\mu$  in diam.).

**CONSTITUENTS.**—**Quercitannic acid** 6 to 11 per cent., a coloring matter, a bitter principle (quercin), sugar (quercite), resin, etc. The active principles are soluble in water and alcohol. The amount of tannin varies with the species, the part of the tree, and the season of the year when gathered; the young bark contains a greater

proportion than the old.

**Quercitannic Acid.**—Two forms of this principle exist, according to Lowe -one soluble in water, of the formula  $C_{28}H_{28}O_{14}$ , and the other scarcely soluble,  $C_{28}H_{24}O_{12}$ . Both are changed by the loss of water into *oak red*,  $C_{28}H_{22}O_{11}$ .

**Quercitron.**—Under this name large quantities of black oak (*Quercus tinctoria*) bark deprived of its epidermis and reduced to a coarse powder are sent from the United States to Europe as a dye. The coloring principle is called quercitron,  $C_{36}H_{38}O_{30}$ . This glucoside splits up by hydrolysis into quercetin and isodulcite, or rhamnose,  $C_6H_{12}O_5(C_5H_9O_5CH_3)$ . Quercitron (*Xantho rhamnini*) forms yellowish crystals, odorless and tasteless, but in hot aqueous or alcoholic solution has a bitter taste.

*Preparation of Quercin.*—Boil bark in acidulated ( $H_2SO_4$ ) water; add milk of lime to neutralize; filter; add  $K_2CO_3$ . Yellow needles slowly form on evaporation of alcoholic solution of above precipitate.

**ACTION AND USES**—**Astringent** and tonic, generally used externally in infusion or decoction as an astringent and tonic bath, injection, etc. Dose: 15 to 60 gr. (1 to 4 Gm.). **Fluidextractum Quercus**, average dose 2 mils.

103. **ALNUS SERRULATA** Willdenow.—TAG ALDER. *Habitat*: North America. (Bark.) Tonic, astringent, and alterative. Dose: 30 to 60 gr. (2 to 4 Gm.).

104. **FAGUS FERRUGINEA** Aiton.—AMERICAN BEECH. (Bark and leaves.) Astringent and slightly tonic.

### 105. GALLA.—NUTGALL

#### GALLS

An excrescence on the young twigs **Quer'cus infectoria** and other species of *Quercus*

produced by the punctures and deposited ova of *Cynips gallæ tinctoriæ* (Fig. 59) Olivier (class, Insecta; order, Hymenoptera). Not more than 5 per cent. of Galls float in water.

**BOTANICAL CHARACTERISTICS.**—A shrub or small tree 6 to 8 feet high. *Leaves* short-petiolate, obovate-oblong, obtusely toothed, oblique at base. *Acorn* solitary, obtuse, two or three times the length of the cup.

**HABITAT.**—Levant.

**DESCRIPTION OF DRUG.**—**Hard, heavy, subglobular**, from the size of a pea to that of a large cherry, contracted below into a **short stipe** and covered above with a few or many **prominent warts**

(tuberculated) between which the surface is smooth. Heavy, sinking in water, except the smaller ones which should not be present to a greater extent than 5 per cent. Externally dark bluish or lead color, frequently with a greenish tinge, often with a circular hole near the middle upper part, communicating with the central cavity. They break with a flinty fracture, showing a whitish or brownish interior, with often a **central cavity**, lined with a thin, hard shell, which contains the insect in all stages of development, or the pulverulent remains of the developed insect mixed with partly eaten fragments of the starchy parenchyma. Odorless; very astringent.

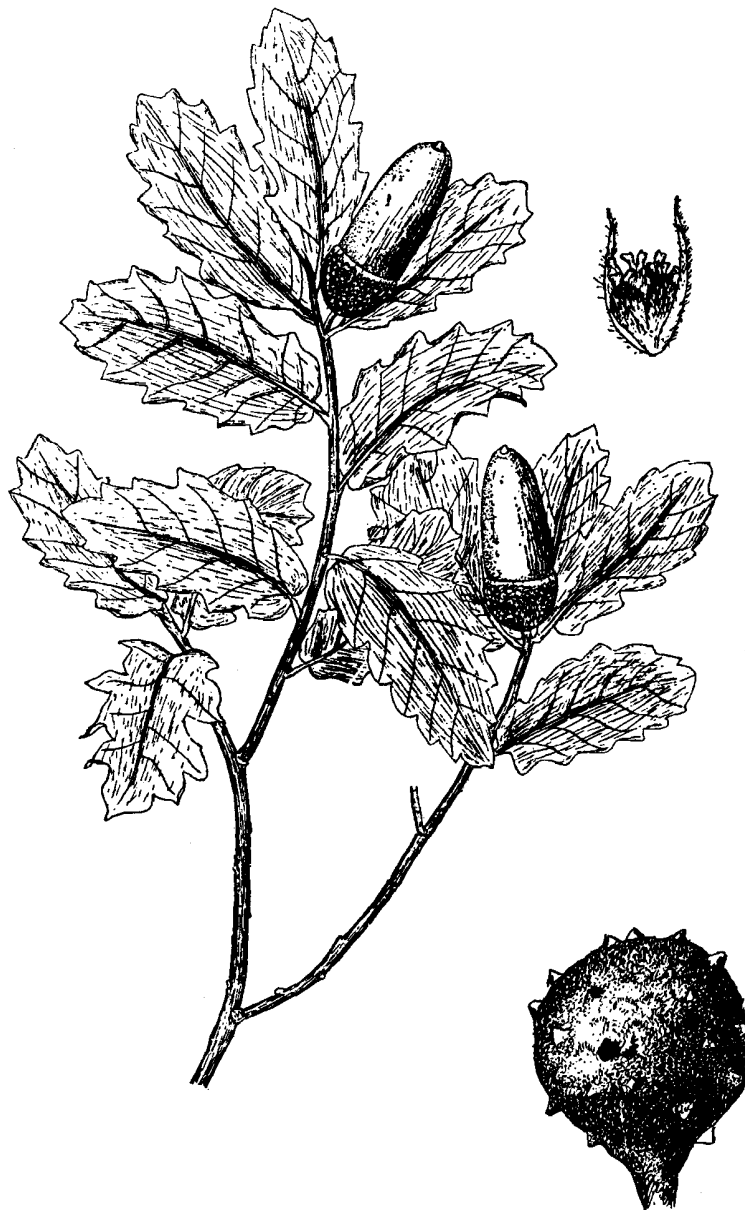


FIG. 59.—*Quercus lusitanica*—Branch and nutgall.



**STRUCTURE.**—The tissue is chiefly parenchyma, loaded with tannin and chlorophyll; the cavity lining is composed of stone cells containing calcium oxalate crystals, within this cavity, if not eaten out, is a starchy parenchyma.

**VARIETIES.**—Most of the oaks are occasionally affected as the above species, the resulting excrescence, known as *galls*, developing a tannin which may be employed for various practical purposes. The Aleppo or Syrian, dark colored and heavy (although the designation Aleppo is not wholly applicable to the official galls—"Galla"), are the products of different parts of Asiatic Turkey; still the name is applied to this variety. *Smyrna* galls, grayish-olive color, intermixed with white galls. *Sorian*, size of a pea, blackish. *Japanese* and *Chinese* from *Rhus simulata*, 1/2 to 2 inches long, ovate, very irregular, tubercular, grayish downy, inclosing the remnants of numerous insects. The Chinese make use of this product in dyeing and as a medicine.

*Powder.*—Gray. The microscopic elements consist of: See Part iv, Chap. I, B.

**CONSTITUENTS.**—Tannin 65 to 77 percent. (**Acidum Tannicum, gallotannic acid 105a**), chemically known as digallic acid,  $C_{14}H_{10}O_9$ . It is a yellowish-white amorphous substance, insoluble in absolute ether, chloroform, benzol, benzin, and carbon disulphide, soluble in glycerine, alcohol, and water; precipitated blue-black by ferric salts, and white by gelatin. It appears to exist, in part at least, as a glucoside and digallic acid. Digallic acid may be considered as an anhydride of gallic acid,  $C_7H_6O_5$ , formed from two molecules of the latter by elimination of one molecule of water. Gallic acid also exists in galls. It is precipitated blue-black by ferric salts, the color disappearing on boiling, and is not affected by gelatin when gum is absent.

*Preparation of Tannic Acid.*—Powdered nutgall is exposed to damp atmosphere for twenty-four hours, then made into paste with washed ether. Allow to stand six hours, then express in canvas cloth between tinned plates. After powdering the pressed cake, again make into paste with washed ether. Repeat the former process and allow the mixed liquid to evaporate spontaneously.

**ACTION AND THERAPEUTIC PROPERTIES.**—When taken into the digestive tract some of it is changed into gallic acid and absorbed as such; while some may be taken up as a soluble alkaline tannate.

Because of its power and lack of toxicity, tannic acid is one of the most

widely used of all the astringents, either in the form of the tannic acid itself or of one of the various vegetables containing it.

Locally applied it may be used to overcome relaxation, as in spongy gums, mercurial sore mouth, hemorrhoids, and chronic sore throat.

To check hemorrhage it may be used whenever the source of flow can be reached directly, as in epistaxis, hematemesis, hemorrhage from the bowels, etc.

Tannic is useful as an antidote against a number of poisons including most of the irritant metallic salts, especially those of antimony and iron. Dose: 8 gr. (0.6 Gm.).

#### OFFICIAL PREPARATIONS.

Preparations commonly employed:

**Unguentum Gallæ** (20 per cent.).

**Acidum Tannicum**,.....Dose: 10 to 20 gr. (0.6 to 1.2 Gm.).

**Trochisci Acidi Tannici**,.....Each 1 gr. (0.06 Gm.).

**Glyceritum Acidi Tannici** (20 per cent.),..Local use.

**Unguentum Acidi Tannici** (20 per cent.),..Local use.

**Collodium Stypticum** (2 per cent.),.....Local use.

105b. **ACIDUM GALLICUM**, U.S.—**GALLIC ACID**. Usually prepared from tannic acid. Also prepared by exposing moistened powdered nutgalls to the action of the air for a month or more; a peculiar fermentation sets in which converts the tannic acid into gallic acid; this is extracted by expression and purified by filtration and crystallization. It is in **light, silky, acicular needles**, colorless when pure, but as usually seen in the shops, of a more or less **pale brownish color**; inodorous; taste sourish and astringent. **It differs from tannic acid** in its sparing solubility in cold water, and in not precipitating gelatin or alkaloids from their solutions. It is less astringent than tannic acid, and inferior to it in all respects except where the astringent effect must be reached through the medium of the general circulation. When applied locally, gallic acid acts as a mild astringent, but does not cause coagulation of the blood, for which reason it is not used locally in the control of hemorrhage. Dose: 5 to 30 gr. (0.3 to 2 Gm.).

105c. **PYROGALLOL**, U.S.—**PYROGALLIC ACID**. A triatomic phenol,  $C_6H_3(OH)_3$ , obtained chiefly by the dry distillation of gallic acid. It is in light, white, shining laminae, or in fine needles, becoming gray or darker when exposed to the air or light, and should therefore be kept in amber-colored bottles; inodorous; astringent. Soluble in water and

alcohol. **Used exclusively externally** in the form of ointments, in lupus, psoriasis, and other **skin diseases**. Its absorption through abrasions in the skin has caused death by general poisoning.

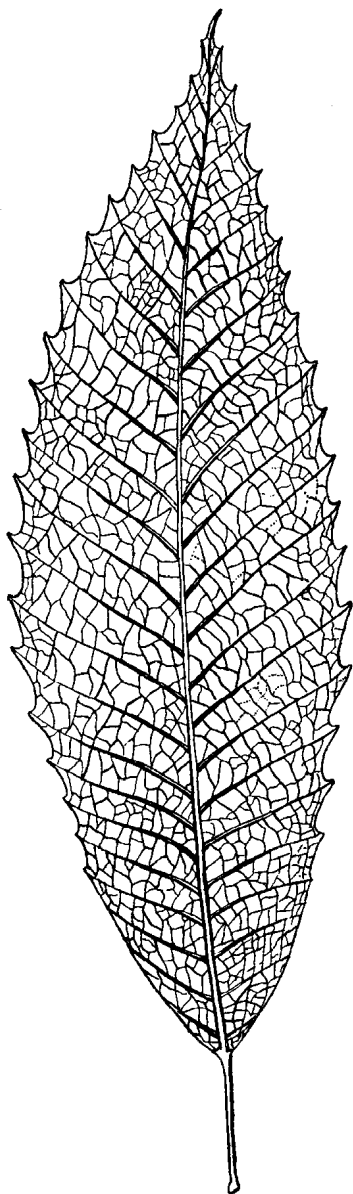


FIG. 60.—Chestnut leaf, natural size.

106. **CASTANEA**, N.F.—CHESTNUT. The leaves of **Castan'ea denta'ta** Sudworth, collected in September or October while yet green. Off. U.S.P.1890. Oblong, elliptical, from 150 to 250 mm. (6 to 10 in.) long, and about 50 mm. (2 in.) broad, with a sharply pointed apex and a short petiole; margin somewhat unequally, but strongly, repand-dentate, with prominent parallel veins beneath each tooth (feather-veined); texture firm, flexible; odor slight; taste somewhat astringent. Constituents: Tannic acid about 9 per cent., gum, albumen, salts, and traces of resin and fats. Tonic and astringent, used almost exclusively in whooping-cough in the form of infusion or fl'ext. Dose:  $\frac{1}{2}$  to 2 dr. (2 to 8 Gm.).

**Fluidextractum Castaneæ**, U.S.P. 1890, Dose:  $\frac{1}{2}$  to 2 fl. dr. (2 to 8 mils).

#### 107. **OLEUM BETULÆ**.—VOLATILE OIL OF BETULA

##### OIL OF SWEET BIRCH

A volatile oil distilled from the bark of **Betula lenta** Linné (Fam. Betulaceae, U.S.P. 1900).

**BOTANICAL CHARACTERISTICS**.—A tree often exceeding 60 feet in height, with a diameter of 2 or 3 feet. The trunk is invested with a dark brown or reddish bark, separating in thin layers. Remarkable for its agreeable fragrance and flavor. *Leaves* cordate, ovate-acuminate, acutely, finely, and doubly serrate, veined beneath. *Flowers* monoecious, *sterile* catkins 2 or 3 inches long, *fertile* much shorter and thicker; *petals* hairy; wood reddish, strong, compact.

**DESCRIPTION**.—This oil is **identical with methyl salicylate**,  $\text{CH}_3\text{C}_7\text{H}_6\text{O}_3$ , and nearly identical with **oil of wintergreen** (413a). Its specific gravity is 1.18. In fact, is one of the sources of commercial oil of wintergreen. Dose: 5 to 30 drops (0.3 to 2 Mils).

It should be kept in well-stoppered bottles, protected from the light.

107a. OLEUM BETULÆ EMPYREUMATICUM RECTIFICATUM, N.F.—Obtained by the dry distillation of the bark and wood of *Betula alba* and rectified by steam distillation. Is used mainly as an external remedy in cutaneous diseases.

108. **OSTRYA VIRGINICA**.—IRON-WOOD. HOP-HORNBEAM. The wood has some reputation as an antiperiodic, tonic, etc. The fl'ext. is used in malaria, in doses of 1/2 to 1 fl. dr. (2 to 4 mils).

## URTICACEÆ.—Nettle Family

A large and very diversified family, consisting of herbs, shrubs, or trees, sometimes with a milky juice yielding caoutchouc; some species have a bark which yields mucilage; the nettles are remarkable for the caustic secretion of their glandular stinging-hairs; the juice of the hempworts (suborder Cannabineæ) is bitter and narcotic.

### *Synopsis of Drugs from the Urticaceæ*

- |                       |                        |                       |
|-----------------------|------------------------|-----------------------|
| A. <i>Bark.</i>       | D. <i>Herb.</i>        | F. <i>Fixed Oil.</i>  |
| <b>ULMUS</b> , 109.   | <b>CANNABIS</b> , 112. | Oleum Cannabis, 112 b |
| B. <i>Strobiles.</i>  |                        | G. <i>Fruits.</i>     |
| <b>HUMULUS</b> , 110. | Urtica, 113.           | *Ficus, 114.          |
| C. <i>Glands.</i>     | E. <i>Seed.</i>        | Morus, 115.           |
| *Lupulinum, 111.      | Cannabis Semen, 112 a. |                       |

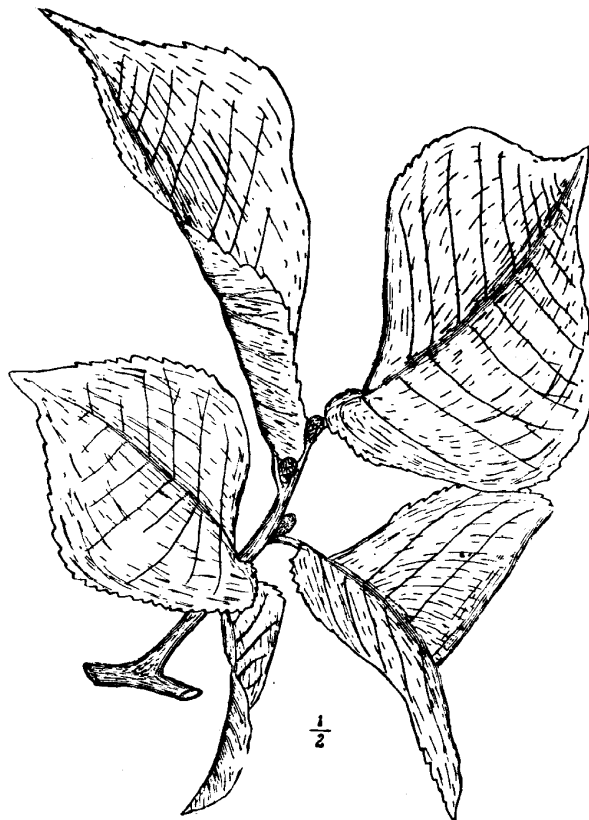


FIG. 61.—*Ulmus fulva*—Branch.

## 109. ULMUS.-ELM

### SLIPPERY ELM BARK

The dried bark of *Ulmus fulva* Michaux (Fam. transferred to Ulmaceæ—U. S. P. 1900), deprived of its periderm.

**BOTANICAL CHARACTERISTICS.**—A tree 40 to 60 feet high. *Leaves* ovate-oblong, taper-pointed, doubly serrate, very rough above. *Flowers* nearly sessile, in lateral clusters, purplish or brownish. *Fruit* a 1-celled, 1-seeded samara, winged all around.

**HABITAT.**—North America, north of the Carolinas and east of Nebraska.

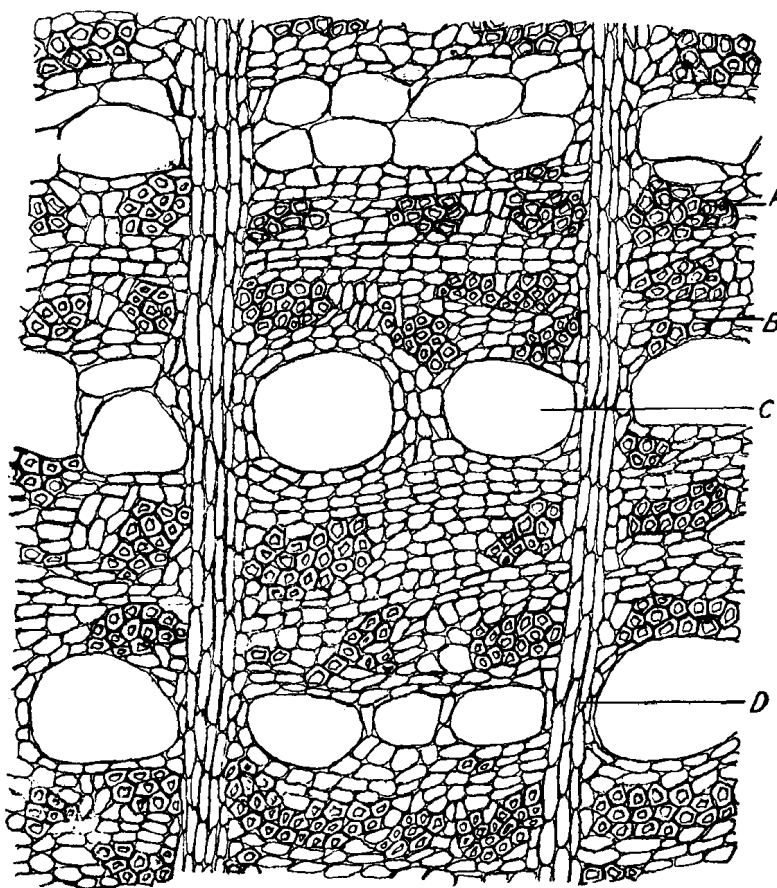


Fig. 62.—Ulmus—Cross-section of bark. *A.* Bast fibers. *B.* Parenchymatous tissue. *C.* Mucilage ducts. *D.* Medullary rays.

**DESCRIPTION OF DRUG.**—Various sized **flat pieces** about 4 mm. (1/6 in.) thick **deprived of cork**, of a uniformly pale brownish-white color, the finely ridged inner surface with a slight reddish tinge; good specimens are **tough and flexible**, capable of being bent double. The

texture consists of soft parenchymatous tissue with tangentially arranged bast fibers and numerous medullary rays, giving to a cross-section of the bark a delicately checkered appearance. **Odor** agreeable, resembling fenugreek. Taste highly mucilaginous. It yields a fawn-colored powder which is often adulterated with starch. European elm bark, from *U. campestris* and *U. effusa*, cinnamon-colored, nearly inodorous, mucilaginous, but has a bitterish and astringent taste, owing to the presence of a little tannin. A few nearly spherical starch grains (0.005 to 0.01  $\mu$  in diameter) are sometimes present.

*Powder.*—Characteristic elements: See Part iv, Chap. I, B.

**CONSTITUENTS.**—A large quantity of mucilage (capable of precipitation with alcohol and lead acetate), and some tannin.

**ACTION AND USES.**—**Demulcent**—externally as an emollient application, in poultice. Dose: 2 dr. (8 Gm.) or more.

## 110. HUMULUS.—Hops

### HOPS

The strobiles of **Hu'mulus lu'pulus** Linné, carefully dried-bearing the whole of their natural glandular coating (Fam. transferred to Moraceae, U.S.P. 1900).

**BOTANICAL CHARACTERISTICS.**—Rough, climbing perennial. *Leaves* palmately 3- to 7-lobed, roughish, ovate. *Flowers* dioecious, the fertile flowers forming a strobile in fruit; *calyx*, *akene*, etc., thickly studded with yellowish, resinous grains, which give the bitterness and aroma to the hops.

**HABITAT.**—North Temperate Zone.

**DESCRIPTION OF DRUG.**—**Strobile** about 30 mm. (1<sup>1</sup>/<sub>5</sub> in.) long, **cone-shaped**, consisting of numerous membranous, greenish-yellow scales attached to a thin, undulating, hairy axis; the scales are oval, leaflike, translucent, showing delicate veins, and surround a subglobular akene; there are also, covering the surface of the scales at the base and adhering to the zigzag axis, **small yellow grains of lupulin**, upon which the value of hops depends. Odor strong, peculiar, somewhat narcotic; taste bitter, aromatic, slightly astringent.

*Powder.*—See Part iv, Chap. I, B.

CONSTITUENTS.—**Lupulin** (Lupulinum, U.S.), volatile oil (0.08 per cent.), resin, choline, and tannin. Ash, not exceeding 8 per cent.

ACTION AND USES.—Tonic, anodyne, and slightly narcotic. Dose: 1/2 to 5 dr. (2 to 20 Gm.), in infusion or tincture. Externally as an anodyne or sedative in fomentation or poultice.

111. **LUPULINUM**, N.F.—LUPULIN. The granular powder separated from humulus, bright yellow, becoming yellowish-brown with age; mixed with minute scale particles; resinous; **odor** peculiar, aromatic, like hops, but stronger; taste bitter. Under the microscope each gland is seen to be composed of two reticulated hemispheres, one narrow and one round; the narrow one collapses on drying, giving to the granule a hood-shaped appearance. They are filled with an oleoresin, the volatile oil of which contains a trace of valerianic acid, and valerol, which passes into valerianic acid when kept a long time, causing the valerian-like odor of old hops—lupamaric acid,  $C_{35}H_{35}O_4$ .

ACTION AND USES.—Same as hops. Dose: 6 to 15 gr. (0.4 to 0.1 Gm.), in capsules or pills, the latter of which may be made by simply rubbing the powder with warm water until it becomes adhesive.

**Fluidextractum Lupulini**      Dose: 10 to 30 drops (0.6 to 2 Mils).  
**Oleoresina Lupulini**         Dose: 3 to 6 drops (0.2 to 0.4 mil).

## 112. CANNABIS.—INDIAN CANNABIS

### INDIAN HEMP. HEMP

The dried flowering tops of the pistillate plant of **Can'nabissati'va** Linné or of the variety indica, Lamarck (Fam. Moraceae), freed from thicker stems and large foliage leaves, and without admixture of more than 10 per cent. of fruits.

TEST.—When made into a fl'ext. and assayed biologically, produces incoordination when administered to dogs in a dose of not more than 0.03 mil of fl'ext. per kilogramme of body weight.

BOTANICAL CHARACTERISTICS.—*Stem* 4 to 8 feet high, annual, tall, and roughish, the inner bark consisting of tough fibers. *Leaves* palmately 5- to 7-divided, the leaflets coarsely serrate. *Flowers* dioecious green, in compound, axillary racemes or panicles. *Akene* globose, crustaceous.

SOURCE.—The plant is indigenous to Asia, from India northward to Western China and Caspian Sea. Its cultivation has extended to Central and Southern Europe, Russia, Brazil, and the Western United States—in fact, it may be said to grow in all civilized countries on the globe.



FIG. 63.—*Cannabis indica*—Branch.

DESCRIPTION OF DRUG.—*Cannabis indica* occurs in commerce as bundles of the flowering tops; the branches, digitate leaves, and the numerous flower-bracts are more or less compressed, and **agglutinated together** with a resinous exudation; color brownish-green; odor peculiar, narcotic; taste bitterish, somewhat acrid. It is sold in Indian bazaars for smoking purposes as “gunjah.” The leaves, small stalks, and capsules, dried separately and mixed with aromatics and fruits, form the Arabian confection, “hashish, bhang, or siddhi.” “Churrus” is a brown, earthy-looking resin, brushed off from the plants by leather-clad men running through the field.

*Cannabis americana*, the plant grown in various parts of the United States, acts similarly to the official plant. See article by author, “Cultivation of Medicinal Plants in U. S.” Jour. Amer. Phar. Assoc., 1915



*Powder.*—Characteristic elements: See Part iv, Chap. 1, B.

**CONSTITUENTS.**—The resin and a yellow, aromatic volatile oil,  $C_{10}H_{16}$ , are its most important constituents. The former, **cannabin** (15 to 20 per cent.), is a brown, amorphous powder, soluble in absolute alcohol (but not in cold alcohol of 89 to go per cent.), from which solution it is thrown down as a white precipitate by water; it is very potent, 33 of a grain acting as a powerful narcotic; it comes into the market as cannabin tannate; choline,  $C_5H_{15}NO_2$ , syrupy, soluble in alcohol and water, very sensitive to Mayer's reagent, yielding a yellow, crystalline precipitate, is probably the same as the so-called alkaloid, "tetano-cannabinine." Ash, not exceeding 15 per cent.

*Cannabinol.*—This principle has been obtained by Wood, Spivey, and Ester held from the exudate of *cannabis indica* (*charas*). Several different fractional distillates from the ethereal extract of this exudate were obtained. Among these distillates is *cannabinol*,  $C_{18}H_{24}O_2$ , boiling at  $265^{\circ}C$ . It is oleaginous and has a red color. This they have found to largely represent the active principle. A condensed account of the pharmacology of *cannabis indica*, as contributed by Dr. C. R. Marshall, may be found in "Western Druggist," 1889, pp. 163-166.

*Preparation of Cannabin.*—Treat drug with water made alkaline with  $Na_2CO_3$ ; exhaust dry residue with alcohol; add milk of lime; precipitate with  $H_2SO_4$ ; treat filtrate with animal charcoal. From the resulting liquid, concentrated, cannabin is precipitated by water.

**ACTION AND USES.**—**Powerful narcotic.** The primary effect of the drug is that of exhilaration, intoxication, stimulating the imagination, etc. This is followed by depression, drowsiness, and stupor, the heart becomes weak and slow and the pupil dilated. It has some advantages over opium, it is claimed, in that it is not constipating, and interferes less with digestion; it is more acceptable in certain morbid states of the system and nervous disquietude. Dose: 3 to 5 gr. (0.2 to 0.3 Gm.).

#### OFFICIAL PREPARATIONS.

112a. **CANNABIS SEMEN.**—HEMP SEED. These have been used in the form of emulsion as demulcent and anodyne, depending upon the fixed oil which they contain. They are mostly used as a bird-seed, however, and for the extraction of the fixed oil.

112b. **OLEUM CANNABIS.**—OIL OF HEMP. A greenish fixed oil, becoming lighter and brownish on exposure; odor hemp like; taste mild. Used as a demulcent and protective. Neither it nor the seed are thought to have any narcotic action.

113. **URTICA**.—NETTLE. STINGING NETTLE. The herb of **Urti'ca dio'ica** Linné  
*Habitat*: United States and Europe, Tonic, astringent, and a valuable diuretic. As an  
astringent it is chiefly used in uterine hemorrhages. Dose: 20 to 40 gr. (1.3 to 2.6  
Gm.).

114. **FICUS**.—FIG, N.F.

FIG

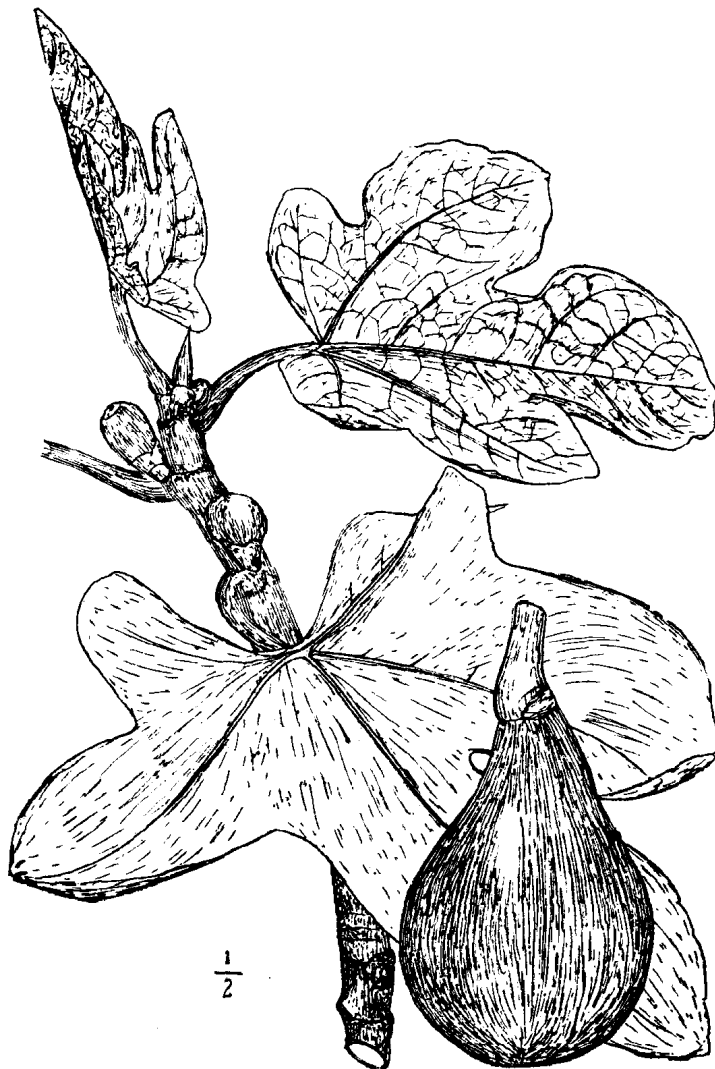


FIG. 64.—*Ficus carica*—Branch and fruit.

The partially dried fruit of **Fi'cus car'ica** Linné (Fam. Moraceæ, U.S.P. 1900).

**BOTANICAL CHARACTERISTICS.**—A small tree with palmately lobed, cordate leaves. Flowers monoecious, inclosed within a pear-shaped receptacle which converges so as to leave only a small orifice at the apex; *style* single; *stigmas* 2.

**HABITAT.**—Levant; cultivated extensively in the Mediterranean Basin and subtropical regions.

**COLLECTION.**—Figs are either left on the tree to dry or are dried after being gathered by artificial heat or the heat of the sun, and in this condition are called “natural figs,” or they are rendered pliant by pulling and kneading. They are then packed in boxes or drums and known as “pulled figs.” The largest and best are those of Smyrna and Turkey, the best Smyrna being known as “Eleme figs.” The largest amount is imported from Asiatic Turkey, and the remainder from Spain, Portugal, and other countries.

**DESCRIPTION OF DRUG.**—Figs come into market compressed, and covered with an efflorescence of sugar which melts in warm weather and makes them soft and moist. They are yellowish or brownish, somewhat translucent, and consist mostly of a sweet, viscid pulp, in the center of which are numerous small, yellow ovaries, or akenes, popularly regarded as seeds; odor peculiar; taste sweet, mucilaginous. When soaked in water they may be opened out to their original pear-shaped form, showing the short stalk, or its scar, at the base or pointed end, and scales at the large end surrounding an orifice near which the staminate flowers were situated; the numerous akenes, or ovaries, of the pistillate flowers cover the walls of the hollow interior.

**CONSTITUENTS.**—Grape sugar (60 to 70 per cent.), gum, fat, and salts.

**ACTION AND USES.**—Nutrient, laxative, and demulcent. Their principal use medicinally is as a laxative diet in constipation, freely given, which action in dried figs is mainly due to the indigestibility of the seeds and tough skin. Dose: 4 dr. (15 Gm.).

**OFFICIAL PREPARATION.**

**Confectio Sennæ** (12 per cent.),           Dose: 1 to 3 dr. (4 to 12 Gm.).

115. **MORUS.**—MULBERRY. The fruit of **Mo'rus ru'bra**, **M. nigra**, and **M. alba** Linné, indigenous trees. Dense, cylindrical spikes of the small fruit, differing in size, shape, and color in the different species. They are all used in the fresh state as a refrigerant.

## **SANTALACEAE.-Sandalwood Family**

116. **SANTALUM ALBUM**, N.F.—SANDALWOOD. The wood of **San'talum al'bum** Linné, and other species of Santalum. It comes in billets from 100 to 150 mm. (4 to 6 in.) in diameter, or in split slices; color varying, yellowish, whitish, or brownish; it has only a feeble taste, but an aromatic odor, particularly when rubbed or in powder. Contains from 1 to 4 per cent. of volatile oil.

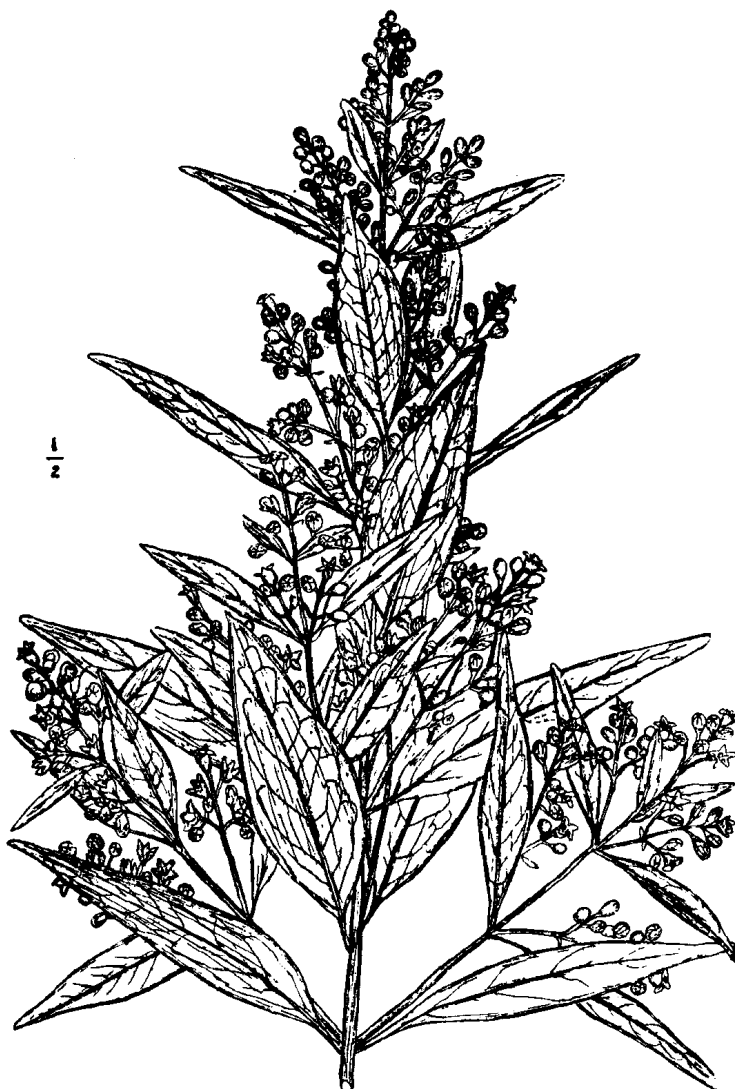


FIG. 65.—*Santalum album*—Branch.

116a. **OLEUM SANTALI**, U.S.—**OIL OF SANTAL**. A yellowish, somewhat thick volatile oil, having a peculiar, strongly aromatic odor, and a pungently aromatic taste. It is a valuable remedy in inflammation of the mucous membrane, used especially in gonorrhea and bronchitis. Its principal use is. in the manufacture of perfumery. Dose: 10 to 30 drops (0.6 to 2 Gm.) administered usually in capsule.

### **LORANTHACEÆ.-Mistletoe Family**

117. **MISTLETOE**.—The bark of **Phoraden'dron flaves'cens** Nuttall, a parasitic evergreen growing on various trees, particularly on fruit trees. Laxative, oxytotic, and antispasmodic. As an oxytotic it is claimed to be superior to ergot. Dose; 15 to 60 gr. (1 to 4 Gm.).