

SAYRE'S MATERIA MEDICA - Part II

ARISTOLOCHIACEÆ.—Birthwort Family

Climbing shrubs, or low herbs, with perfect *flowers*, the lurid *calyx* coherent, with the ovary, which forms a 6-celled capsule or berry in fruit. *Leaves* petiolate. Principal constituents are volatile oil and resinous principles.

118. SERPENTARIA.—SERPENTARIA

VIRGINIA SNAKE-ROOT

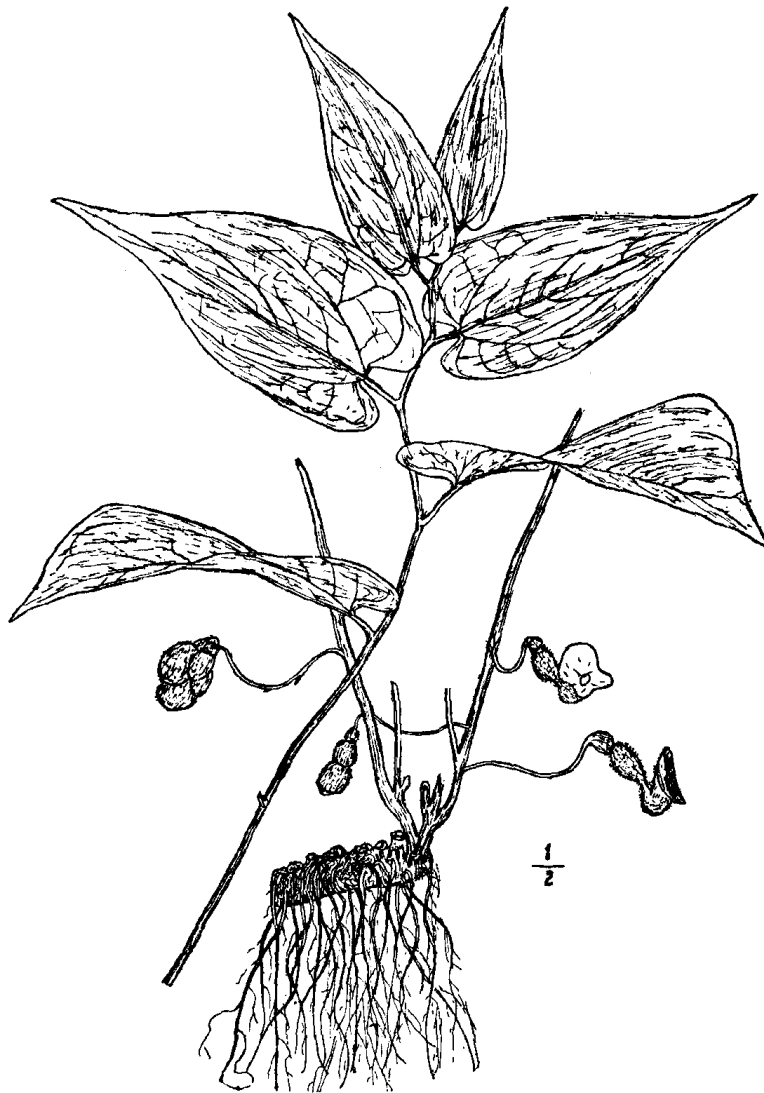


FIG. 66.—*Aristolochia serpentaria*.

The dried rhizome and roots of *Aristolochiaserpentaria* Linné (Virginia), and of *Aristolochia reticulata* Nuttall (Texas).

BOTANICAL CHARACTERISTICS.—*Stem* 8 to 15 inches high, pubescent. *Leaves* alternate, ovate, or oblong, with a heart-shaped or halberd-shaped base. *Flowers* all next the root, short-peduncled; *calyx-tube* bent like the letter S; *stamens* 6, the sessile anthers adnate to the fleshy style.

HABITAT.—United States (**Virginia and Texas**).

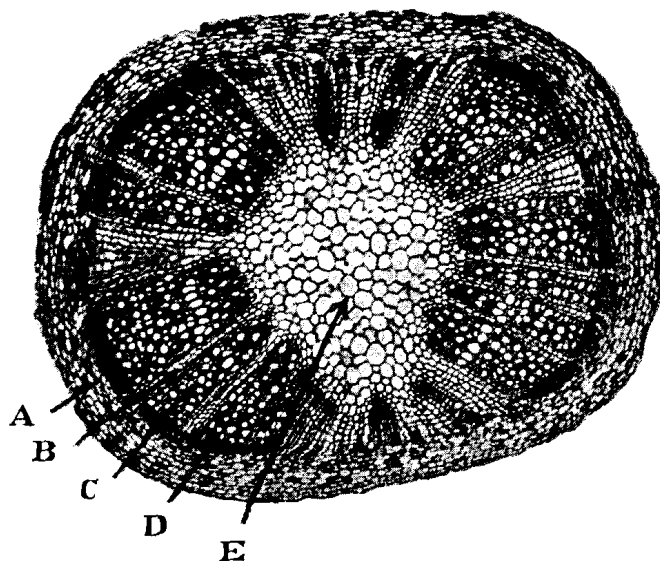


FIG. 67.—*Serpentaria*—Cross-section of rhizome. (25 diam.) A, Parenchyma of cortex. B, Medullary ray. C, Xylem. D, Phloem. E, Medulla. (Photomicrograph.)

DESCRIPTION OF DRUG.—A rhizome about 25 mm. (1 in.) long, and about the thickness of a quill, contorted, bent up and down, externally light grayish-brown, with short stem-bases on the upper side and numerous long, fibrous, branching rootlets below, interlaced; internally grayish, closely matted. The bark is thin, overlaying quite a large woody zone, and separated into wood-wedges by broad medullary rays; **the pith is not in the center** but is nearer the upper side, making the lower wood-wedges the longest. **Odor family terebinthinate, characteristic**; taste warm, bitter, and camphoraceous. **Virginia and Texas *Serpentaria*** are both recognized by the U.S.P. The latter is about twice as large as the former, with fewer and thicker rootlets.

ADULTERATIONS.—As found in commerce, *Serpentaria* is frequently adulterated with portions of the stem. *Hydrastis canadensis* has been used as an intentional adulteration; also spigelia. All of these may easily be distinguished from the genuine by their general characteristics.

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

CONSTITUENTS.—Volatile oil (1/2 per cent.), containing borneol, aristolochine, C₃₂H₂₂N₂O₁₃ (very bitter), tannin, resin, starch, etc.

Preparation of Aristolochine.—Precipitate decoction with lead acetate; ex. haust precipitate with hot alcohol; evaporate; dissolve out alkaloid with water. It is bitter, yellow, amorphous, or in needles; soluble in alcohol, water, precipitated by tannin.

ACTION AND USES.—Aromatic stimulant and tonic. Its only possible therapeutic virtue is as a stimulant to the gastric mucosa—Wood.

Dose: 5 to 30 gr. (0.3 to 2 Gm.).

Tinctura Cinchonæ Composita (2 percent. of serpentaria) 1 to 4 fl. dr. (4 to 15 mils).

119. **ASARUM CANADENSE** Linné.—CANADA SNAKE-ROOT. Asarum, N.F. WILD GINGER. A long, creeping rhizome, more or less contorted. In commerce broken into pieces from 100 to 150 mm. (4 to 6 in.) long, from the thickness of a straw to that of a goose-quill; somewhat quadrangular or twoedged; externally grayish-brown, longitudinally wrinkled, beset with small fibers, easily broken off; internally nearly white, the small wood-bundles surrounding a large pith; odor peculiar, aromatic; taste aromatic and pungent. It contains a large percentage of volatile oil which is often used in perfumery. This contains asarol, probably identical with linalool, its acetic and valerianic esters, methyl eugenol. Aromatic stimulant and tonic. Dose: 30 gr. (2 Gm.).

POLYGONEÆ.-Buckwheat Family

Herbs or woody plants with alternate, entire *leaves*, and with the stipules in the form of sheaths above the smaller joints of the stem. *Fruit* an akene. The leaves and stem are very rich in crystals of calcium oxalate.

Synopsis of Drugs from the Polygoneæ

A. *Roots.*

RHEUM, 120.

*Rumex, 121.

Canaiigre, 122.

B. *Rhizome.*

Bistorta, 124.

C. *Herb.*

Polygonum, 123.

120. RHEUM.—RHUBARB

RHUBARB

The dried rhizome and roots of **Rhe'um officinale** Baillon, **Rheum palmatum** Linné, and the var. **Tanguticum** Maximowicz, and probably other species of Rheum, deprived of most of the cortex and carefully dried.

BOTANICAL CHARACTERISTICS.—Botanical history somewhat obscure. It is known, however, from authentic specimens, that the plant is a herbaceous perennial with acidulous juice, resembling the garden rhubarb, but attaining a larger size than any other species. Leaves very large, roundish, cordate at base, and 5- to 7-lobed. The flower-stem, 6 to 8 feet high, bears flowers having a greenish perianth; ovary (and fruit) triangular, 1-celled.

SOURCE.—Rhubarb is obtained from many species of *Rheum*, mostly natives of Asia, especially of China, Chinese Tartary, and Thibet. Russian or Turkish rhubarb—so called because all of it imported into these countries from China had to be submitted to official inspection—is now never found in the market. The caravan commerce between Russia and China has been an important one for many generations, and the rhubarb in European commerce was almost entirely carried from China through Persia and Asia Minor; hence the old name of Turkey rhubarb. Later on it was brought through Northern China, Siberia, and European Russia (Kiachta) to St. Petersburg.

The “Russian rhubarb” of early times was evidently what is now known as Shensi variety. That brought into the trade by the port of Canton, known in Europe as Indian rhubarb, is now called Canton. The Chinese rhubarb is the variety recognized in commerce. The root, often attaining a weight of fifty pounds, is cut up into pieces of a suitable size for drying, holes being usually bored through the pieces and a string passed through for hanging them up.

DESCRIPTION OF DRUG.—In cylindrical, conical, or plano-convex pieces, or pieces with no regular shape, varying in size from 75 to 150 mm. (3 to 6 in.) long, and 50 to 75 mm. (2 to 3 in.) thick; they are usually sorted into “round” and “flat” rhubarb. Externally somewhat shriveled, often with portions of the cortical layer which have not been pared away; usually covered with a bright yellow dust, beneath which it is seen to have a rusty-brown hue; under the lens it is seen to be marked with the medullary rays (innumerable short, broken lines of a deep brown color) crossing a white ground, forming elongated whitish meshes. Well-formed pieces broken transversely display near the cambium zone dark lines arranged as an internal ring of star-like spots, with radiating, reddish medullary rays, marking the internal origin of the leaves. **The tissue is made up** of a white parenchyma, with reddish-brown or brownish-yellow medullary rays, so twisted, however, as to be scarcely recognizable as such, giving a **cross-section a mottled appearance of red, white, and yellow.** The white

parenchyma cells are loaded with starch and crystals of calcium oxalate, which cause the grittiness between the teeth; the medullary rays contain the active constituents. Odor characteristics; taste bitter, aromatic, astringent, and gritty. When chewed, it tinges the saliva orange-yellow. It yields a **yellowish powder** with a reddishbrown tinge.

PLATE I.

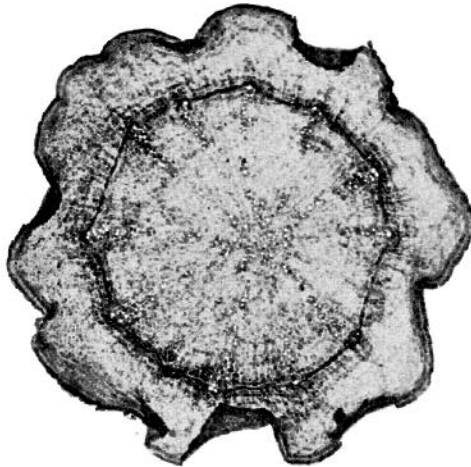


FIG. 1.—Cross-section of Canaigre root (*Rumex hymenosepalus*). X 5¼. (Photomicrograph.)



FIG. 2.—Cross-section of Chinese Rhubarb. X 5¼. (Photomicrograph.)

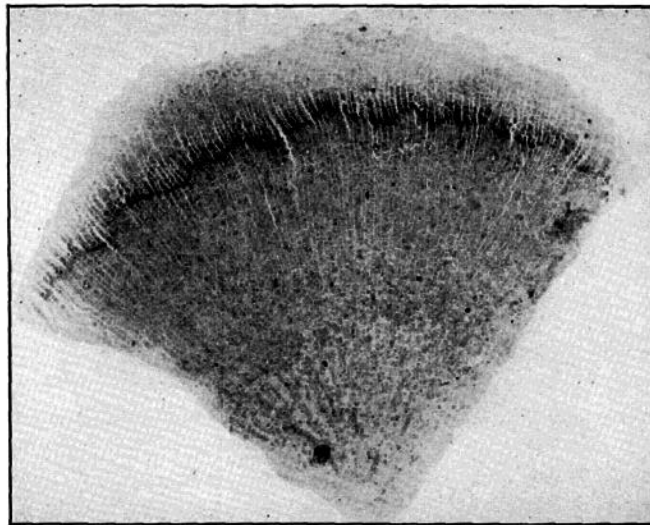


FIG. 3.—Cross-section of *Rheum rhaponticum*. X 5¼. (Photomicrograph.)

The common pie-plant, Crimean rhubarb, from *Rheum rhaponticum* Linné, is a European variety, having properties similar to that of rhubarb, but the astringent principles predominate. It is fusiform, about

100 mm. (4 in.) long and 20 mm. ($\frac{4}{5}$ in.) thick, with a thick orange-red cork, partially removed; a **cross-section** shows a comparatively regular, radiate structure of red medullary rays traversing a whitish parenchyma and extending into the cortical layer when present; its odor is less aromatic, is less gritty, and its taste more mucilaginous and astringent. *Rumex hymenosepalus*, Canaigre, has been used, in powder, to adulterate powdered rhubarb. For detection, follow general directions for examination of powders, see Part iv, Chap. I.

Choice of Rhubarb.—Select the moderately heavy and compact pieces, which should break with a brittle fracture, presenting a **lively, mottled appearance of yellowish and reddish fibers intermingled with white parenchyma**; odor decidedly aromatic; taste bitter, astringent, and gritty, not mucilaginous, tingeing the saliva orangeyellow when chewed. Very light, rotten, or worm-eaten pieces should be rejected. The yield of extractive using dilute alcohol should not be less than 30 per cent. The yield of ash should not exceed 13 per cent. It should be stored in air-tight containers with a few drops of chloroform to prevent the development of insects.

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

CONSTITUENTS.—Seemingly a mixture of different coloring principles of a somewhat resinous quality, each having a peculiar solubility of its own: **Chrysophan**, $C_{27}H_{30}O_{14}$ (and chrysophanic acid), **emodin**, **aporetin**, **phæoretin**, **erythroretin**, **rheumatic acid**, and **rheo-tannic acid**; also starch, calcium oxalate, pectin, and arabic acid. Chrysophan is a yellow glucoside yielding, with acidulated water, sugar and chrysophanic acid, $C_{15}H_{10}O_4$, yellow crystals, one of the best solvents for which is hot benzol. According to Hagar, by proper extraction with chloroformic solvent, etc., rhubarb yields not less than 3 per cent. of chrysophanic acid. Chrysophanic acid, or dioxy-methyl-anthraquinone ($C_{14}H_5CH_3(OH)_2O_2$) is closely related to emodin, which is a trioxy-methyl-anthraquinone ($C_{14}H_4CH_3(OH)_3O_2$). **Cathartic acid** represents the cathartic principles of rhubarb in a crude but concentrated form. For its preparation, see Senna (240)

EMODIN TEST, in Rhubarb.—Boil 0.100 Gm. of powdered rhubarb with 10 mils of an aqueous solution of potassium hydroxide 1 in 100), allow it to cool, filter, acidulate the filtrate with hydrochloric acid and shake it with 10 mils of ether; on standing, the ethereal layer should be

colored yellow. On shaking this ethereal solution with 5 mils of ammonia water, the latter should be colored cherry-red (presence of emodin) and the ethereal layer should remain yellow (presence of chrysophanic acid) U.S.P.

Preparation of Phæoretin.—Wash alcoholic extract with water; dissolve residue in a little alcohol; add ether. This precipitates crude phæoretin.

Preparation of Chrysophanic Acid.—Tincture of rhubarb, after standing for some time, deposits yellow sedimentary crystals. This sediment, dissolved in benzene, deposits the principle on evaporation.

Chrysarobin is a principle easily converted into chrysophanic acid by oxidation. The source of this is Goa powder (from *Andira araroba*). The powder is extracted with hot benzene (benzol), and the liquid allowed to cool. The orange-colored principle separates as the liquid cools.

ACTION AND USES.—**Purgative and astringent.** It has been highly esteemed as an antidysenteric remedy because of the fact that the cathartic principles are accompanied by the antiseptic action of chrysophan, and because catharsis is followed by an astringent and tonic effect upon the mucous lining. Roasting destroys the cathartic quality, when the root becomes simply a bitter astringent. Dose: 15 to 30 gr. (1 to 2 Gm.).

OFFICIAL PREPARATIONS.

Tinctura Rhei (20 per cent., with cardamom),.....	Dose: 1 to 4 fl. dr. (4 to 15 mils).
Tinctura Rhei Aromatica (20 per cent., with cassia cinnamon, cloves, and nutmeg),.....	½ to 3 fl. dr. (2 to 12 mils).
Syrupus Rhei Aromaticus (15 per cent. of aromatic tincture),.....	2 to 6 fl. dr. (8 to 24 mils).
Fluidextractum Rhei ,.....	5 to 30 ℥ (0.3 to 2 mils).
Mistura Rhei et Sodæ (1.5 per cent. with sodium bicarbonate, fl'ext. of ipecac, and spirit peppermint),...	
Syrupus Rhei (Fl'ext. 10 per cent.),	2 to 6 fl. dr. (8 to 24 mils).
Extractum Rhei ,.....	5 to 15 gr. (0.3 to 1 Gm.).
Pulvis Rhei Compositus (25 per cent., with magnesia and ginger),.....	1 to 3 dr. (4 to 12 Gm.).
Pilulæ Rhei Compositæ (each pill containing about 2 gr. of rhubarb, with purified aloes 1½ gr., myrrh, and oil of peppermint),.....	1 to 3 pills.

121. **RUMEX**, N.P.—YELLOW DOCK. The root of **Ru'mex cris'pus** Linné, and of some other species of *Rumex*. Off. in U.S.P. 1890 A fusiform root from 100 to 200 Mm- (4 to 8 in.) long and 10 to 15 Mm- (2/5 to 3/5 in.) thick; **externally reddish-**

brown, the upper portion annulate, the lower portion wrinkled; **fracture** short, exhibiting a rather thick cortical layer and a yellowish or whitish interior, somewhat mottled, the rather porous and horny wood-wedges separated by fine, distinct, reddish medullary rays; inodorous; taste astringent and bitter. Alterative, tonic, and astringent. Dose: 15 to 60 gr. (1 to 4 Gm.). **Extractum Rumicis Fluidum**, U.S.P. 1890. Dose: 15 to 60 drops (1 to 4 mils) .

122. **CANAIGRE**.—The root of **Ru'mex hymenosep'alus** Torrey, from which a tannin is obtained. This plant resembles common dock, *Rumex crispus*, and flourishes in dry, barren, sandy soil in Southwestern United States and Mexico. It propagates by means of the roots, which grow in clusters of three or four. They are from 50 to 150 mm. (2 to 6 in.) long, and 25 to 50 mm. (1 to 2 in.) thick, reddish-brown to almost black. A cross-section shows a prominent cambium line and a broad radiating center. The tissue is chiefly parenchyma, containing starch, tannin, and a yellowish-red coloring matter. The tannin is yellowish-white, identical with that of rhubarb (rheotannic acid).

123. **POLYGONUM ACRE**.—WATER PEPPER. SMART WEED. (Herb.) Stimulant, diuretic, and emmenagogue. Dose: 1 to 2 dr. (4 to 8 Gm.).

124. **BISTORTA**.—BISTORT. The rhizome of **Poly'gonum bistor'ta** Linné. Habitat: Europe, Northern Asia, and Northwestern United States, in moist places. An S-shaped rhizome (bent upon itself—bistorted), flattened, and transversely striate on upper side, and convex, with depressed rootscars, on lower side; color dark reddish-brown, internally lighter; fracture smoothish, showing a thick bark and a pith of about the same thickness as the bark. Contains tannin, 20 per cent., and starch, with red coloring matter. Tonic and astringent. Dose: 8 to 30 gr. (0.5 to 2 Gm.), in decoction.

CHENOPODIACEÆ.-Goosefoot Family

Weed-like herbs, with minute *greenish flowers*; ovary 2 -styled, 1 -celled, becoming a I -seeded thin utricle or caryopsis. Generally bland and innocent.

125. **CHENOPODIUM**.—AMERICAN WORMSEED. The fruit of **Chenopo'dium ambro'sioi'des** Linné, and variety **anthelmin'ticum** Gray. Off. U.S.P. 1890 A small, irregularly globular, seed-like fruit (utricle) not larger than a pin-head and of a grayish-yellow or brownish color. By rubbing the minute grains (fruit) in the hands, the capsular covering to the seeds is broken off, when the shining, lenticular, blackish seeds appear and a peculiar, strong, terebinthinate odor is rendered sensible. Taste pungent and bitter. The variety *Anthelminticum* gives a similar fruit, but is more aromatic. Constituents: Its medical properties depend upon a volatile oil, 3.5 per cent. (125a), in which it, as well as all the other parts of the plant, abounds. Anthelmintic. Dose; 15 to 30 gr. (1 to 2 Gm.).

125a. **OLEUM CHENOPODII**, U.S.—OIL OF CHENOPODIUM. A thin, yellowish, volatile oil, turning darker or brownish by age, having the peculiar odor and taste of the fruit. It is composed of a hydrocarbon and a heavier oil. Dose: 4 to 8 drops (0.25 to 0.50 mil).

PHYTOLACCACEÆ.-Pokeweed Family

Tropical plants represented in the United States by *Phytolaccadecandra* and *Rivinia, lævis*.

126. PHYTOLACCA, N.F.—POKE ROOT

The dried root of **Phytolac'ca decan'dra** Linné, collected in autumn.

BOTANICAL CHARACTERISTICS.—*Stem* red, 3 to 8 feet high, smooth, with an unpleasant odor. *Leaves* large, petiolate, alternate, ovate-lanceolate, entire, cuspidate. *Racemes* lateral, opposite the leaves; *calyx* (perianth) white, lobes ovate, rounded at the apex; *ovary* bright green, *berries* dark purplishred, pulpy.

HABITAT.—North America; naturalized in West Indies and Southern Europe.

DESCRIPTION OF DRUG.—A large root, often 25 to 75 mm. (1 to 3 in.) in diameter, but cut into various sized **transverse or longitudinal slices** for drying and for the market; externally yellowish-brown, much wrinkled; **internally grayish**, turning yellow on exposure. **Structure loosely fibrous**, almost ligneous, alternating with dark, circular layers; a **transverse slice** shows on its face numerous concentric circles formed by the projecting ends of fibers between which the intervening parenchyma has shrunk; odor slight; taste sweetish, then acrid.

CONSTITUENTS.—Resin, tannin, starch, gum, sugar, fixed oil, salts, and probably a glucoside. A trace of alkaloid is reported, but the writer has found alkaloidal reaction quite pronounced in concentrated and purified solutions of the drug. Its virtues are imparted to water and alcohol.



FIG. 68.—Phytolacca—Cross-section of root. (Photograph.)

ACTION AND USES.—Alterative, emetic, cathartic. It is not suitable for a cathartic however, because of the narcotic effect often produced. Its most important use is as an alterative in chronic rheumatism, etc., and externally, in the form of ointment, in

various skin diseases. Dose: 3 to 30 gr. (0.2 to 2 Gm.). Emetic in the larger dose.

Fluidextractum Phytolaccae, (U.S.P. 1900), Dose: Emetic, 1.0 mil (15 drops.)
Alterative 0.2 mil (3 drops).

127. **PHYTOLACCAE FRUCTUS**.—POKE-BERRIES. Globular, purplish or black, berry-like fruits, about 8 mm. ($\frac{1}{3}$ in.) or less in diameter, adhering together in masses from the exudation and drying of a purplish-red juice. Ten-celled, each containing a single glossy black seed imbedded in a succulent pulp. Inodorous; taste sweetish, slightly acrid, and nauseous. Constituents: **Phytolaccin**, **phytolaccic acid**, tannin, sugar, gum, and an evanescent coloring matter, turned yellow by alkalies and bleached by sunlight.

CARYOPHYLLÆ.-Pink Family

Herbs with swollen joints, opposite, entire, and regular flowers; *petals* 4 or 5 mostly removed from the calyx by a short internode. Usually bland herbs; some are highly valued as ornamental plants.

128. **SAPONARIA LEVANTICA**.—LEVANT SOAPWORT. The root of **Gyp'sophila panicula'ta** Linné. *Habitat*: Italy to Asia Minor. A simple, fusiform root, longitudinally wrinkled, and marked with transverse ridges; used in washing silks and other fabrics. It contains sapotoxin (8.5 per cent.), and the acrid glucoside saponin, yielding by hydrolysis sapogenin, which is used as a detergent.

129. **SAPONARIA**.—SOAPWORT. **Sapona'ria officina'lis** Linné. An acrid root, found in Europe and the United States; contains resin, and the glucoside; saponin. The latter is a white powder, soluble in hot water and alcohol, its solution when shaken foams like soap-water. When treated with acids it is split into sugar and a crystallizable principle, sapogenin, soluble in water. Used as an alterative in doses of 15 to 60 gr. (1 to 4 Gm.).

130. **STELLARIA**.—CHICKWEED. The herb of **Stella'ria me'dia** Smith. Demulcent and emollient; a poultice is used in ophthalmia, bruises, inflammation, etc.

PORTULACEÆ.-Purslane Family

131. **PORTULACA**.—GARDEN PURSLANE, The herb of **Portula'ca olera'cea** Linné. Refrigerant and mild efficient diuretic in ascites; it has a beneficial action in catarrhal affections of the genito-urinary tract, Dose: 1 to 3 dr. (4 to 12 Gm.).

NYMPHÆÆ.-Water Lily Family

Aquatic plants, with peltate or cordate leaves from a prostrate rhizome.

132. **NYMPHÆÆA**.—WATER LILY. The rhizome of **Nymphae'a odora'ta** Aiton. *Habitat*: United States, in ponds. About 500 mm. (20 in.) long and 50 mm. (2 in.) thick, usually broken up into grayish, spongy segments, consisting mainly of

parenchyma, with a few scattered wood-bundles. Inodorous; taste mucilaginous and astringent. Used as a demulcent and astringent. Dose: 15 to 30 gr. (1 to 2 Gm.).

The rhizome of **Nu'phar ad'vena** Nuttall, Yellow Pond Lily, has similar properties and uses.

RANUNCULACEÆ.--Crowfoot Family

Herbaceous or somewhat shrubby plants with acrid juice; distinguished by the parts of the flower-sepals, petals, stamens, and pistils-being *free and distinct*—that is, separated and independently situated on the receptacle. The *leaves* are dilated at base, one-half clasping the stem. *Fruit* a pointed or feathery akene, dry pod, or berry. The order has numerous anomalies in the form and structure of the calyx, and corolla in such genera as columbine, aconite, larkspur, ranunculus, anemone, etc., which, nevertheless, agree in the separation of their sepals and petals, the insertion of their numerous stamens, direction of their anthers, structure of seed, etc.



FIG. 69.—*Cimicifuga racemosa*—Plant and rhizome.

133. CIMICIFUGA.—CIMICIFUGA

BLACK SNAKEROOT. BLACK COHOSH

The dry rhizome and roots of *Cimicifuga racemosa* Nuttall.

BOTANICAL CHARACTERISTICS.—*Stem* 4 to 8 feet high, from a thick rhizome; *leaves* alternate, ternately decompose; *flowers* regular, small, white, in wandlike racemes often 3 feet long; *sepals* 5, petaloid; *petals* from 1 to 8, small, on claws, 2-horned at apex; *stamens* numerous; *pistils* 1 to 3; *fruit* 1 to several dry, dehiscent pods.

SOURCE.—This plant is common in rich woodlands of the United States, westward to Iowa and northward to Canada. *Actæ'a racemo'sa* is mentioned by Flückiger as a synonym of this plant. A similar plant, *Actæ'a spicat'a*, furnishing a rhizome resembling black snakeroot, is common in Europe; it differs, however, in having juicy berries instead of dry follicles.

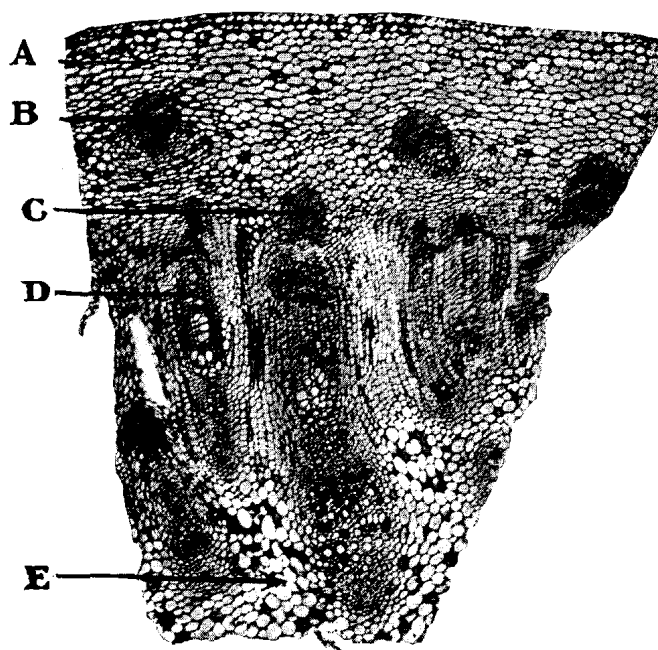


FIG. 70.—*Cimicifuga*—Cross-section of Rhizome. (18 diam.) A, Parenchyma of cortex. B, Vascular bundle. C, Group of bast fibers. D, Xylem. E, Medulla. (Photomicrograph.)

DESCRIPTION OF DRUG.—A short horizontal rhizome from 10 to 25 mm ($\frac{2}{5}$ to 1 in.) thick, with numerous branches—remains of aerial stems—each terminated by a deep cup-shaped scar; on the lower side are found **numerous brittle rootlets** from 1 to 2 mm. ($\frac{1}{25}$ to $\frac{1}{12}$ in.) thick; **externally** brownish-black; fracture of rhizome, horny; odor slight (the powder, however, has a heavy odor); taste bitter and acrid.

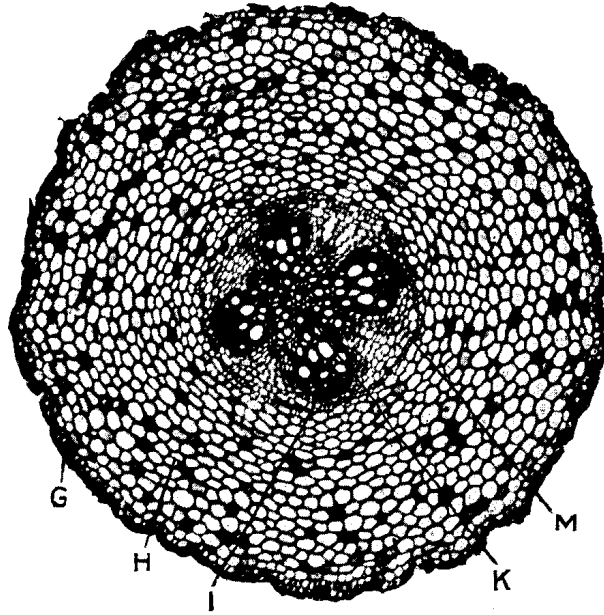


FIG. 71.—Cimicifuga rootlet—Cross-section. (26 diam.) G, Cork. H, Parenchyma of cortex. I, Phloem. K, Xylem. M, Endodermis. (Photomicrograph.)

Cross-section of the rhizome exhibits a large, whitish pith, around which, more or less stellately arranged, are wood-wedges separated by medullary rays. Bark hard and thickish. The rootlets display, under the microscope, a thick cortical layer, the space within which contains converging wedges of open, woody tissue, three to five in number, forming a Maltese cross. The stellate arrangement of the woody wedges of the rootlets is one of the best distinguishing characteristics.

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

CONSTITUENTS.—Besides the ordinary vegetable principles-fat, sugar, tannin, and starch-there exists a **resin** which has been by some assigned as the active medicinal constituent. This resin, amounting to about 3¹/₂ per cent., is contained in the resinoid **cimicifugin** or **macrotin** of the market. An acrid, crystalline principle, soluble in chloroform, ether, and alcohol, and not precipitated by lead acetate, is also said to exist in the root. Ash, not more than 10 per cent.

Preparation of Cimicifugin.—By precipitating the concentrated tincture with water, a crude article is prepared which is known as the resinoid. A purer form is made by precipitating the tincture of the fresh drug with lead subacetate, removing the lead from solution with H₂S, and evaporating. Soluble in alcohol and chloroform.

ACTION AND USES.—Antispasmodic, diaphoretic, and expectorant. It

acts like digitalis on the circulation, and as a sedative upon cardiac ganglia; small doses stimulate digestion and secretion; used in rheumatism and disturbances of the menstrual function. It is a powerful uterine stimulant. In large doses *cimicifuga* causes nausea, headache, vertigo, tremors, muscular relaxation, slowing and weakening of the pulse. Dose: 15 to 30 gr. (1 to 2 Gm.).

OFFICIAL PREPARATIONS.

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

Extractum Cimicifugæ Dose: 3 to 5 gr. (0.2 to 0.3 Gm.).

134. HYDRASTIS.—HYDRASTIS

GOLDEN SEAL. YELLOW PUCCOON

The dried rhizome and roots of **Hydras'tiscanaden'sis** Linné. Yielding not less than 2.5 per cent. of ether soluble alkaloids of Hydrastis,

BOTANICAL CHARACTERISTICS.—Plant about 8 inches high, from a thick, knotty rhizome. The single radical leaf simple, 5-lobed; *stem* 2-leaved at summit; *flowers* terminal, single, greenish; *calyx* of 3-petaloid sepals, regular; *fruit* a head of 1-2-ovuled berries.

SOURCE.—The area of the country over which hydrastis grows in sufficient abundance to be a commercial source of the drug is embraced in Ohio, Indiana, Kentucky, Michigan, and West Virginia. It is also found in other portions of the Eastern United States. Large quantities of the drug are now being cultivated. One of the fields the writer has visited, is located in Douglas, Michigan, "Seal Growers," as they are called, have a cooperative Society to promote their interests. in the growing of this plant and ginseng, especially.

DESCRIPTION OF DRUG.—A knotty, contorted rhizome about 40 mm. ($1\frac{3}{5}$ in.) long and 5 mm. ($\frac{1}{5}$ in.) thick; on the upper side are several scars which mark the positions and detachment of former herbaceous stems; these scars (cup-like projections) have given rise to the name "golden seal." **Externally** rough, of a dull yellowish-brown color, annulate, and beset with numerous slender rootlets; **internally** of a lemon-yellow color; breaks with a short, resinous fracture; a **cross-section** shows a thick bark, narrow wood-wedges, and broad medullary rays which radiate from a large pith. The rootlets show a woody center surrounded by a thick parenchymatous cortical tissue which is bordered by an outer row of compressed cells; odor distinct; taste bitter. Two to three hundred thousand pounds of the drug are annually consumed.

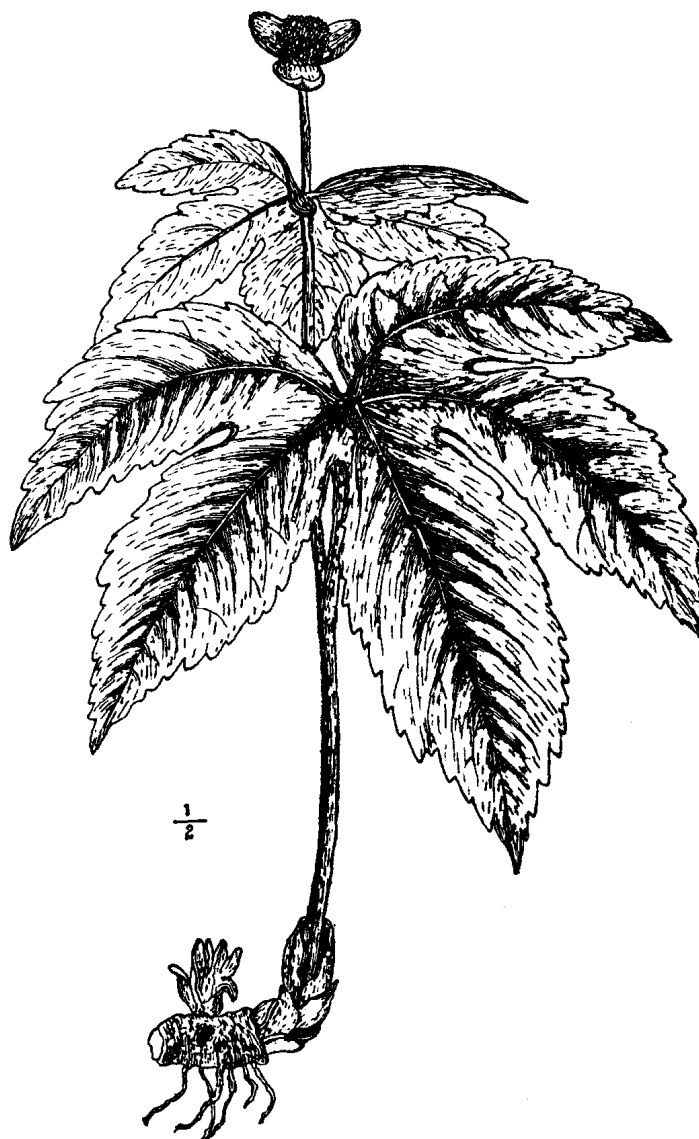


FIG. 72.—*Hydrastis canadensis*.

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

CONSTITUENTS.—The two alkaloids, **hydrastine**, $C_{21}H_{21}NO_6$ (colorless and slightly acrid), and **berberine** (yellow and intensely bitter), are the principal constituents. **Berberine**, $C_{20}H_{17}NO_4$, is **very widely distributed in nature**, being found in drugs from several different families of plants. **Hydrastine, when pure, is in perfectly colorless**, very brilliant, glassy crystals. As a rule, however, they are white and opaque, owing to the presence of numerous fractures. The yellow color of berberine adheres very tenaciously to the hydrastine, so that the absolutely colorless hydrastine is difficult to obtain. **Canadine**,

$C_{20}H_{21}NO_4$, tetrahydroberberine, the sulphate of which is soluble in water and alcohol. **The resinoid, hydrastin, should not be confounded with the active alkaloid.** This resinoid is made by precipitating a concentrated alcoholic tincture of hydrastis with acidulated water, and is probably, in the main, an impure muriate of berberine. Hydrastinine, which Falk regards as a valuable remedy, is made by decomposing the alkaloid, hydrastine, with dilute nitric acid and gentle heat, when opianic acid is also formed.

Preparation of Hydrastine.—Pereolate drug with water; precipitate berberine by adding HCl; to filtrate add ammonia in excess. The impure hydrastine which then deposits is dissolved in alcohol, filtered through charcoal, and crystallized.

Preparation of Berberine.—(Obtained also from *Berberis vulgaris* and allied drugs.) Exhaust powdered root with boiling water, evaporating to soft extract; exhaust this with alcohol; add water. Distil off alcohol; add H_2SO_4 in excess, when berberine sulphate crystallizes in yellow needles.

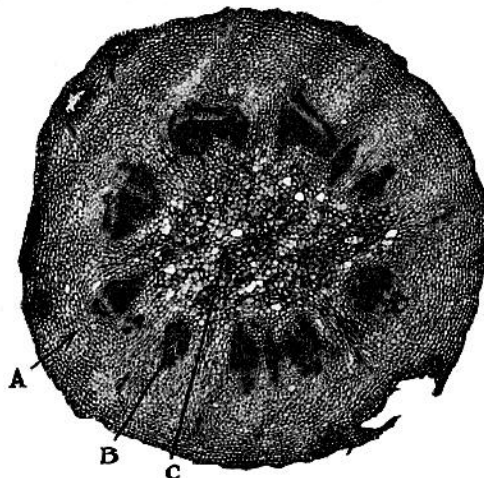


FIG. 73.—Hydrastis—Rhizome, cross-section, (18 diam.) A, Cortex. B, Vascular bundle. C, Medulla. (Photomicrograph.)

ACTION AND USES.—Until the introduction of the white alkaloid hydrastine, the drug was used almost exclusively as a local astringent; but of late years, since the many physiological experiments with this alkaloid, it has been used internally in chronic inflammations of the mucous membrane. Hydrastis is now quite largely employed in the treatment of depraved mucous membranes, as, for example, in chronic rhinitis, the atonic stomach of drunkards, chronic intestinal catarrh, catarrhal jaundice, vaginal leucorrhœa, and the later stages of gonorrhœa. It has been recommended in the treatment of uterine hemorrhages resulting from endometritis, and is said to act well in cases in which Ergot has proved useless.

In dyspepsia it has been used as a stomachic stimulant, and has received praise in the vomiting of pregnancy. Dose: 30 gr. (2 Gm.). Hydrastine is said to have antiperiodic properties and is given in doses Of 1/32 gr. (0.002 Gm.).

OFFICIAL PREPARATIONS.

Extractum Hydrastis Dose: 8 gr. (0.5 Gm.).
Fluidextractum Hydrastis Dose: 5 to 30 drops (0.3 to 2 Mils).
Tinctura Hydrastis (20 per cent.) Dose: 10 to 60 drops (0.6 to 4 mils).
Glyceritum Hydrastis (each mil contains 1 Gm. of drug). Used externally.

135. **ACTÆA ALBA.**—WHITE COHOSH. The rhizome of **Actæ'a alb'a** Bigelow. *Habitat:* Southern and Eastern United States. Often found in the European market mixed with black hellebore; its appearance, however, is more like cimicifuga. Violent purgative, irritant, and emetic.

136. **COPTIS, N.F.**—GOLD THREAD. The herb of **Cop'tis trifol'ia** Salisbury. *Habitat:* Northern and Eastern United States. The drug as found in commerce consists mainly of long, thread-like, yellow rootlets, attached to a slender, terete rhizome, mixed with trifoliolate leaves. Contains *berberine* and a white alkaloid resembling hydrastine. Tonic. Dose: 15 to 60 gr. (1 to 4 Gm.) in decoction.

137. **HELLEBORUS NIGER.**—BLACK HELLEBORE. The rhizome and roots of **Helle'borus ni'ger** Linné. *Habitat:* Central and Southern Europe. Irregular and knotty; externally brown-black; internally grayish, with a thick bark; taste sweetish, bitter, and acrid; odor slight, peculiar. Poisonous; anthelmintic, drastic cathartic, and emmenagogue. Dose: 5 to 20 gr. (0.3 to 1.3 Gm.).

138. **HELLEBORUS VIRIDIS.**—GREEN HELLEBORE. The rhizome and roots of **Helle'borus viri'dis** Linné. This resembles above, but is smaller. Used as a diuretic, cathartic, and emmenagogue. Dose: 5 to 20 gr. (0.3 to 1.3 Gm.). It should not be confounded with veratrum viride (also called green hellebore), a cardiac and nervous sedative.

139. **XANTHORRHIZA.**—YELLOW-ROOT. The rhizome of **Xanthorri'za apiifol'ia** L'Heritier. *Habitat:* Southern and Central United States. About 500 to 1,000 mm. (20 to 40 in.) long, and 10 mm. ($\frac{2}{5}$ in.) thick; externally of a bright yellowish-brown color; internally yellow; inodorous and bitter. Contains berberine, the alkaline base of berberis vulgaris; it is a matter of record that in many, perhaps most, berberine-yielding plants, a colorless alkaloid accompanies berberine, but, according to Lloyd, a second alkaloid does not exist in this drug. Used as a tonic. Dose: $\frac{1}{2}$ to 1 dr. (2 to 4 Gm.).

140. **PULSATILLA, N.F.**—PASQUE FLOWER. The herb of **Anem'one pulsatil'la** and of **Anemone praten'sis** Linné, collected soon after flowering. Off. U.S.P. 1890. The drug never comes into the market in a condition in which the leaf or other parts are readily recognizable, as they are most always broken or compressed. The U.S.P.

1890, directed that the herb should be carefully preserved, and not kept longer than one year. Even the drying of the plant is said to render the drug unreliable. Constituents: A peculiar acrid crystallizable principle exists in the plant known as anemonin ($C_{10}H_8O_4$) an acrid, unstable principle not well understood. Some authorities state that it undergoes decomposition after its solution, under conditions that are not precisely known, into anemonic acid ($C_{10}H_{10}O_5$) and anemoninic acid ($C_{10}H_{18}O_6$), etc.; others state that it is a volatile, fluid, acrid principle, very susceptible of decomposition.

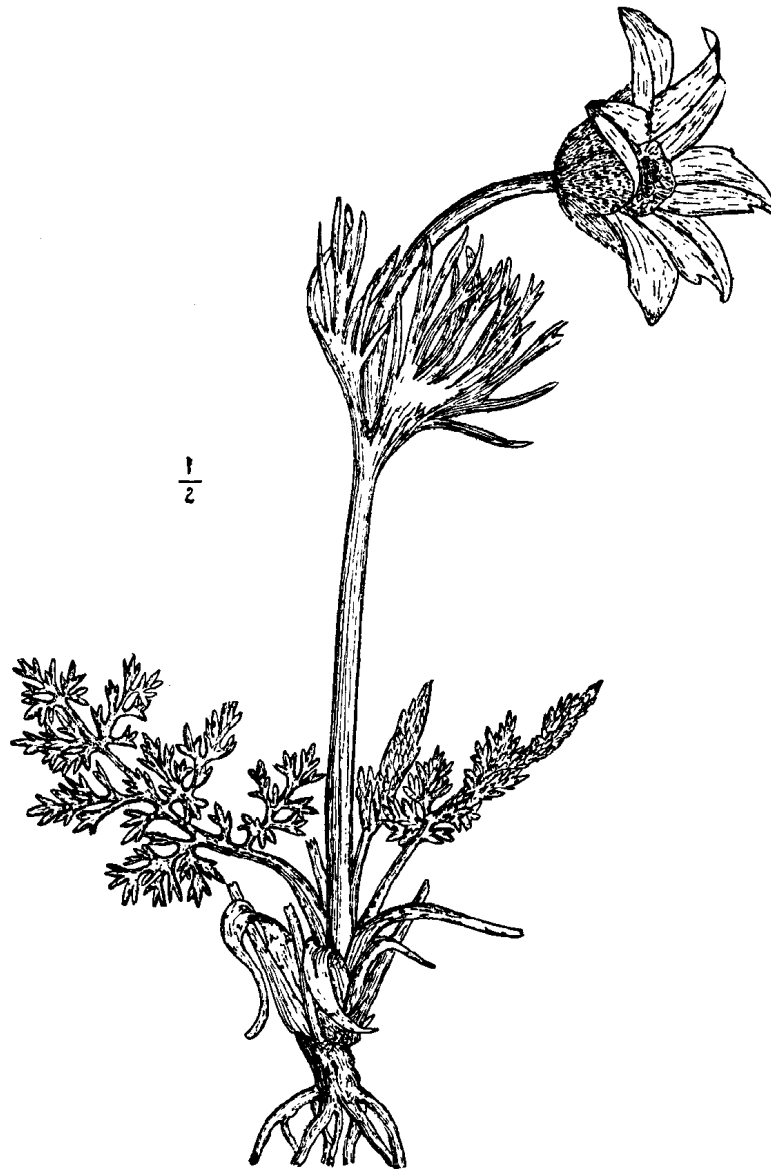


FIG. 74.—*Anemone pratensis*.

Preparation of Anemonin.—If aqueous distillate be treated with chloroform, the latter, on evaporation, yields a residue-anemonin. Dose: $1\frac{1}{2}$ to 3 gr. (0.1 to 0.2 gm.).

Diuretic, diaphoretic, mydriatic, irritant. The action of *pulsatilla* is said to resemble aconite as a cardiac sedative. One author says it is equivalent to *senega* in convulsive coughs and in bronchitis. The recent tincture, in 5-drop doses (made according to the formula of the tincture of recent herbs, U.S.P. 1890, is highly esteemed by some practitioners. The drug is not infrequently classed among the most useful emmenagogues. Dose: 1 to 5 gr. (0.065 to 0.3 Gm.).

141. **ADONIS VERNALIS**, N.F.—FALSE. HELLEBORE. The herb of **Adon'is vernal'is** Linné. This rather obscure drug owes its poisonous quality and medicinal activity to a glucoside, **adonidin**, whose physiological action seems to be almost identical with that of digitalin, except that it is more powerful, and not cumulative. Like digitalis, it is used in heart disease and dropsy, slowing the heart's action, and making it more regular and forcible; it greatly increases urinary secretion. Dose: 2 to 10 gr. (0.12 to 0.6 Gm.), in infusion.

142. **Ranunculus**.—CROWFOOT. BUTTER CUP. The herb of **Ranun'culus bulbo'sus** Linné. *Habitat*: Europe and North America. Base of stem thick; flowers yellow, the ovaries of which form akenes with a short, curved beak; inodorous, with acrid taste. Used externally as an irritant.

143. STAPHISAGRIA.—STAPHISAGRIA

STAVESACRE

The ripe seed of **Delphin'ium staphisag'ria** Linné.

BOTANICAL CHARACTERISTICS.—*Stem* 3 to 4 feet high, erect, more or less colored purple; *leaves* long petiolate, alternate, palmately 5-9-divided, blotched with purple; *flowers* in loose spoke-like racemes, varying from light-blue to purple; irregular; *sepals* 5, petaloid, upper one prolonged into a spur; *petals* 4, small; fruit 3, hairy follicles.

SOURCE.—This herb is a native of Italy, Greece, the Greek Islands, Asia Minor, Mediterranean regions, and Canary Islands. It was introduced into England in 1596.

DESCRIPTION OF DRUG.—About 5 mm. ($\frac{1}{5}$ in.) long, 3 to 4 mm. ($\frac{1}{9}$ to $\frac{1}{6}$ in.) thick; **externally** flattish, tetrahedral, the broadest side convex; testa brownish, with reticulate ridges, rough and deeply pitted; **internally** it contains a whitish, oily albumen, inclosing a small, straight embryo in its sharper end. The outer layer of the testa is made up of thin-walled, narrow cells, which become larger near the edges of the seed and in the superficial wrinkles. They contain a small number of minute starch granules. The interior layer exhibits a single layer of small, densely-packed cells. The albumen is composed of the usual tissue

loaded with granules of albuminoid matter and drops of fatty oil. Nearly inodorous; taste bitter and astringent. Dose 1 gr, (0.06 Gm.).

Powder.—Dark greenish. Characteristic elements: The angular cells of the parenchyma of the endosperm with aleurone and oil globules; very large epidermal cells, brown, thick-walled, with irregular thickenings.

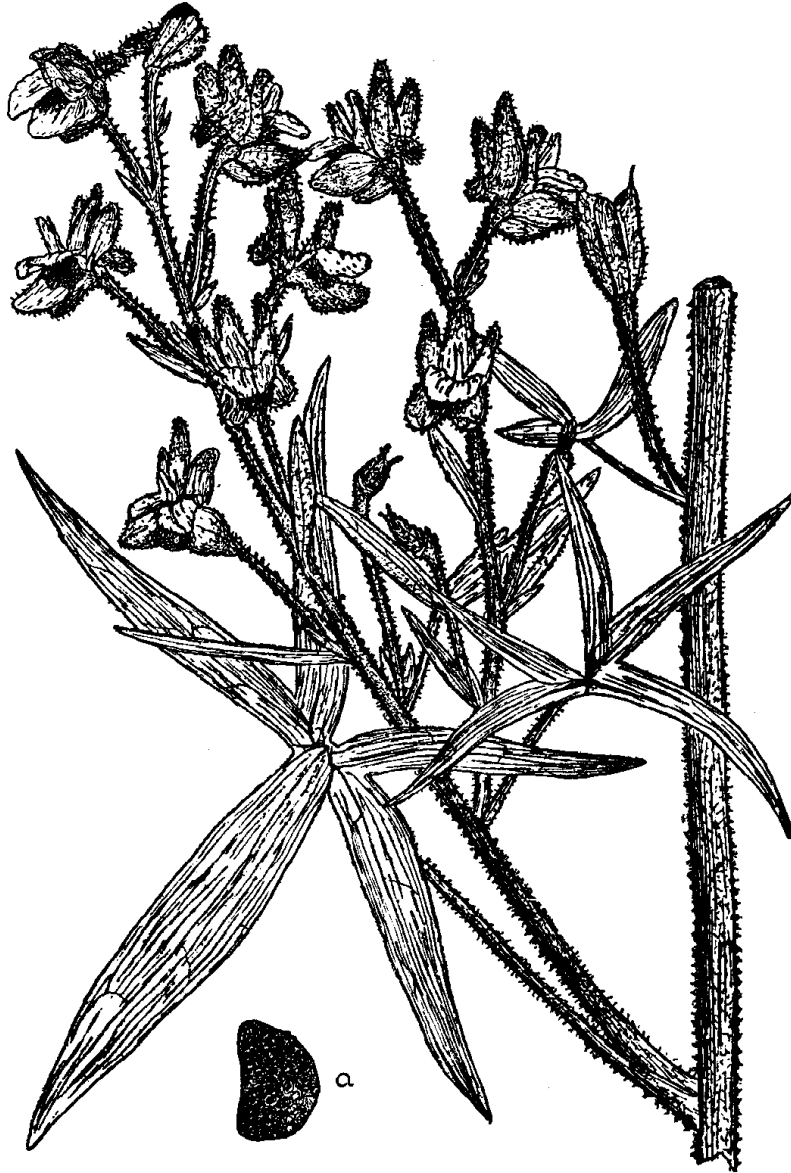


FIG. 75.—*Delphinium staphisagria*—Flowering branch and seed *a*.

CONSTITUENTS.—Resides fixed oil, etc., one of the most prominent constituents is a **poisonous alkaloid, delphinine**, which exists in the form of a malate. This alkaloid, however, is said to be **composed of several distinct principles**. Marquis has separated four distinct alkaloids from the seed.

Preparation of Delphinine.—Treat the decoction with magnesia, exhaust the precipitate with alcohol, and evaporate. The crude alkaloid thus obtained consists of three distinct principles—resin, staphisagrine, and delphinine. Pure delphinine is soluble in alcohol and ether.

ACTION AND USES.—Stavesacre is mostly used as a parasiticide to destroy vermin, especially against *pediculi vestimentorum*—inhabiting the garments next to the skin. A tincture in cologne spirit has been used in some districts as a substitute for tincture of *coccus indicus*, applied to the scalp as an antiparasitic. Internally, the action resembles aconite in its effects upon the heart and respiration. Dose: 1 to 2 gr. (0.065 to 0.130 Gm.). Poisonous doses are rapidly diffused, and antidotal measures should be rapidly applied. (Fluidextractum *staphisagriæ*, used externally as a parasiticide.)

144. **DELPHINIUM**, N.P.—LARKSPUR SEED. The seed of **Delphinium consolida** Linné. *Habitat*: Central Europe; cultivated and naturalized in some parts of the United States. A flattish, tetrahedral seed, 1 to 1.5 mm. ($\frac{1}{25}$ — $\frac{1}{16}$ in.) broad; edges sharp, testa black and roughly pitted; internally, it consists of whitish, oily albumen, inclosing a small, straight embryo; inodorous; taste bitter and acrid; contains delphinine. Used as a diuretic, cathartic, and emetic; poisonous. Dose: $\frac{1}{2}$ to 3 gr. (0.03 to 0.2 Gm.).

145. **NIGELLA**.—NIGELLA. The seeds of **Nigella damasce'na** Linné. *Habitat*: Levant; cultivated. Triangular-ovate, about 2.5 mm. ($\frac{1}{10}$ in.) long; testa brittle, dull-black; embryo straight and small, with pointed ends. It has a strawberry-like odor, and bitter taste. Used as an emmenagogue and diuretic.

146. ACONITUM.—ACONITE

MONKSHOOD

The dried tuberous root of **Aconi'tum napel'lus** Linné. Yielding, by official assay, not less than 0.5 per cent. of ether soluble alkaloids, also assayed biologically.

The minimum lethal dose of fluidextract should not be greater than 0.00004 mil for each gramme of body weight of guinea-pig.

BOTANICAL CHARACTERISTICS.—Stem 3 to 4 feet high, smooth and erect; *leaves* nearly sessile, alternate, palmately 5-divided; *root-leaves* long-petioled; *flowers* deep violet, irregular, very showy, in racemes; *sepals* 5, petaloid, the upper one hooded or helmet-shaped; *petals* 2, concealed.



FIG. 76.—*Aconitum Napellus*—Flowering branch and tuber.

SOURCE AND VARIETIES.—This genus of poisonous herbs, including a number of species, is found throughout cold, mountainous districts of Europe, in the Himalayas, and in Northwestern North America. It is one of the oldest and commonest plants of the English garden, and is often found in dangerous proximity to horseradish (Royle). Hindu writers mention no less than eighteen different kinds of “bish”—the vernacular for aconite. Ten of these are said to be unfit for medicinal use on account of their extremely poisonous nature. The root (tuber) of *A. napellus* is the source of the medicinal preparations of this drug. Nepaul aconite is the source of the extremely active alkaloid, *pseudaconitine* (see below).

A. fischeri produces Japanese aconite root. It yields japaconitine, stated to be identical with aconitine.

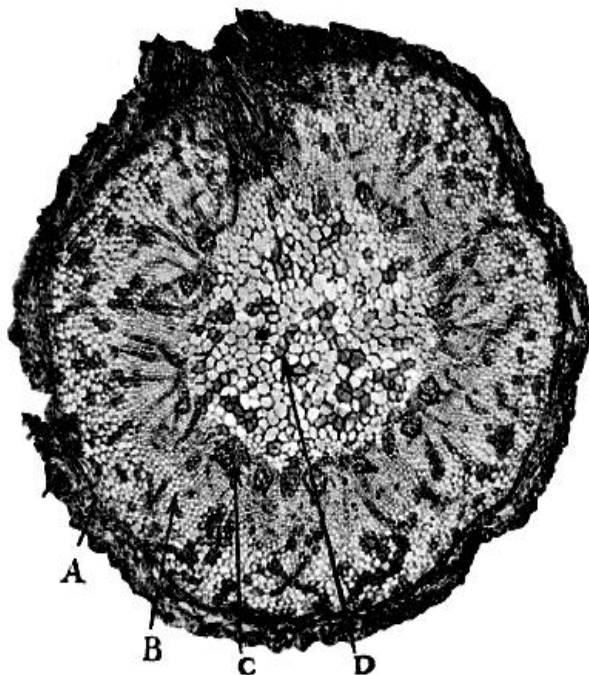


FIG. 77.—Aconite tuber—Cross-section. (14 diam.) A, Cork. B, Parenchyma of cortex. C, Vascular bundle. D, Medulla. (Photomicrograph.)

DESCRIPTION OF DRUG.—Almost napiform, abruptly tapering, from 40 to 100 mm. long, about the thickness of a finger at the top, which is tuberculated; **externally** dark-brown, wrinkled longitudinally at lower portion, stem scars visible, rootlets usually detached; **fracture short**, horny or starchy, exhibiting sometimes a spongy or resinous, white, grayish, or brownish tissue; taste at first sweetish, then acrid and tingling, followed by numbness. This peculiar **tingling sensation of the tongue** is one of the most prominent characteristics upon which the toxicologist depends for the recognition of this drug and its preparations. At the upper portion of the root there often projects a lateral branch connecting a second tuber, which is an offspring of the other. A **cross-section** of the tuber shows a thick bark and a **pith often in the form of a star**, the two being separated by a nucleus sheath; the cambium, following the outline of the pith, is also 5- to 7-angled, and at the terminal and basal extremities of each ray are found small groups of vascular bundles; these, however, are inclined to follow the whole cambium line.

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

ADULTERANTS.—With allied aconite roots, defective roots, and horseradish. The root of European masterwort resembles aconite root, but it is aromatic and pungent.

CONSTITUENTS.—The principal constituent is aconitine, $C_{34}H_{47}NO_{11}$ (0.5 per cent.), forming about one-third the total alkaloid of the root. This is white, usually amorphous, but with difficulty may be obtained in rhombic, tabular crystals; almost insoluble in cold water, soluble in alcohol, ether, and diluted acids. Other related principles exist in the drug **combined with aconitic acid** ($H_3C_6H_3O_6$), but our knowledge of them is not satisfactory. The crystallized alkaloid melts at 189° to $190^{\circ}C.$, and yields acetic acid at slightly higher temperature.

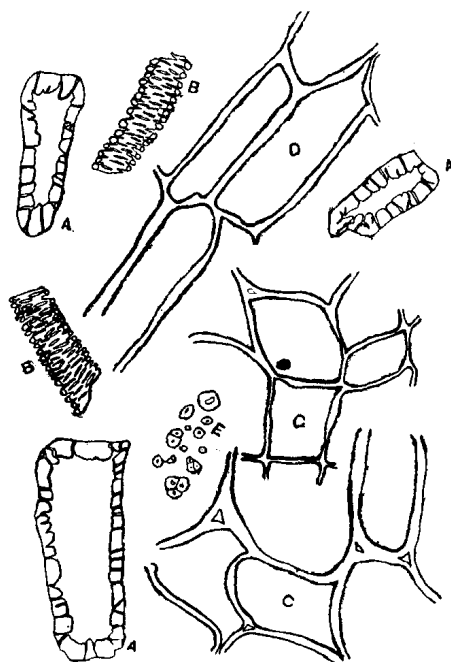


FIG. 78.—Powdered Aconite Tuber. (100 diam.) A, Stone cells. B, Fragments of water tubes. C, Parenchyma, cross-section. D, Parenchyma, longitudinal section. E, Starch.

Pseudaconitine, $C_{36}H_{49}NO_{12}$, from *Aconitum ferox*, is highly poisonous. Atisine, $C_{22}H_{31}NO_2$ (from *Aconitum heterophyllum*), does not present any close analogy to the alkaloids of the other and well-known species of aconite (*A. napellus*, *A. ferox*, and *A. japonicum*). In small doses it is said to be non-toxic, but its action, according to some reports, resembles that of aconite.

Commercial aconitine contains some of the allied principles, which are

separated from the alkaloid with difficulty. Ash, not exceeding 6 per cent.

Preparation of Aconitine.—After extracting oil and resin by a suitable solvent, an alcoholic extract is made which is treated with hot water. The aqueous solution is precipitated by adding NH_4OH in excess. This precipitate is exhausted with ether-etheral solution distilled to dryness. Purify residue by dissolving in acidulated (H_2SO_4) water, again precipitating with NH_4OH , etc. This process yields a commercial product which is not free from pseudoaconitine.

ACTION AND USES.—Antipyretic to a certain extent by reducing circulation; depressant of the sensory nerve-ends, the heart, the respiration, and spinal system. It relaxes the inhibitory apparatus of the heart, and paralyzes the cardiac muscle and its contained ganglia, the respiratory centers, and the spinal cord in all its functions—sensory, reflex, and motor—but does not affect the cerebrum. Murrell has called attention to the fact that the English alkaloid is seventeen times stronger than the German, while the French is variable, but generally between these; the crystalline variety (Duquesnel's or Merck's aconitine) is therefore to be preferred on account of its uniform strength. The dose of the commercial aconitine is $\frac{1}{64}$ gr.; the crystallized alkaloid, however, is given in doses of only from $\frac{1}{300}$ to $\frac{1}{250}$ gr.

Dose of drug: 1 gr. (0.06 Gm.).

OFFICIAL PREPARATIONS.

Fluidextractum Aconiti,	Dose: $\frac{1}{4}$ to 2 drops (0.015 to 0.12 mil).
Extractum Aconiti	Dose: $\frac{1}{6}$ to $\frac{1}{3}$ gr. (0.010 to 0.02 Gm.).
Tinctura Aconiti (10 per cent.)	Dose: $\frac{1}{2}$ to 4 drops (0.03 to 0.25 mil).

147. **HEPATICA.**—LIVERWORT. The leaves of **Anem'one hepa'tica** Linné. *Habitat:* North America and Europe. Heart-shaped, about 50 mm. (2 in.) long, slightly leathery; inodorous; astringent and bitter. The more correct synonym for this plant is liverleaf, as the term liverwort is applied to a family of cryptogamic, moss-like plants—*Hepaticæ*. Used as a demulcent and tonic. Dose: $\frac{1}{2}$ to 2 dr. (2 to 8 Gm.) in decoction.

148. **PÆONIA.**—PEONY. The root of **Pæonia officinalis** Linné. Seldom used, although at one time a popular remedy in epilepsy, diarrhea, and as an emmenagogue. Occasionally used in chorea, whooping-cough, etc. Dose: 15 to 60 gr. (1 to 4 Gm.), in infusion.

MAGNOLIACEÆ.—Magnolia Family

Trees and shrubs, mostly of subtropical regions. *Leaves* coriaceous; alternate, simple, usually pellucid-punctate, entire, or rarely dentate; *flowers* axillary or terminal, usually solitary, perfect, or, in a few genera, unisexual; *sepals*, *petals*, *stamens*, and *pistils* numerous and hypogynous. *Fruit* various, cone-like, or forming a stellate group of whorl (illicium), or capsular with ventral or dorsal dehiscence.

Synopsis of Drugs from the Magnoliaceæ

A. *Fruit.*

Illicium, 149.

B. *Barks.*

Magnolia, 150.

Wintera, 151.

Liriodendron, 152.



FIG. 79.—*Illicium verum*—Flowering branch and fruit.

149. **Illicium**.—STAR ANISE. The dry fruit of **Illicium ve'rum** Hooker filius. Off. U.S.P. 1890. The fruit is pedunculate, and consists of light, **stellately arranged**, one-seeded carpels, which are **boat-shaped** and **united around a short central column** rising from an oblique pedicle. Each carpel is 12 or 15 mm. ($\frac{1}{2}$ to $\frac{3}{5}$ in.) long, woody, wrinkled, with a straight beak; rusty-brown in color, and split at the ventral suture, exposing the flattish, bright, glossy-brown, oval seed; odor intermediate between fennel and anise; taste (residing in the carpel,) aromatic and sweet; **seed not aromatic**, but oily. Adulterated with *Illicium religiosum* Siebold (found growing around Buddhist temples in southwest China, whence its name), a poisonous plant cultivated in China and Japan, which resembles it in appearance., but is more woody, has a curved beak, a clove-like odor, and a disagreeable taste. *Constituents*: A volatile oil resembling the oil of pimpinella anise. The former oil is solidified at 35°C., and the latter between 50° and 60°C., almost entirely composed of anethol (C₁₀H₁₂O), with small amounts of terpenes, safrol, anisic acid, etc.

It has stimulant, anodyne, diuretic, and carminative properties which reside exclusively in the volatile oil. Dose: 5 to 30 gr. (0.3 to 2 Gm.).

150. **MAGNOLIA**.—MAGNOLIA. The bark of **Magnolia glau'ca** Linné. *Habitat*: Middle and Southern United States. A thin-quilled bark of a gray color, or sometimes light brown, fissured, and covered with numerous scattered warts; the inner surface smooth and of a light brown color; fracture short, toward the inner portion somewhat fibrous; nearly inodorous, with a bitter, spicy, and pungent taste. It contains a volatile oil, resin, tannin, coloring matters, gum, and a crystalline glucoside, **magnolins**. Used as a diaphoretic, tonic, and febrifuge. Dose: 10 to 80 gr. (2 to 4 Gm.) in decoction.

151. **WINTERA**.—WINTER'S BARK. From **Drimys winte'ri** Forster, a South American tree. It has an aroma similar to that of canella and cinnamon, for which drugs. it has been substituted, and is known in some places as Winter's Cinnamon. The bark of *Drimys granatensis* from New Granada is said to have been offered as Coto bark. It also has an astringent, pungent, as well as aromatic taste. Dose: 15 to 30 gr. (1 to 2 Gm.).



FIG. 80.—Flowering branch of *Liriodendron tulipifera*.

152. **LIRIODENDRON**.—TULIP-TREE BARK. From **Liriodendron tulipi'fera** Linné. *Habitat*: United States westward to Kansas. In quills and curved pieces obtained from the branches. These quills and pieces are about 2 mm. ($\frac{1}{12}$ in.) thick; outer surface purplish-brown, with thin ridges forming elongated meshes; nearly

inodorous; taste pungent and bitter. Tonic, febrifuge and vermifuge. Dose: 1 to 2 dr. (4 to 8 Gm.) in infusion or fluid extract.

Preparation of Liriodendrin.—Concentrate the alcoholic tincture; add water until a permanent turbidity commences to appear. Set aside to evaporate spontaneously. It forms, when purified, white needles or small scales. Insoluble in water, soluble in ether and alcohol.

CALYCANTHACEÆ.—Calycanthus Family

153. CALYCANTHUS.—FLORIDA ALLSPICE. The bark of **Calycan'thus flor'idus**. An aromatic stimulant, used in diarrhea mixtures. Dose: 10 to 30 gr. (0.6 to 2 Gm.).

MYRISTICACEÆ

- | | |
|-------------------------|-----------------------------------|
| A. <i>Seed.</i> | C. <i>Fixed Oil.</i> |
| MYRISTICA, 154. | Oleum Myristicæ Expressum, 154 b. |
| B. <i>Volatile Oil.</i> | D. <i>Arillode.</i> |
| OLEUM MYRISTICÆ, 154 a. | *Macis, 155. |

154. MYRISTICA.—NUTMEG

NUTMEG

The kernel of the ripe seed of **Myris'tica frag'rans** Houttuyn.

BOTANICAL CHARACTERISTICS.—*Tree* about 30 feet high. *Leaves* oblong-oval, entire, glossy above, whitish beneath, aromatic. *Flowers* dioecious; *male flowers* in axillary clusters; *female flowers* single, solitary, and axillary, both very small and of a pale yellow color.

HABITAT.—Molucca Islands; cultivated in adjacent East India islands, and especially in the Dutch Banda Islands, whence most of the nutmegs are imported for market.

DESCRIPTION OF DRUG.—A roundish or oval kernel about 25 mm. (1 in.) long; externally light grayish-brown, marked with worm-shaped furrows and covered with lime (done by the Dutch growers to kill the germ, thinking in this way to monopolize its cultivation). They are hard and not readily pulverizable, but can easily be cut or grated, showing a **waxy luster; internally** yellowish, a **cross-section having a mottled appearance**, due to the penetration to the albumen of the inner seed-coat in narrow brown strips; these strips contain oily material; hilum and micropyle on the broad end, chalaza near the upper

end, united by a groove corresponding to the raphé; the embryo is small, in a cavity at the base; **odor** strongly aromatic; **taste** warm and aromatic.



FIG. 81.—*Myristica fragrans*—Branch and fruit.

The male, wild, or long nutmeg, as it is variously termed, is occasionally found in market- it is much longer than the official nutmeg, elliptical, destitute of the dark brown inner veins, and of a bitter and disagreeable taste. Penang and Singapore nutmegs are unlimed.

Californianutmeg, so called, is the seed of *Torreya Californica* (nat. ord. Coniferae); testa smooth, brownish, internally marbled, resembling nutmeg, but has a terebinthinate odor and taste.

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

CONSTITUENTS.—The greater portion of nutmeg (25 to 30 per cent.) consists of a **fixed oil**; this is official in the British Pharmacopoeia and is called oil of mace or mace butter; it contains chiefly myristin, with some myristic acid, olein, palmitin, resin, and volatile oil (see 154 b). The aromatic properties of nutmeg depend upon 2 to 8 per cent. of **volatile oil**. Ash, not exceeding 5 per cent.

ACTION AND USES.—Aromatic stimulant and stomachic. Used as a corrective and as a condiment. In large doses it possesses narcotic properties. Dose: 8 to 30 gr. (0.5 to 2 Gm.).

OFFICIAL PREPARATIONS.

154a. **Oleum Myristicæ**, U.S.—OIL OF NUTMEG. A thin, colorless or pale straw-colored volatile oil, lighter than water, and having the characteristic properties of nutmeg; on standing for a considerable length of time it becomes darker and thicker, and deposits a crystalline fatty glyceride of myristic acid. It contains a hydrocarbon, pinene, myristicin, and an oxygenated compound, myristicol, isomeric with carvol. Action and uses same as nutmeg, but rarely used. Dose: 1 to 3 drops (0.065 to 0.2 mil).

154b. **OLEUM MYRISTICÆ EXPRESSUM.**—EXPRESSED OIL OF NUTMEG. MACE BUTTER (see Myristica Constituents). Unctuous blocks, marbled whitish and brown. Mostly used externally.

155. **Macis**, N.F. (U.S. 1890).—The thick membrane or “arillode” immediately investing the kernel of the nutmeg. It comes in narrow bands, irregularly slit above into somewhat branched and lobed divisions, united at the base in an unbroken band; reddish or orange-yellow in color, with a fatty feeling when scratched or pressed; peculiar aromatic odor and taste. It contains volatile oil (about 8 per cent.), a red fixed oil, gum, resin, sugar, and proteids, but no starch. Aromatic stimulant and tonic; mostly used as a flavoring agent. Dose: 5 to 20 gr. (0.3 to 1.3 Gm.).

MENISPERMACEÆ.-Moonseed Family

Woody climbers, mostly tropical, with peltate or palmate alternate exstipulate *leaves*, and small dioecious, greenish, or whitish *flowers* in axillary panicles. *Sepals* and *petals* alike, in three rows—the petals sometimes wanting. The *stamens* equal or exceed the petals in number. *Pistils* 2 to 6, with nearly straight ovaries, which, however, are incurved in fruiting, so that the seed is either a crescent or a ring.

Synopsis of Drugs from the Menispermaceæ

- | | | |
|---|--------------------|------------------|
| A. <i>Roots.</i> | B. <i>Rhizome.</i> | C. <i>Fruit.</i> |
| CALUMBA , 156.
*Pareira, 157. | Menispermum, 158. | *Cocculus, 159. |

156. CALUMBA.—CALUMBA

COLUMBO

The root of **Jateorrhiza palma'ta** Lamarck, sliced transversely and dried.

BOTANICAL CHARACTERISTICS.—Underground stem a short, irregular rhizome, from which start numerous fleshy fusiform roots 1 to 4 inches in diameter. Leaves palmate, on long petioles. According to Bentley and Trimen, the blade of the leaf often reaches 14 inches in length. Flowers dioecious, sepals 6, petals 6, stamens 6; anther 2-celled; fruit about the size of a hazelnut, densely clothed with long, spreading hairs, each tipped with a black, oblong gland.

HABITAT.—East Africa and Madagascar, cultivated in the East Indies.

DESCRIPTION OF DRUG.—**In transverse sections**, circular or oval in outline, 25 to 50 mm. (1 to 2 in.) in diameter; 3 to 12 mm. ($\frac{1}{8}$ to $\frac{1}{2}$ in.) thick. The outer edge is covered with a brown wrinkled layer of cork. The bark is about 9 mm. ($\frac{3}{8}$ in.) thick; a dark, shaded cambium line separates this bark from the **spongy grayish-yellow central portion**. In drying the central portion contracts more than the outer, hence the disks are depressed at this point, where also are found a few interrupted circles of projecting wood-bundles, while the outer portion near the cambium is distinctly radiate. **A microscopic section** shows near the center very **distinct bright yellow wood-bundles**, which are **narrow and radiate near the bark**. The parenchyma is filled with large, oval or circular starch granules.

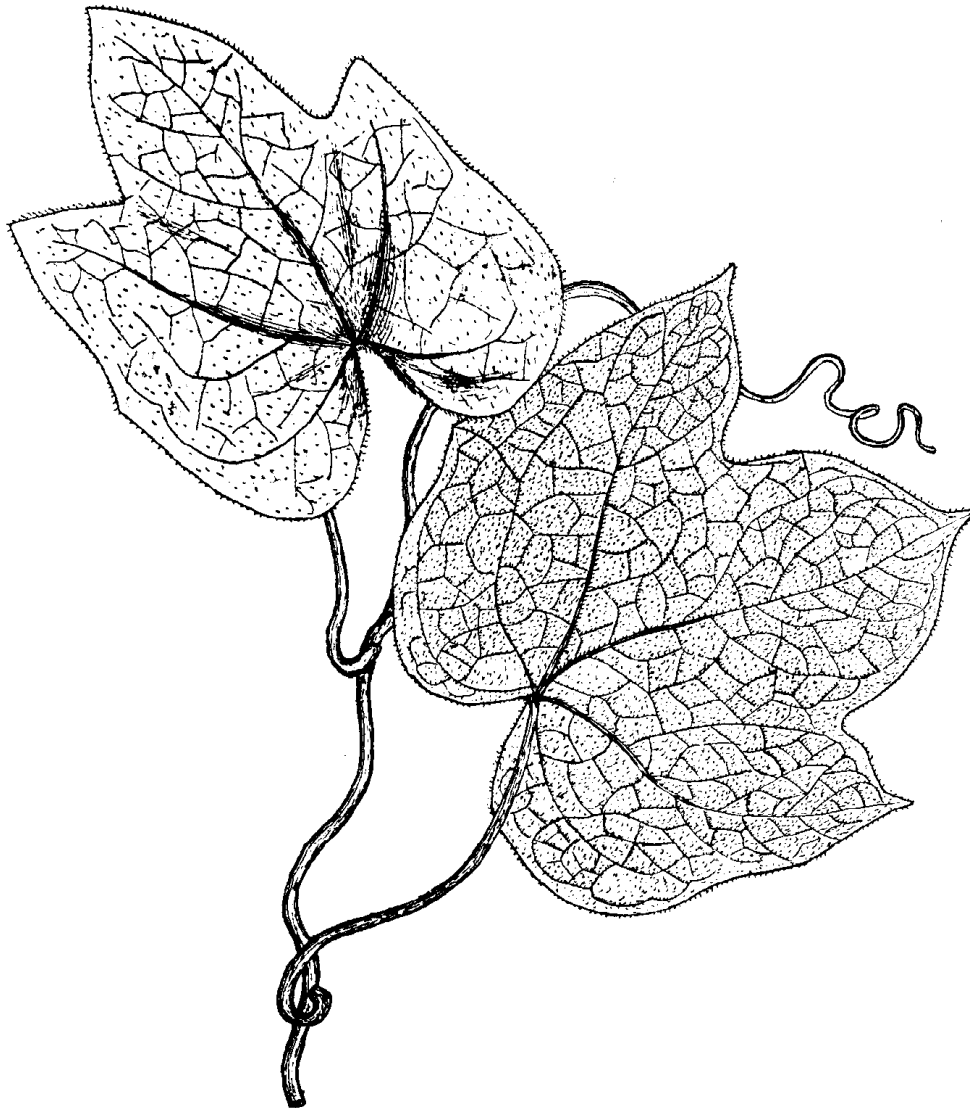


FIG. 82.—*Jateorrhiza palmata*—Portion of vine.

Odor faint; taste slightly aromatic, very bitter, and mucilaginous. Dose: 30 gr. (2 Gm.).

SUBSTITUTION.—American calumba has frequently been used. It is almost uniformly much smaller, the color is not yellow, it contains no starch and is not mucilaginous. The decoction gives brown precipitate with ferric chloride.

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

CONSTITUENTS.—A neutral crystalline principle, **calumbin**, extremely bitter, **berberine**, **calumbic acid**, and starch, of which it

contains 33 per cent. **No tannin is present**; it can therefore be compounded with salts of iron. The best solvent for the bitter principle is dilute acetic acid. This liquid, however, is not a good menstruum. Ash, 8 per cent.

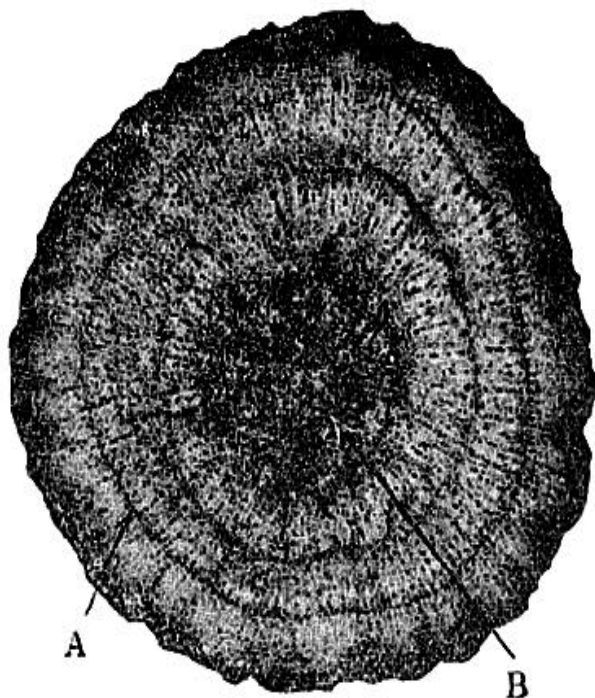


FIG. 83.—Columbo—Cross-section of root. (1.5 diam.) A, Annual ring of growth. B, Medulla.
(Photograph.)

Preparation of Calumbin.—Infusion of columbo, made with 3 per cent. of oxalic acid, is neutralized with ammonia. Evaporate to one-third, and when cool, shake out with ether. On evaporation of ethereal solution, white calumbin is obtained.

ACTION AND USES.—A simple tonic, stimulating the appetite through the gustatory nerves, increasing in turn the gastric and salivary secretions. Its special value as a tonic resides in the fact that it has no disagreeable effects, such as nausea, headache, or febrile disorder, like other remedies of its class. Externally, antiseptic, disinfectant, and anthelmintic.

OFFICIAL PREPARATION.

Tinctura Calumbæ (20 per cent.),. Dose: 1 to 4 fluid drams (4 to 15 mls)

157. PAREIRA, N.F.—PAREIRA

PAREIRA BRAVA

The dry root of **Chondoden'drontomento'sum** Ruiz et. Pavon. With not more than 5 per cent. of stem bases.

BOTANICAL CHARACTERISTICS.—A vine with twining stem 4 inches in diameter; *leaves* large, cordate, long-petioled, with entire margins; *flowers* dioecious; *fruit* purplish, ovoid, 1-seeded, drupaceous, forming thick clusters resembling bunches of grapes.

HABITAT.—Brazil.

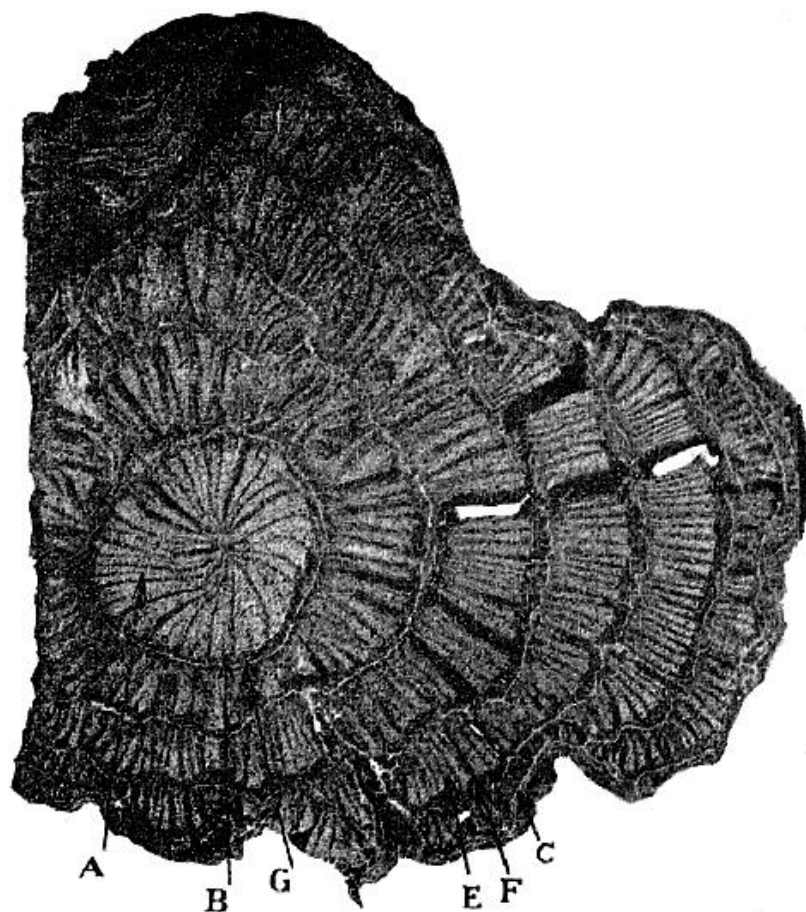


FIG. 84.—Pareira—Cross-section of root. (1.5 diam.) A, B, E, Xylem. B, Phloem. C, G Rings of stone cells. (Photograph.)

DESCRIPTION OF DRUG.—A long, branching, woody root, found in commerce in tortuous, subcylindrical pieces, about 100 to 150 mm. (4 to 6 in.) long, and from 20 to 100 mm. ($\frac{4}{5}$ to 4 in.) thick. **Externally** it varies from brown to light grayish-brown in color, and is marked with fissures, transverse ridges, and longitudinal wrinkles. When cut or sliced it displays a dark brown interior, leaving under the knife a waxy luster. **A**

cross-section displays a thin bark; within this bark circle there are two or more circles (zones) of radiating wood-wedges. About 12 of these wood-wedges are found in the central zone radiating from a common center. The outer **circles (zones) of wood-wedges are separated from one another by a narrow line of parenchyma**, stone cells, and compressed cells, and the short, circular, radiating **wedges of wood are separated from one another by medullary tissue**, making a combination of concentric and radiate arrangement which is quite characteristic. Sometimes sections of the stem are found in the drug; these have a rather thick bark and a narrow pith. Taste at first mild, then bitter and somewhat acid; odorless.

Powder.—Brownish-yellow. Characteristic elements: Starch, ellipsoidal, simple or 2 to 4 compound (7 to 15 μ in diam.); sclerenchyma consisting of long bast fibers and numerous isodiametric or elongated stone cells 20 to 50 μ across; wood fibers, simple or bordered pits; cork, dark brown cells (20 to 25 μ in diam.); calcium oxalate, in rosettes, few.

CONSTITUENTS.—Pelosine (cissampeline), amorphous, insoluble in hot or cold water, soluble in alcohol and chloroform; starch, gum, tannin; taste sweetish-bitter.

Preparation of Pelosine (also known as Cissampeline).—Boil root in acidulated H_2SO_4 water, precipitate with K_2CO_3 , purify by redissolving in acidulated water, decolorize with charcoal, again precipitate with K_2CO_3 and purify from solution in ether.

ACTION AND USES.—As a remedial agent pareira is generally conceded to be beneficial as a diuretic and tonic in the treatment of cystitis and Suppurative kidney diseases, acting in a soothing manner, especially on the bladder. Formerly renowned as a lithontriptic. Dose: 30 to 60 gr, (2 to 4 Gm.). **Fluidextractum Pareiræ**, U.S.P. 1900 Dose: $\frac{1}{2}$ to 2 fluidrams (2 to 8 mils).

158. **MENISPERMUM**—YELLOW PARILLA.—The dry rhizome and roots of **Menisper'mum canadense** Linné. Rhizome about 1,000 mm. (40 in.) or more long, and 6 mm. ($\frac{1}{4}$ in.) thick; **externally** dark yellowish-brown, knotty, and longitudinally wrinkled; fracture woody and tough; nearly inodorous; taste bitter. Rootlets thin, brittle, yellow. A **cross-section** of the rhizome displays a thick bark and a yellowish interior. Under the microscope are seen **numerous wood-wedges separated by narrow medullary rays**; at the extremity of each wood-ray there appears a semilunar bundle, which on longitudinal section proves to be composed of bast fibers penetrating the bark. The diameter of the pith varies, not infrequently occupying one-third of the space between the bark. The overground stem, with which the drug is not infrequently mixed, has a very large, porous pith. *Constituents*: **Berberine** (yellow) in small amount, and menispine (white), the principal constituents, with resin, tannin, and starch. Alterative, tonic, diuretic, and laxative; said to resemble sarsaparilla in its action. The root was introduced into the market as Texas sarsaparilla. Dose: 5 to 30 gr. (0.3 to 2 Gm.).

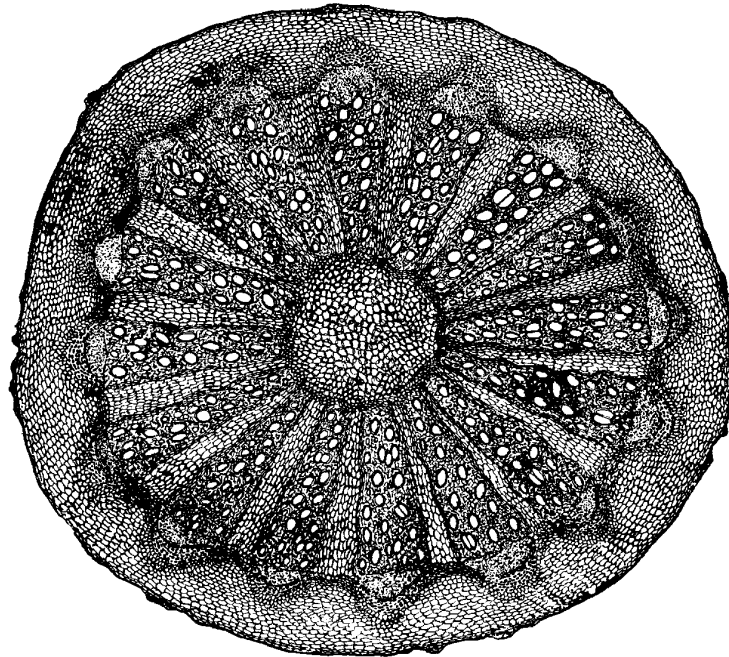


FIG. 85.—Cross-section of Menispermum—Magnified 14 diam.

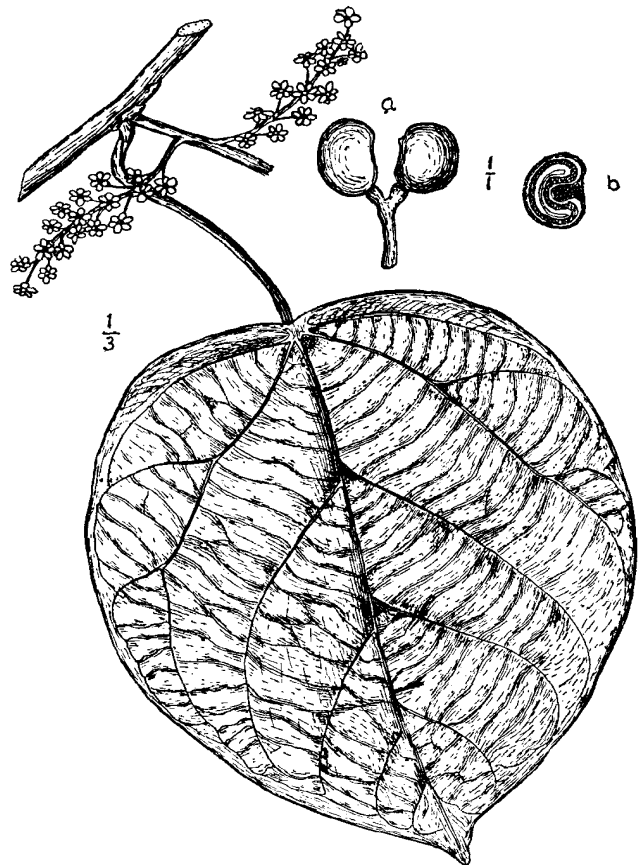


FIG. 86.—*Anamirta cocculus*—Flowering branch. *a*, Fruit. *b*, Section of same.

159. **COCCULUS**.—FISH BERRIES. **Coc'culus In'dicus**. N.F. The fruit of **Anamirta cocculus** Wight and Arnott. Obtained from a climbing shrub in Eastern India, native of Malabar coast. The berries are ovoid, **kidney-shaped**, and about the **size of a large pea**, with an obscure ridge around the convex back. Externally wrinkled and blackish-brown in color. **The endocarp** is white, and extends from the concave side deeply into the interior.

The **seed is semilunar**, oily, very bitter, but the pericarp is tasteless. The chief constituent is **picrotoxin**.

Preparation of Picrotoxin.—To aqueous extract add MgO; treat this with hot alcohol. Evaporate and collect the deposited picrotoxin.

Locally employed in cutaneous affections. The decoction (or tincture added to water, 1 to 4) is used as an insecticide in head lice. **Picrotoxin is an acrid narcotic poison**; in its action on the secretions it is said to resemble pilocarpine. The berries have been used from ancient times for stupefying and capturing fish, but “this unsportsmanlike method of fishing in some parts of the country is now illegal.”

Cocculus indicus has been sometimes confounded with the fruit of the *Laurus nobilis*, commonly known as bayberry. The latter is, however, generally larger, distinctly oval in form, and the seeds lie loose within and fill the cavity of the fruit. The seed of the bayberry has an agreeable aromatic taste.

BERBERIDACEÆ.-Barberry Family

Herbs, shrubs, or trees with watery juice. A peculiarity of the **leaves** in the principal genus of the order suggests the name barberry; these are usually **beset with spiny teeth**, occasionally **reduced to simple or branching spines** (barbs). **Inflorescence** various; solitary (Podophyllum), in racemes (Berberis), panicles, cymes, or spikes. **Flowers** greenish (Caulophyllum) or white with outer greenish bractlets (Podophyllum); **fruit** a berry or capsule (sometimes edible—May apple).

Synopsis of Drugs from the Berberidaceæ

A. <i>Rhizomes.</i>	B. <i>Roots.</i>	C. <i>Bark.</i>
*Caulophyllum, 160.	Berberis Radix, 163.	Berberis cortex,
PODOPHYLLUM , 161.	*Berberis, 165.	164.
Jeffersonia, 162.		

160. **CAULOPHYLLUM**.—SQUAW ROOT. BLUE COHOSH. N.F. The rhizome and roots of **Caulophyl'lumthalictroi'des** Linné. Off. in U.S.P. 1890. Rhizome crooked, of horizontal growth, about 1 00 mm. (4 in.) long, and 6 to 8 mm. (1/4 to 1/3 in.) thick; **on the upper side are broad cup-shaped scars** and short bent branches having concave terminations; it is beset with numerous tough and **wiry light-brown rootlets matted together**. Externally of a dull brown color, internally whitish, **with**

numerous narrow wood-wedges, sometimes **in two circles**, inclosing a large pith. The rootlets have a much thicker bark and a thick central woody cord. Nearly inodorous; taste slightly sweetish and somewhat acrid. (Highly magnified starch grains of caulophyllum, see Fig. 87.) *Constituents*: CAULOPHYLLINE. Resins, 12 per cent., tannin, starch, gum, etc. **Caulophylline** is colorless, odorless, and almost tasteless, is not precipitated by alkalis, and crystallizes with difficulty; many of its characteristics make it appear as a proximate principle belonging to a new class of bodies about which little is known.

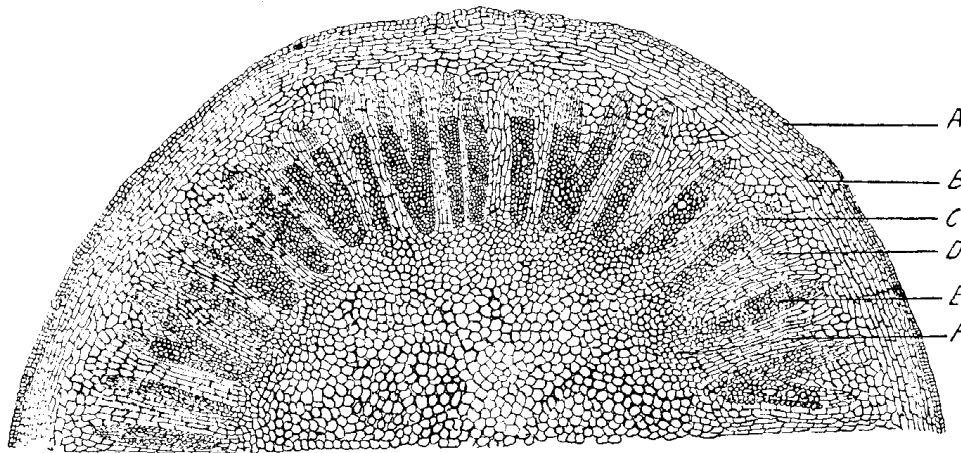


FIG. 87.—*Caulophyllum*—Cross-section of rhizome. A. Epidermis. B. Parenchymatous tissue. C. Phloem portion of bundle. D, F. Medullary rays. E. Xylem portion of bundle.

Preparation of Caulophyllin.—Concentrate alcoholic tincture and add this to a large volume of water. Collect precipitate and dry in current of warm air.

Caulophylline.—Extract drug with 60 per cent. alcohol. Evaporate tincture to a semi-solid. Add ferric hydrate and sodium bicarbonate to this residue and extract the mixture with chloroform. The principle remains on the evaporation of the solvent. Emmenagogue, diuretic, and antispasmodic; it has some reputation in the treatment of rheumatism and as an expectorant in bronchitis. Dose: 5 to 30 gr. (0.3 to 2 Gm.).

161. PODOPHYLLUM.—PODOPHYLLUM

MAYAPPLE. MANDRAKE

The dried rhizome and roots of **Podophyl'um pelta'tum** Linné. Yielding not less than 3 per cent. of resin U.S.P. IX.

BOTANICAL CHARACTERISTICS.—Leaf 7-9-lobed; peltate. Flowering stem bearing two one-sided leaves with the stalk thickest near their inner edge. Flower large, white, nodding. Fruit ovoid, slightly acid, edible.

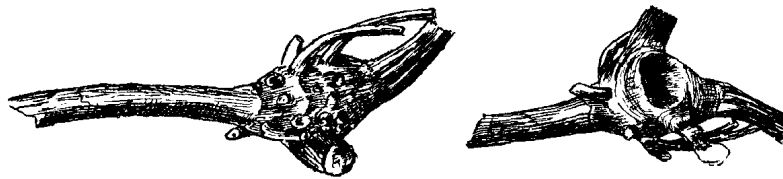


FIG. 88.—*Podophyllum peltatum*—Plant and rhizome.

DESCRIPTION OF DRUG.—Rhizome 300 mm- (12 in.) or more long and 5 mm- (1/5 in.) thick, jointed, consisting of nodes and internodes, the length of the internodes being about 50 mm. (2 in.). The rhizome **is very much thickened at the nodes, where it is sometimes branched laterally, each node having a circular scar on the upper side** and about six to ten small brittle rootlets below or scars from broken rootlets; externally smooth, slightly wrinkled longitudinally, of an orange-brown color; fracture short, white and starchy, showing a rather thick bark, and from **sixteen to thirty vascular bundles encircling a broad pith**; the parenchyma contains chiefly starch. Odor faint and characteristic; taste sweetish, slightly acrid, and quite bitter.

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

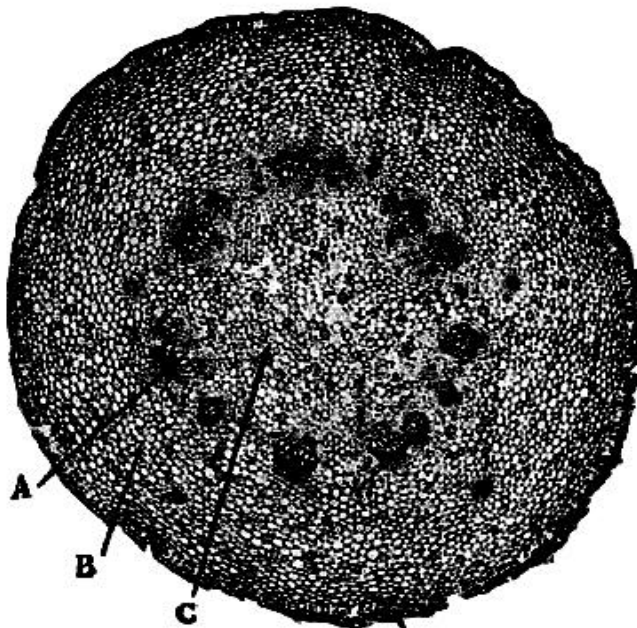


FIG. 89.—Podophyllum. Cross-section of rhizome. (15 diam.) A, Vascular bundle. B, Parenchyma of cortex. C, Medulla. (Photomicrograph.)

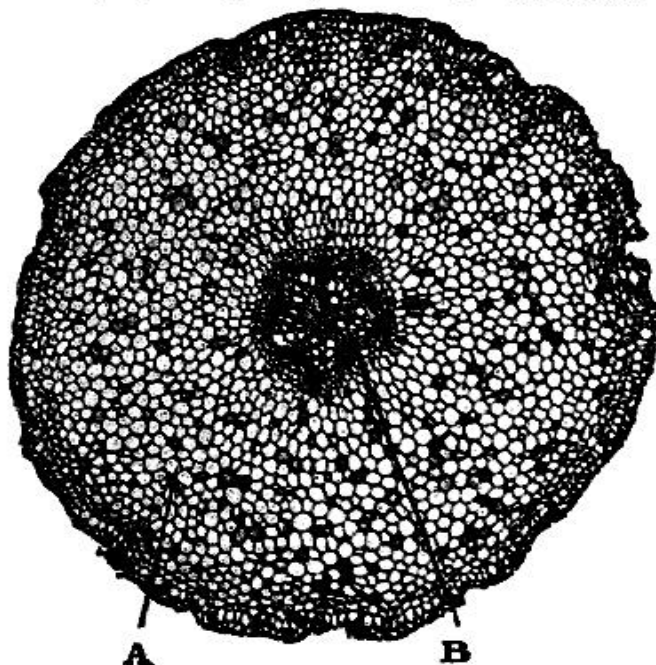


FIG. 90.—Podophyllum. Cross-section of rootlet. (25 diam.) A, Cortex. B, Xylem. (Photomicrograph.)

Preparation of Podophyllin.—Composed of several resinous principles separable by solvents. Ether dissolves out a resin of bright yellow color, leaving a brown, odorless resin of little more prompt activity. A concentrated tincture is precipitated by water containing HCl. The precipitate is collected and dried.

Podophyllin is not found to any extent in the fresh drug, according to Lobman. It is developed to the fullest extent only by storage.

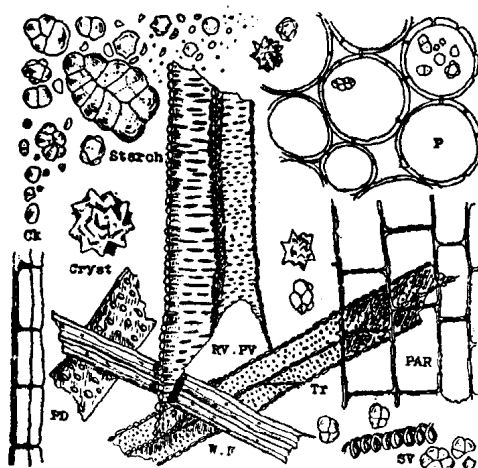


FIG. 91.—Podophyllum in powder. Starch. Cryst, Crystals of calcium oxalate. Ck, Corky tissue, side view. PD, Duct with bordered pores. RV, PV, Reticulated and pitted ducts. Tr, Tracheids. SV, Spiral vessels. W.F, Wood fibers or bast fibers. Par, Parenchyma in longitudinal view. P, Parenchyma in cross-section.—(After Jelliffe.)

CONSTITUENTS.—Resins associated with other common vegetable principles; **podophyllin** (Resina podophylli, U.S.P.) 4 to 6 per cent., together with amorphous and crystalline principles. Later investigations have given prominence to the following: Podophyllotoxin, $C_{15}H_{14}O_6$ (white crystals), converted by hydration into podophyllic acid, $C_{15}H_{16}O_7$; picropodophyllin, isomeric with podophyllotoxin (inert); quercetin, yellow needles; podophylloresin (purgative). Some authorities state that the purgative principle is closely related to emodin. (See *Rhamnus purshiana*.)

ACTION AND USES.—Classed usually with the drastic cathartics. Dose: 10 to 20 gr. (0.6 to 1.3 Gm.). Podophyllin is an irritant to the mucous membrane; in small doses an active cathartic, having reputed cholagogue properties, hence the name “vegetable calomel.” Dose: as a laxative $\frac{1}{10}$ gr. (0.006 Gm.), as a purgative $\frac{1}{4}$ gr. (0.016 Gm.).

There is a remarkable difference shown in the medicinal activity of podophyllin, whether precipitated by water alone, whether by acidulated water, or by solution of alum. The one precipitated by water is said to be fifteen to twenty times as active as the one precipitated by acidulated water, and the one precipitated by alum much weaker than either.

OFFICIAL PREPARATIONS.

Fluidextractum Podophylli Dose: 5 to 15 drops (0.3 to 1 mil).

Resina Podophylli Dose: $\frac{1}{8}$ to $\frac{1}{2}$ gr. (0.0081 to 0.0324 Gm.).

162. **JEFFERSONIA DIPHYLLA** Persoon.—TWIN-LEAF. (Rhizome.) Has properties somewhat similar to senega; it is also diuretic, alterative, and antispasmodic. Dose: 15 to 60 gr. (1 to 4 Gm.).

163. **BERBERIS RADIX**.—BARBERRY ROOT. The root of **Berberis vulgaris** Linné/ *Habitat*: Europe, Western Asia, and North America. Thick, muchbranched, from 25 to 50 mm. (1 to 2 in.) in diameter in the thickest part; wood light yellowish, hard, tough, with a very thin bark (see Barberry Bark below); odor slightly aromatic; taste bitter. It contains five alkaloids, of which **berberine** is the most interesting. Used as a tonic in doses of 30 to 60 gr. (2 to 4 Gm.).

164. **BERBERIS CORTEX**—BARBERRY BARK. The bark of the above root, coming in long, thin pieces, exfoliating, or separating into thin layers; outer surface yellowish-gray; inner surface bright yellow. It contains the same alkaloids as the root, but in greater proportion. This species is the host plant for the common wheat rust (*Puccinia graminis*) in its accidio stage. The leaves when parasitized by this fungus seem to be covered with yellow spots, the openings of the cups in which the spores are borne. Dose: 3 to 10 gr. (0.2 to 0.6 Gm.).

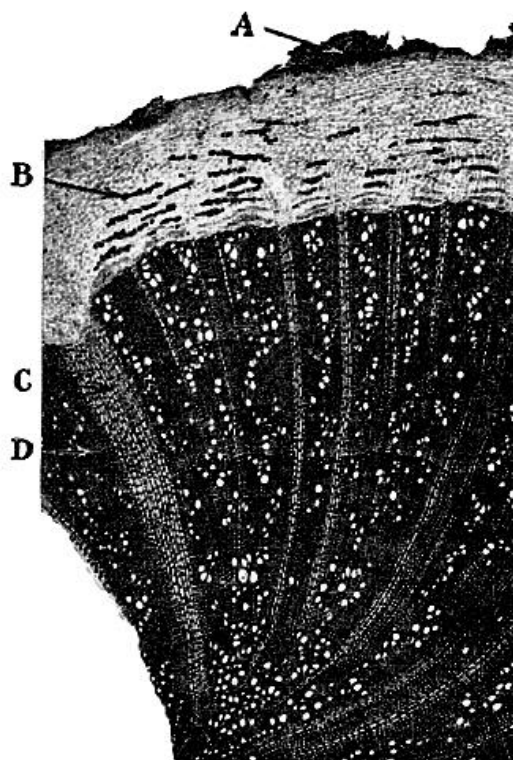


FIG. 92.—*Berberis*. Cross-section of rhizome, (32 diam.) A, Cork. B, Group of bast fibers. C, Medullary ray. D, Xylem. (Photomicrograph.)

165. BERBERIS, N.F.

BERBERIS. (OREGON GRAPE.)—The rhizome and roots of species of the section *Odostemon* (*Mahonia*) Refinesque of the genus *Berberis* Linné, without the admixture of more than 5 per cent. of the overground parts of the plant or other foreign matter. *Berberis* without the bark should be rejected.

In more or less knotty irregular pieces of varying length and from 3 to 50 mm. in diameter; bark from 0.5 to 2 mm. thick; wood yellowish, distinctly radiate, with narrow medullary rays, hard and tough; rhizome with a small pith; odor distinct; taste bitterish.

Powder.—Yellowish-brown composed chiefly of fragments of wood fibers associated with a few tracheae and medullary rays. Wood fibers yellow with large simple transverse pores; tracheae chiefly with bordered pores occasionally reticulate; starch grains single or 2 to 3 compound. The individual grains are irregularly spherical.

CONSTITUENTS.—Contains three alkaloids, **berberine**, **oxycanthine** and **berbamine**; the two latter are white. Used as tonic and alterative in doses of 8 to 30 gr. (0.5 to 2 Gm.). (Fluidextractum U.S.P. 1900.)

MONIMIACEÆ

166. **BOLDUS.**—BOLDO, N.F. The leaves of *Peumus boldus* Molina, an evergreen shrub growing in the Chilian Andes. They are broadly oval, about 50 mm. (2 in.) long, with entire margin and rough, reddish-brown surfaces, covered with numerous small glands containing a volatile oil; upper surface glossy, lower surface hairy; midrib prominent; odor fragrant; taste pungent, aromatic, somewhat bitter. They are used as an aromatic stimulant and tonic; in South America in inflammation of the genito-urinary tract. Dose: 15 to 60 gr. (1 to 4 Gm.), in fl'ext., tincture, or infusion.

LAURACEÆ.—Laurel Family

Aromatic trees or shrubs, all parts of which yield volatile oil. Leaves simple, alternate, pellucid-punctate.

Synopsis of Drugs from the Lauraceæ

A. <i>Barks.</i>	B. <i>Leaves.</i>	F. <i>Volatile Oils.</i>	
CINNAMOMUM	Laurus, 176.	OLEUM	CINNA-
ZEYLANICUM,	Umbellularia, 177.	MOMI, 168 a.	
167.	C. <i>Wood.</i>	OLEUM	SASSA-
Cinnamomum	Sassafras Lignum, 171.	FRAS, 170 a.	
Cassia, 168.	D. <i>Pith.</i>	OLEUM	CAM-
CINNAMOMUM	*Sassafras Medulla,	PHORÆ, 178 a.	
SAIGONICUM,	172.	G. <i>Fixed Oil.</i>	
169.	E. <i>Stearopten.</i>	Oleum Lauri, 176 a.	
SASSAFRAS, 170.	CAMPORA, 178.	H. <i>Seeds.</i>	
Nectandra, 173.		Persea, 179.	
Coto, 174.			
Lindera, 175.			



FIG. 93.—*Cinnamomum zeylanicum*—Branch.

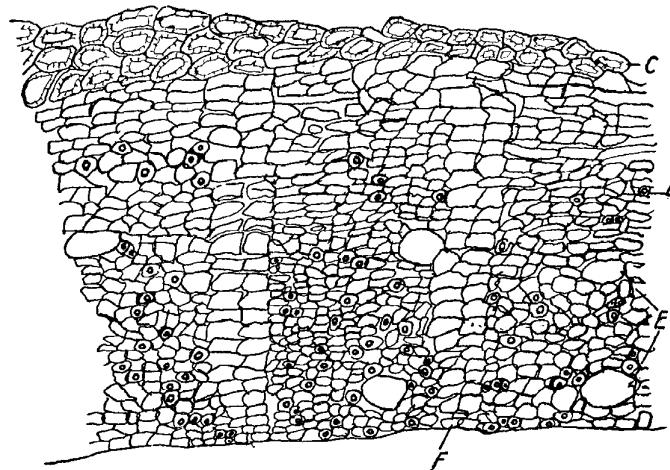


FIG. 94.—Ceylon cinnamon—Cross-section of bark. *C*, Stone cells. *D*, Parenchyma containing numerous bast fibers. *E*, Oil-resin cells. *F*, Medullary rays.

167. CINNAMOMUM ZEYLANICUM

CEYLON CINNAMON

The dried inner bark of the shoots of *Cinnamo'mum zeylan'icum* Breyn.

BOTANICAL CHARACTERISTICS.—Tree about 30 feet high. Root with the odor of camphor as well as that of cinnamon. Leaves ovate-lanceolate, entire, smooth and shining, tasting of cloves. Flowers in panicles, usually unisexual. Drupe 1-seeded, the seed large, with oily cotyledons.

HABITAT.—Ceylon.

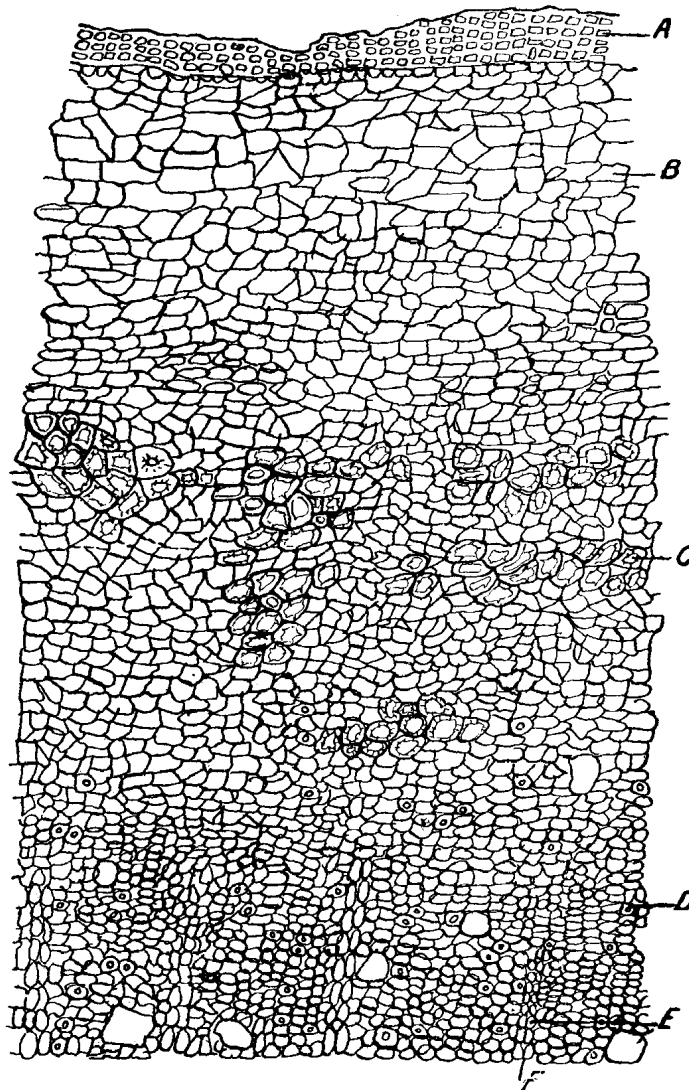


FIG. 95.—Cassia cinnamon—Cross-section of bark. A. Cork cells. B. Parenchyma cells. C. Stone cells. D. Bast fibers in parenchyma. E. Oil-resin cells (black line from E should have been directed to the large cell below and to the left of that letter). F. Medullary ray.

DESCRIPTION OF DRUG.—Long, cylindrical quills deprived of the corky layer by scraping; **compound**, consisting of 8 or more thin, papery, light brownish-yellow, quilled layers, inclosed one within the other, their sides curling inward, giving the sticks a flattened appearance on one side; somewhat flexible, with a splintery fracture; the outer surface is marked with shining, wavy bast lines, and occasionally with small scars or perforations indicating the former position of leaves; under the microscope it is seen to be formed by a layer of stone cells.

The inner surface is darker and striated. A characteristic, sweet, fragrant odor, and a warm, aromatic, pungent, and sweetish taste run through the different cinnamon barks, but the taste of the Ceylon cinnamon is the more delicate. The broken pieces, caused by repacking at custom-houses (sorted and sold as “small cinnamon”), are commonly used in pharmacy.

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

CONSTITUENTS.—All the cinnamons contain volatile oil, mucilage, resin, tannin, mannite, and bitter substance, in varying relative proportions.

In typical samples, the Saigon variety contains the most volatile oil (1 per cent. or more) and mannite, the Cassia variety coming next and the Ceylon last, the oil of the last ranging from 0.50 to nearly 1.00 per cent. Cassia contains the most and Saigon the least, of both tannin and bitter substance. The oil of cinnamon is not identical in the different barks, that of Ceylon cinnamon is recognized as of finer and more perfect flavor, while the Saigon, being sweeter, is more aromatic but the odor is less permanent. Ash, not exceeding 6 per cent.; not exceeding 2 per cent. insoluble in HCl.

ACTION AND USES.—Aromatic stimulant and tonic, carminative and astringent. The different varieties of cinnamon are among the most pleasant and efficient aromatics and form agreeable **adjuvants** to a great many official preparations. Dose: 8 to 30 gr. (0.5 to 2 gm.).

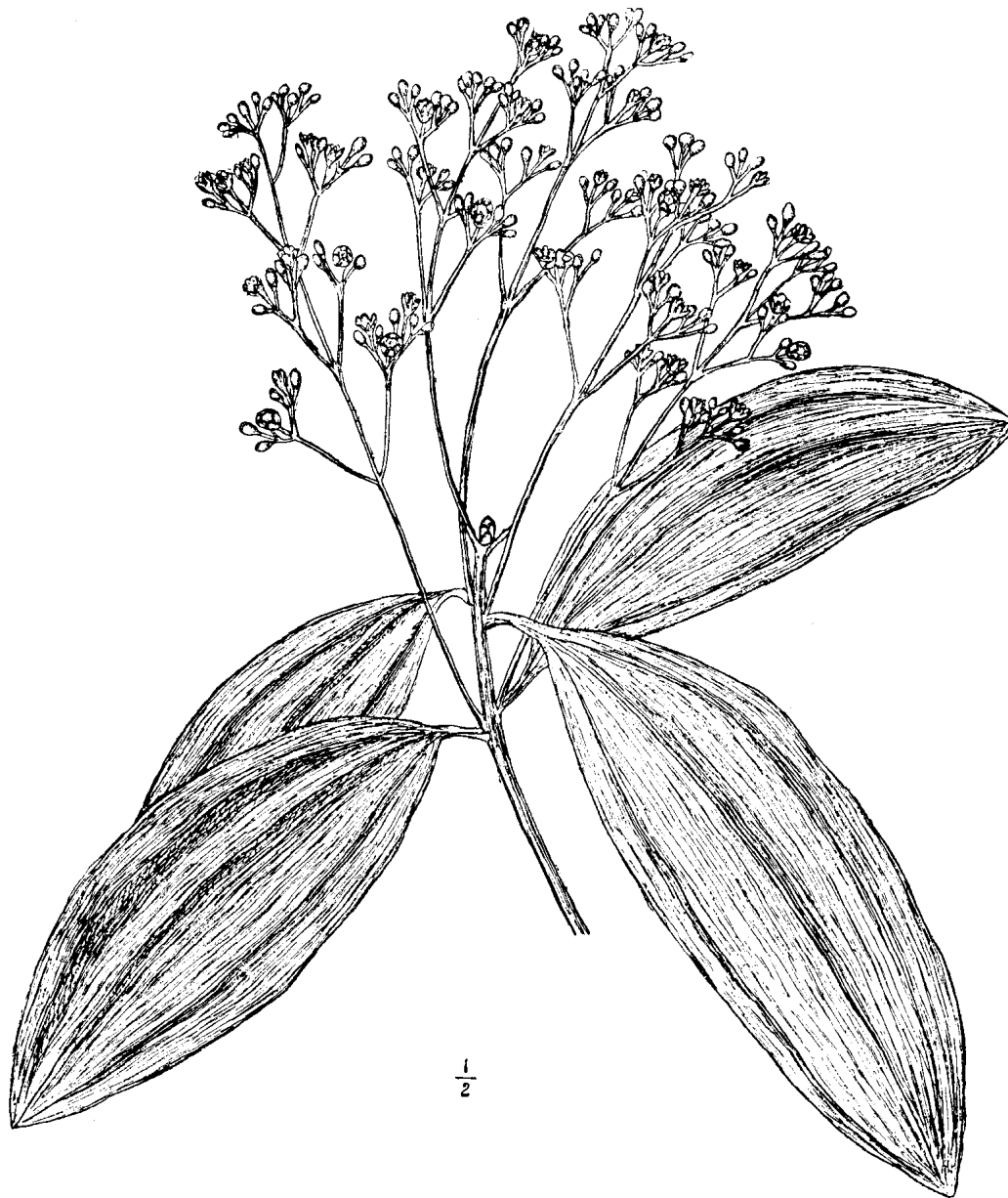


FIG. 96.—*Cinnamomum cassia*—Branch.

168. **CINNAMOMUM CASSIA**.—CASSIA BARK. The bark of the shoots of one or more undetermined species of **Cinnamo'mum** grown in China (Chinese cinnamon). Off. U.S.P. 1890. Cassia cinnamon is in tubes or curved pieces, of a darker yellowish-brown color than preceding, nearly deprived of the corky layer; these tubes are usually simple, rarely double, 1 mm. ($\frac{1}{25}$ in.) or more thick, and break with a rather short fracture; odor and taste similar to, but somewhat less delicate than, that of Ceylon cinnamon. Constituents the same, the volatile oil being officially recognized as from this source. This variety has been superseded by Saigon cinnamon in the official preparations containing cinnamon.

168a. **OLEUM CASSIÆ.**—OIL OF CINNAMON. Contains at least 80 per cent. of **cinnamic aldehyde**. Both the Ceylon oil and that derived from Cassia, and other cinnamon barks are found in commerce, and they are essentially the same. The oil of Ceylon cinnamon has a more delicate odor and flavor. All of the various oils of cinnamon become darker and thicker by age and exposure to the air; they have the characteristic odor of cinnamon, a sweetish, spicy, and burning taste.

CONSTITUENTS.—Oil Of cinnamon consists chiefly of **cinnamic aldehyde**, with small quantities of hydrocarbon; when the oil is exposed to the air for a time, the cinnamic aldehyde is oxidized into cinnamic acid, two resins, and water, the oil becoming thicker and darker, and frequently separating out a few crystals of the cinnamic acid.

OFFICIAL PREPARATIONS.

Aqua Cinnamomi (0.2 per cent.), Dose: 1/2 to 1 fl. oz. (15 to 30 Gm.).
Spiritus Cinnamomi (10 per cent.), Dose: 10 to 20 drops (0.6 to 1.3 mls).

169. **CINNAMOMUM SAIGONICUM.**—SAIGON CINNAMON

SAIGON CASSIA

The dried bark of the stem and branches of an undetermined species of **Cinnamo'mum**

DESCRIPTION OF DRUG.—It takes its name from Saigon, the capital of French Cochin-China, where it is collected and exported. It is in large quills or broken pieces, 1 or 2 mm. (1/25 to 1/12 in.) thick; the gray or grayish-brown bark, which is not removed, is more or less rough and warty, longitudinally wrinkled and ridged, and covered with whitish patches. Inner bark cinnamon-brown or dark brown, with numerous white striæ near the bark; fracture short, granular; odor aromatic; taste aromatic and pungent. Ash, not exceeding 6 per cent.; not exceeding 2 per cent. insoluble in HCl.

COMPARISON OF THE CINNAMON BARKS.—

Color.—There is quite a difference in the depth of the color of the three barks. The Ceylon is the lightest, the Saigon is the darkest, and the Cassia intermediate. This difference in shade is shown best in the powder.

Thickness.—The Ceylon is very thin and papery. The Saigon, usually regarded as the thickest, is in the average about the same as Cassia.

Odor.—The odor and taste of the Saigon is the strongest, the Ceylon is the most delicate, the Cassia weakest.

Microscopical.—To distinguish between the barks no difficulty is experienced in cross- and longitudinal sections, which display the oilcells, stone cells, and other elements. In the powdered condition the Ceylon shows the largest stone cells. In Cassia the stone cells are less numerous and smaller. In the Saigon the oblong stone cells are about the same size as those of Cassia, but fewer in number.

Powder.—Elements of: See Part iv, Chap. I, B.

OFFICIAL PREPARATIONS.

Tinctura Cardamomi Composita (2.5 per cent.),.....	Dose: 1 to 3 fl. dr. (4 to 12 mils).
Tinctura Gambir Composita (2.5 per cent.),.....	½ to 3 fl. dr. (2 to 12 mils).
Tinctura Lavandulæ Composita (2 per cent.),.....	½ to 2 fl. dr. (2 to 8 mils).
Tinctura Rhei Aromatica (4 per cent.), employed in Syrupus Rhei Aromaticus.	½ to 2 fl. dr. (2 to 8 mils).
Tinctura Cinnamomi (20 per cent.),.....	Employed also in Vinum Opii and Infusum Digitalis.
Pulvis Aromaticus (35 per cent.),.....	15 gr. (1 Gm.).

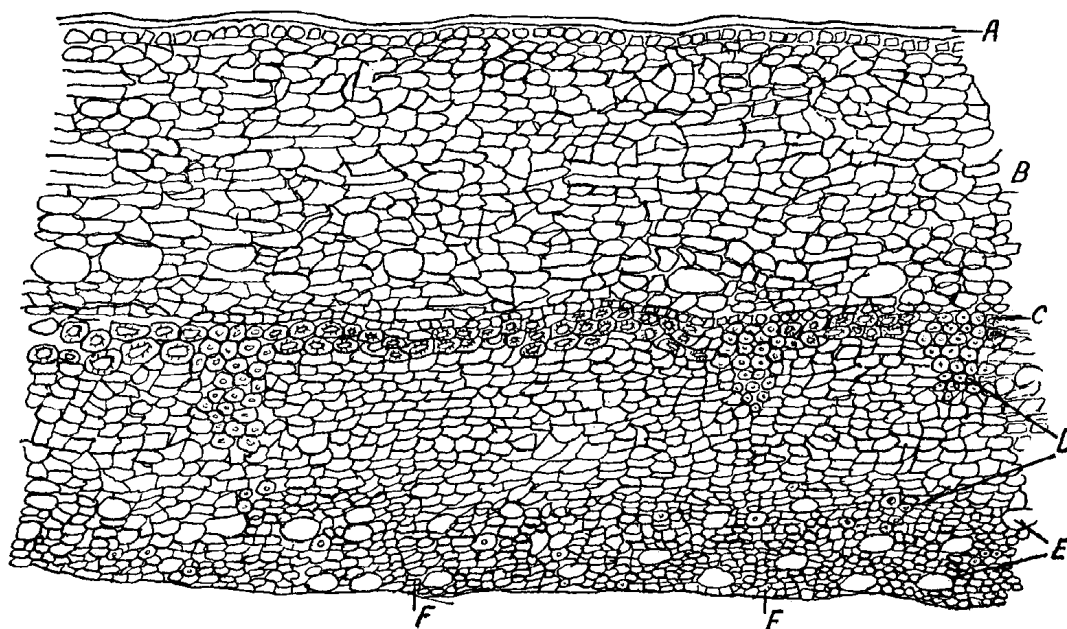


FIG. 97.—Saigon cinnamon—Cross-section of bark. A. Corky layer. B. Parenchyma cells. C. Stone cells. D. Bast fibers. E. Oil-resin cells. F. Medullary rays, very inconspicuous.

SASSAFRAS.—SASSAFRAS

Sassafras variifolium O. Kuntze. The various portions used in medicine are the bark of the root, the volatile oil, and the pith, all official, and the wood, unofficial.

BOTANICAL CHARACTERISTICS.—Tree with spicy, aromatic bark, 15 to 125 feet high, with yellowish-green twigs. *Leaves* ovate, entire, or some of them 3-lobed. *Flowers* dioceious, greenish-yellow, in racemes.

HABITAT.—North America, from Kansas eastward.

170. SASSAFRAS.—SASSAFRAS BARK

The dried bark of the root of **Sassafras variifolium** O. Runtze, collected in early spring or autumn and deprived of the outer corky layer with not more than 2 per cent. of adhering wood present.

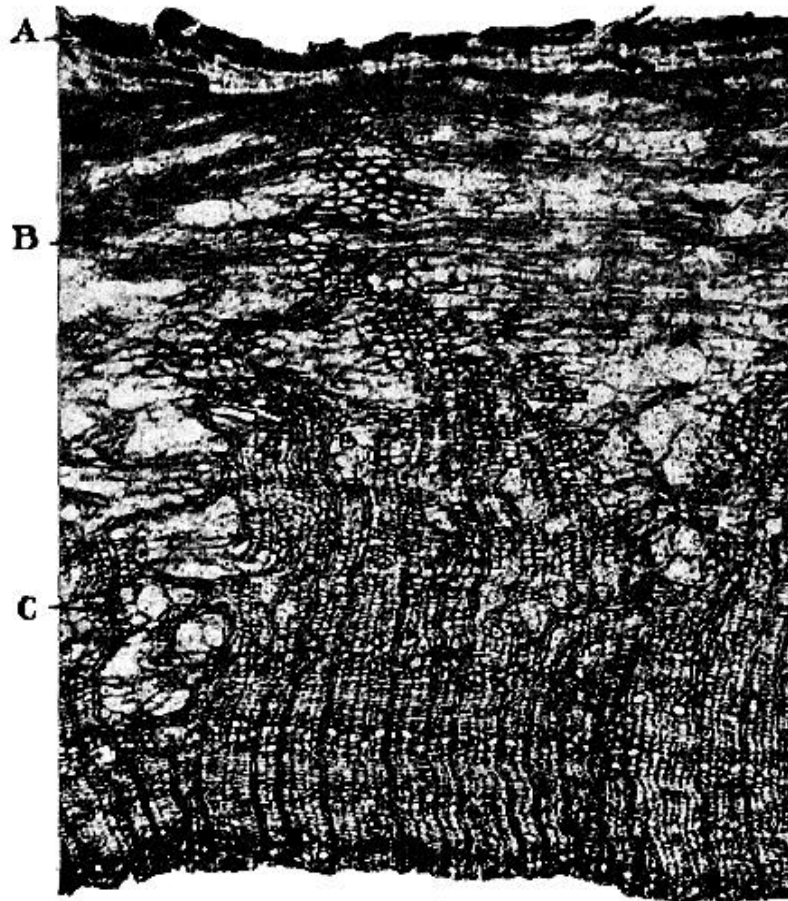


FIG. 98.—Sassafras—Cross-section of bark. (27 diam.) A, Cork. B, Parenchyma of primary cortex. C, Medullary ray. (Photomicrograph.)

DESCRIPTION OF DRUG.—In small, irregular, rust-brown fragments, deprived of the grayish-brown, fissured, corky layer,

leaving a reddish or rust-brown surface; 1 to 5 mm- ($\frac{1}{25}$ to $\frac{1}{5}$ in.) thick. It breaks with a short, corky fracture, exposing a whitish interior dotted with numerous oil-cells; **odor** highly fragrant, characteristic; taste sweetish, aromatic. Oil is employed in the **compound syrup of sarsaparilla**.

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

CONSTITUENTS.—**Volatile oil** (about 5 per cent.), camphoraceous matter, tannin (6 per cent.), sassafrid (a derivative of tannin, 9 per cent.), gum, resin, starch, etc. Ash, not exceeding 30 per cent.

ACTION AND USES.—Aromatic stimulant, alterative, and astringent. It is used almost entirely as an adjuvant or corrective. The infusion is used as a popular household remedy for its diuretic and diaphoretic effects in febrile states. Dose: 30 to 120 gr. (2 to 8 Gm.), in infusion.

170a. **OLEUM SASSAFRAS**, U.S.—A volatile oil usually distilled from the entire root. A colorless or yellow liquid, sp. gr. 1.051.075, becoming thicker and of a reddish color by age and exposure, and having the characteristic odor and taste of sassafras. It contains a hydrocarbon (safrene, $C_{10}H_{16}$), and an oxygenated compound, safrol, $C_{10}H_{10}O_2$ (melts at $8.5^{\circ}C.$, $47.3^{\circ}F.$), a widely distributed principle obtained commercially from oil of camphor, phellandrene, $C_{10}H_{16}$, eugenol, $C_{10}H_{12}O_2$, etc. Generally used as a flavor. Dose: 1 to 5 drops (0.065 to 0.3 mil). The oil is sometimes adulterated with the artificial oil and a camphor oil fraction. Virginia is said to be the chief producer of oil of sassafras.

171. **SASSAFRAS LIGNUM** (Unofficial).—SASSAFRAS WOOD. The wood of the root, coming in billets, partially or wholly deprived of bark, or in raspings or chips; pale brownish or reddish in color, light and easily cut; medullary rays narrow; odor and taste like the bark, but weaker, there being a smaller proportion of volatile oil. It is used like the bark.

172. SASSAFRAS MEDULLA, N.F.—SASSAFRAS PITH

The dried pith of **Sassafras variifolium** O. Kuntze.

DESCRIPTION OF DRUG.—Thin, cylindrical, white pieces, very light and spongy; inodorous; taste insipid and mucilaginous. The tissue is entirely composed of parenchyma. It contains a mucilage (not precipitated by alcohol or lead subacetate)

which forms a limpid, ropy, viscid solution with water, but not sufficiently tenacious to hold insoluble substances in suspension. **Demulcent**, often used as an application to inflamed eyes.

PREPARATION.

Mucilago Sassafras Medullae (2 per cent.).

173. **NECTANDRA**.—BEBEERU BARK. GREENHEART BARK. From **Nectan'draro'diæi** Schomburgk. *Habitat*: South America. Large, flat, heavy pieces, from 250 to 300 mm. (10 to 12 in.) long, 50 to 150 mm. (2 to 6 in.) broad; usually deprived of the cork, leaving longitudinal depressions in the grayishbrown outer surface similar to the digital furrows of flat calisaya bark; internally pale brown, roughly striate. Its structure is chiefly short liber cells filled with secondary deposit, causing it to break with a short fracture. Inodorous; intensely bitter, somewhat astringent. It contains tannin, beberine (identical with buxine and pelosine), and sipirine.

ACTION AND USES.—Tonic, astringent, and **febrifuge**, introduced as a substitute for cinchona as an antiperiodic, but much inferior. Dose: 15 to 60 gr. (1 to 4 Gm.), commonly used in the form of beberine sulphate.

174. **COTO**.—COTO BARK. Origin undetermined. *Habitat*: Bolivia. Very large, flat pieces, about 5 to 15 mm. ($\frac{1}{5}$ to $\frac{3}{5}$ in.) thick, usually deprived of cork; the outer surface cinnamon-brown, rough, having the appearance of having been shaved or split off; inner surface darker brown, rough from numerous close ridges of longitudinally projecting bark fiber; a fresh cross-section shows numerous small, yellowish spots (groups of stone cells). Odor aromatic, cinnamon-like, stronger when bruised; taste hot, bitter.

PARACOTO BARK, N.F.—Which occasionally enters our market from Bolivia, very much resembles the above, but is marked with whitish fissures, and has a fainter, somewhat nutmeg-like odor.

CONSTITUENTS.—Cotoin, in true coto bark, paracotoin in the other; both barks contain volatile oil, resin, and piperonylic acid. They have established quite a reputation in diarrhoea. Dose: 5 to 10 gr. (0.3 to 0.6 Gm.).

175. **LINDERA BENZOIN** Meissner.—SPICE BUSH. (Dark, berries, and leaves.) Aromatic stimulant, tonic, and diaphoretic. The berries have been used as a substitute for allspice. Dose: 15 to 60 gr. (1 to 4 Gm.).

176. **LAURUS**.—LAUREL. SWEET BAY. The leaves of **Lau'rus nobi'lis** Linné. Oval-oblong, about 50 to 100 mm. (2 to 4 in.) long, brownish, pellucid-punctate; margin entire, wavy; taste aromatic, bitter, somewhat astringent; odor fragrant, due to a volatile oil. The chief constituent, however, is a fixed oil (see below) present to the extent of about 30 per cent. Stimulant and astringent, quite popular as an astringent injection.

176a. **OLEUM LAURI.**—LAUREL OIL. A green, granular, semi-solid of the consistence of butter. It consists mainly of laurostearin, but contains a small quantity of volatile oil which makes it a very aromatic base for liniments and ointments.

177. **UMBELLULARIA CALIFORNICA** Nuttall.—CALIFORNIA LAUREL. (Leaves.) They contain a volatile oil which seems to be a strong local anesthetic, used in neuralgic headache, cerebro-spinal meningitis, intestinal colic, and atonic dyspepsia. Dose: 15 to 30 gr. (1 to 2 Gm.).



FIG. 99.—*Cinnamomum camphora*—Branch and flower.

178. **CAMPHORA.**—CAMPHOR

GUM CAMPHOR

A ketone obtained from **Cinnamo'mum cam'phora** Nees et Ebermaier, and purified by sublimation. It is dextrogyrate.

BOTANICAL CHARACTERISTICS.—A large and handsome tree. *Leaves* evergreen, shining, alternate, ovate-lanceolate. *Flowers* small, perfect, in corymbose panicles; *anthers* 4-celled, opening by terminal pores.

SOURCE.—The camphor tree grows in Japan and China, especially in the island of Formosa. This island alone furnishes half of the total product of the globe, or 5,200,000 pounds. Japan grows 1,560,000 pounds. The rest comes from China, Java, Sumatra, and Florida. It should be mentioned that the camphor of Malaysia is not extracted from *Cinnamomum camphora*, but from *Dryobalanops aromatica*. The United States alone uses 2,000,000 pounds of camphor yearly. The trunk, root, and branches are cut into chips and exposed to vapors of boiling water. The camphor volatilizes and condenses in small granules on the straw with which the head of the still is lined. It is freed from the volatile oil by draining or expressing, and is purified by resubliming with lime from a vessel into which the steam is allowed to escape through a small aperture. The camphor condenses in a compact cake, with a circular hole in the center corresponding to the aperture. Camphor has had to compete with rivals which are cheaper. In the manufacture of celluloid, the substitution of naphthalin for camphor has produced a considerable effect in controlling the high price resulting from the Japanese monopoly of the industry.

DESCRIPTION OF DRUG.—Refined camphor comes in **white, translucent masses**, tough and somewhat flexible, breaking with a shining, crystalline fracture; reduced to a powder only by the addition of a few drops of alcohol, ether, chloroform, glycerin, volatile or fixed oils, or other volatile liquids for which it has an affinity, by triturating with an equal weight of sugar, by precipitating the alcoholic solution with water, or by sublimation. It is very volatile, even at ordinary temperatures, giving out a **characteristic penetrating odor**. Taste pungent, aromatic, leaving a cooling sensation in the mouth. Lighter than water, small pieces taking up a circulatory motion therein, which ceases upon the addition of a drop of oil. Very inflammable, burning with a dense smoke, and leaving no residue. When triturated with about molecular proportions of thymol, phenol, or chloral hydrate, it liquefies. It melts at 175°C. (347°F.) and boils at 204°C. (399.2°F.).

Borneo or Sumatra camphor is an allied camphor. By oxidation it yields

ordinary camphor. Borneol Valerates have been introduced as useful in various neuroses. See "New and Non-official Remedies."

CONSTITUENTS.—Camphor has the composition $C_{10}H_{16}O$, and is considered as a ketone yielded indirectly by the oxidation of borneol, a secondary alcohol having the composition $C_{10}H_{18}O$. By treatment with various reagents camphor yields a number of interesting compounds, as cymol, camphoric acid, etc. With iodine and bromine it forms compounds, one, the **monobromated camphor** ($C_9H_{15}BrCO$), being used as a nerve sedative in doses of 3 gr. (0.2 Gm.); it is made by heating equal portions of bromine and camphor at $172^{\circ}F.$; one-half the bromine goes off as hydrobromic acid. One H of the camphor molecule, is replaced by Br in the reaction. Camphoric acid, $C_{10}H_{16}O_4$, and camphronic acid, $C_9H_{12}O_6$, are produced by oxidation with nitric acid. Ash, not more than 0.05 per cent.

OFFICIAL PREPARATIONS.

Aqua Camphoræ (0.8 per cent.),	Dose: $\frac{1}{2}$ to 2 fl. oz. (15 to 30 mils).
Spiritus Camphoræ (10 per cent.),	5 to 40 μ (0.3 to 2.6 mils).
Tinctura Opii Camphorata (0.4 per cent.),	1 to 4 fl. dr. (4 to 15 mils).
Linimentum Camphoræ (20 per cent.).	
Linimentum Saponis (4.5 per cent.).	
Linimentum Chloroformi (70 per cent.).	
Linimentum Belladonnæ (5 per cent.).	

ACTION AND USES.—Stimulant and antispasmodic. Externally anodyne and rubefacient. Dose: 3 to 10 gr. (0.2 to 0.6 Gm.), in pill or emulsion.

178a. **OLEUM CAMPHORÆ.**—OIL OF CAMPHOR. Obtained in the sublimation of camphor from the wood. It is a reddish liquid with a slight yellowish tint, and is probably a mixture of a hydrocarbon and camphor. It resembles the latter in medical properties, but is more of a stimulant, and is especially applicable to those cases of bowel complaint or spasmodic cholera in which an anodyne and stimulant effect is wanted. This volatile oil must not be confounded with *Linimentum Camphoræ*, the common name for which, with many, is oil of camphor. Dose: 2 or 3 drops (0.13 to 0.2 mil).

179. **PERSEA GRATISSIMA** Gaertner.—ALLIGATOR PEAR. (Seeds.) Used by the Mexicans as an anthelmintic, and, in the form of liniment, in intercostal neuralgia. Dose of fl'ext.: 30 to 60 drops (2 to 4 mils)

PAPAVERACEÆ.—Poppy Family

Herbs, with milky, narcotic juice. *Leaves* alternate. *Flowers* large, with caducous calyx. *Ovary* one-celled, with parietal placentæ. The genus *Papaver*, a description of which is given under *Opium*, is typical of the order. See also illustrations below.

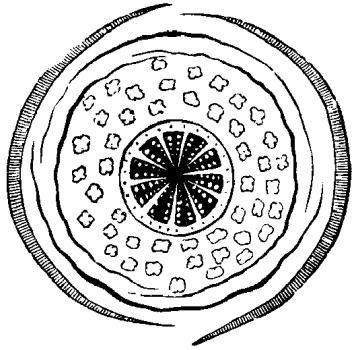


FIG. 100.—Transverse section of flower of Poppy.

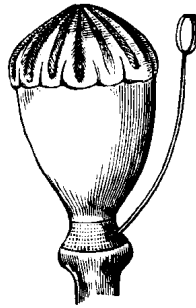


FIG. 101.—Gynecium of Poppy, with one stamen remaining.

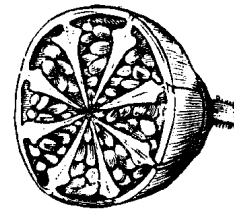


FIG. 102.—Transverse section of ovary of Poppy.

Synopsis of Drugs from the Papaveraceæ

- | | | |
|---------------------------|--------------------------------|---------------------------|
| A. <i>Concrete Juice.</i> | C. <i>Seed, and Fixed Oil.</i> | E. <i>Rhizome.</i> |
| OPIUM , 180. | Papaver, 182. | SANGUINARIA , 185. |
| B. <i>Capsule.</i> | D. <i>Herbs.</i> | F. <i>Flower-petals.</i> |
| *Papaver, 181. | Chelidonium, 183. | Rhœas, 186. |
| | Eschscholtzia, 184. | |

180. OPIUM.—OPIUM

OPIUM

The concrete milky exudation obtained by incising the unripe capsules of **Papa'ver somniferum** Linné, and its variety, **album**, DeCandolle. Containing not less than 9.5 per cent. of anhydrous Morphine.

BOTANICAL CHARACTERISTICS.—*Leaves* large, sessile, wavy, cut, or toothed; *flowers* large and terminal, drooping before expansion; *petals* 4, large, roundish, white or purplish with a darker colored spot near the claws; *stigmas* 4 to 20, radiating, sessile upon the disk, which covers the ovary. *Capsule* obovate, 1-celled; *placentæ* extended so as to almost divide the cavity into several cells; dehiscence by small chinks or pores beneath the crown formed by the radiating stigmas; *seeds* numerous, reniform.



FIG. 103.—*Papaver Somniferum*—Flowering branch and fruit.

SOURCE.—Western Asia; cultivated in the elevated plains of India, in Egypt, Persia, Asia Minor, and in some parts of Europe. Varieties: (1) Smyrna, Levant, Turkey, or Constantinople; opium generally in flattish masses—the most abundant in the market, to which descriptions in text-books usually apply (2) Egyptian, in flattened, roundish cakes; (3) Persian, in cylindrical sticks or cakes of a black color; (4) Indian, in flat squares, covered with layers of mica, and further protected by a coating of wax or an oiled-paper wrapper; (5) Chinese, in flat, globular cakes; (6) European.

DESCRIPTION OF DRUG.—**In irregular or subglobular lumps weighing from four ounces to two pounds**, enveloped in remnants of poppy leaves and with chaffy fruits of a species of *Rumex* adhering; **when fresh it is plastic**, breaking or tearing apart, showing an irregular, chestnut-brown surface, shining when rubbed; odor peculiar, narcotic; taste bitter. When examined with a pocket lens, it is seen to be composed of yellowish, agglutinated tears. **The value of the gum, however, is determined only by assay.** Opium should yield not less than 9 per cent.; powdered opium not less than 12, nor more than 12.5 per cent., of crystallized morphine when assayed by the official process.

Granulated opium, or coarsely powdered opium, is an article of commerce, and is especially recommended as a form of the drug best adapted to the preparation of the tinctures.

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

ADULTERATIONS.—To increase the weight various articles are used, such as sand, clay, scrapings of poppy capsules, and various mucilaginous, albuminous, and saccharine matters. The writer has taken from the interior of about a two-pound lump of opium over a quarter of a pound of lead bullets.

A mixture sold for opium was analyzed and found to be mostly aloes which after suitable mixing, had been buried in the ground until the odor of aloes was gone.

Factitious opium has occasionally been met with, of soft consistence, blackish-brown color, less odorous than the genuine. It is probably an aqueous extract of the poppy plant.

Alkaloidal assay, and microscope, easily betray adulteration.

CONSTITUENTS.—Opium contains a mixture of sixteen or more different alkaloids, with meconic acid, coloring matters, and various inert substances. The principal constituents are the following alkaloids: **Morphine**, $C_{17}H_{19}NO_3 + H_2O$,. **codeine**, $C_{18}H_{21}NO_3 + H_2O$ (both official); narcotine, narceine, paramorphine, papaverine, meconidine, pseudomorphine, codamine, laudanine, and oxynarcotine; these are in combination with meconic and, thebolactic acids. Mineral constituents average about 6 per cent.

Preparation of Morphine.—To the concentrated infusion of opium add three volumes of a mixture composed of one part of alcohol, two volumes of ether, and one-third volume of ammonia; shake, and set aside for crystals to form.

Preparation of Codeine.—The mother liquor, from which morphine has separated, yields crude codeine on evaporation. Obtained artificially by heating morphine with methyl iodide and soda or potassa.

Preparation of Narceine.—The concentrated infusion of opium is shaken with ether. This removes narcotine. If alkali be added in excess, codeine is deposited. From the filtrate morphine can be crystallized, and from the mother liquor narceine may be obtained upon evaporation.

Preparation of Meconic Acid.—Add CaCl_2 to an infusion of opium, which precipitates calcium meconate; decompose the latter by dilute HCl at 180°F . This deposits the calcium bimeconate, which is dissolved in warm concentrated HCl, from which the pure meconic acid deposits in cooling.

ACTION AND USES.—Stimulant, narcotic, anodyne, antispasmodic, and intoxicant. It restrains the movements and checks the secretions of the stomach and intestinal canal. The dominant action of opium, however, is upon the brain, **first producing mental and emotional exhilaration, then hypnotic depression**. It is a powerful respiratory depressant, death usually resulting from paralysis of the respiratory center in the medulla. Toxic doses, also, finally paralyze both the heart and vagi, and produce a rapid and feeble pulse. While the effects are due to the morphine present, the drug is not fully represented by this alkaloid. Codeine is also hypnotic, but affects the cerebrum less. Narcotine is antiperiodic. Thebaine is sudorific and excitant. Dose of opium: 1 to 2 gr. (0.065 to 0.13 Gm.).

POISONING shows three stages or degrees as follows:

- 1. Rather slow respiration, slow heart but good blood pressure, much contracted pupils. The patient is sluggish or inattentive. There may be nausea perhaps retching or vomiting.
- 2. A stupor which supervenes in from fifteen to thirty minutes. The face is cyanotic flushed, the skin warm, the respirations regular, only 4 to 10 per minute, slow heart but blood pressure remains good, pupils pin point, the patient in a state of unconsciousness from which he can be aroused with difficulty.
- 3. This stage is manifested by coma and collapse. The skin is cyanotic, cold and clammy, the pulse is weak, patient cannot be aroused, respirations are very infrequent and shallow about 3 or 4 per minute.

ANTIDOTES.—Emetics, apomorphine subcutaneously injected, strong coffee and stimulants, evacuation by mechanical means (stomachpump, etc.), or rousing and walking the patient. Atropine is the physiological antagonist.

OFFICIAL PREPARATIONS.

Opium Pulvis (10 to 10.5 per cent. of anhydrous Morphine),.....	Dose: $\frac{1}{4}$ to 2 gr. (0.016 to 0.13 Gm.).
Extractum Opium (20 per cent. Morphine),.....	$\frac{1}{4}$ to 1 gr. (0.016 to 0.065 Gm.).
Opium Deodoratum (12 to 12.5 per cent. Morphine),.....	$\frac{1}{4}$ to 2 gr. (0.016 to 0.13 Gm.).
Mistura Glycyrrhizæ Composita ,...	($2\frac{1}{4}$ fl. dr.).
Opium Granulatum ,.....	(1 Gm.).
Pulvis Ipecacuanhæ et Opium (1 gr. Opium and 1 gr. Ipecac in every 10 gr.),.....	5 to 10 gr. (0.3 to 0.6 Gm.).
Tinctura Opium (10 per cent.).....	5 to 15 \mathbb{M} (0.3 to 1 mil).
Tinctura Opium Camphorata (Opium, Camphor, Benzoic Acid, and Oil of Anise, each 0.4 per cent.),....	1 to 4 fl. dr (4 to 15 mils).
Mist. Glycyrrhizæ. Co (From Camphorated Tr.),	
Tinctura Opium Deodorati (10 per cent.),.....	5 to 15 \mathbb{M} (0.3 to 1 mil).
Alkaloids:	
Morphina ,	$\frac{1}{8}$ to $\frac{1}{2}$ gr. (0.008 to 0.032 Gm.).
Morphinæ Hydrochloïdum ,.....	$\frac{1}{8}$ to $\frac{1}{2}$ gr. (0.008 to 0.032 Gm.).
Morphinæ Sulphas ,.....	$\frac{1}{8}$ to $\frac{1}{2}$ gr. (0.008 to 0.032 Gm.).
Codeina ,	$\frac{1}{4}$ to 2 gr. (0.016 to 0.13 Gm.).

181. **PAPAVER.**—POPPY CAPSULES. (*Papaveris Fructus*, N.F.) The nearly ripe capsules, free from seeds, of **Papa'ver somniferum** Linné. There are two varieties, distinguished by the color of their seeds. The white poppy is usually considered the true opium plant; its capsule is smooth, of various shapes, but usually **subglobular and somewhat flattened at the extremities**; it is of a **gray or a light yellowish-brown color**, 50 to 100 mm. (2 to 4 in.) in diameter, **crowned with the sessile stigmas arranged in a circle**; *placentæ* parietal, projecting toward the center; odor slight; taste bitter.

CONSTITUENTS.—Morphine, codeine, narcotine, narceine, papaverosine, and rhoeadine, united with organic acids, of which meconic is the most important.

ACTION AND USES.—Hypnotic and sedative in syrup or extract; local anodyne in decoction. Dose: 15 to 30 gr. (1 to 2 Gm.).

182. **PAPAVERIS SEMEN.**—Poppy SEED. MAW SEED. The seed of **Papa'ver somniferum**, remarkable for containing so large a per cent. of fixed oil, which is very useful in the arts, and is also demulcent and anodyne. The seeds are less than a millimeter in length, kidney-shaped, with the surface regularly pitted, giving them a beautiful appearance under a lens. There is a black-seeded and a white-seeded variety under cultivation.

Fifty per cent. of oil is obtained from the seeds by warm and 30 per cent. by cold

pressure. It is pale yellow, with a bland and slightly sweetish taste, totally destitute of narcotic properties. Poppy-seed oil is used for salads, paints, soaps, illumination, and to adulterate olive and almond oils.

183. **CHELIDONIUM**.—**CELANDINE**. The entire plant of **Chelido'nium ma'jus** Linné. Off. in U.S.P. 1890. Stem hairy, arising from a reddish-brown, branching root, and bearing light green, lyrate-pinnatifid leaves about 200 mm. (8 in.) long; odor slight; taste acrid. Cathartic, diuretic, diaphoretic, and expectorant. In certain sections it is used in the treatment of jaundice. Dose: 15 to 60 gr. (1 to 4 Gm.).

Alkaloids and Principles of Chelidonium and Allied Plants.—Important researches of J. O. Schlotterbeck have shown that chelerythrine, yielding lemon-colored salts, exists also as a prominent alkaloid in sanguinaria and other plants of the same family. Protopine, $C_{20}H_{19}NO_5$, a frequently occurring alkaloid in the poppy family, occurs also in the plants of the fumariaceæ. In physical properties protopine agrees, in every particular with fumarine. Protopine has been found in *Papaver somniferum*, *Eschscholtzia californica*, *Sanguinaria canadensis*, *Stylophorum diphyllum*, and *Adlumium cirrhosa*; it constitutes two-thirds of the entire alkaloidal content of *Bocconia cordata*. ("Proc. Amer. Phar.," 1900, p. 131.) Wintgen found the constituent, chelidonine, to be $C_{29}H_{19}NO_{59} + H_2O$. Schlotterbeck finds its more exact formula as, $C_{20}H_{18}(OH)NO_4 + H_2O$. ("Proc. Am. Ph.," 1903, P. 321.) It occurs in colorless monoclinic prisms, melting at 135° to 136°C. The coloring-matter, known as chelidoxanthin, found in chelidonium and stylophorum diphyllum, has been found to be identical with the alkaloid berberine. ("Pharm. Rev.," Jan., 1902, pp. 4, 5.)

184. **ESCHSCHOLTZIA CALIFORNICA** Chamisso.—(Herb.) A valuable calmative, soporific, and analgesic, "free from the disadvantages of opium." Dose of alcoholic extract: 10 gr. (0.6 Gm.), gradually increased to 3 dr. (12 Gm.) in a day.

185. SANGUINARIA.—SANGUINARIA

BLOOD ROOT

The dried rhizome of **Sanguina'ria canaden'sis** Linné.

BOTANICAL CHARACTERISTICS.—A low perennial, common in rich woods, having a thick, prostrate root-stock, surcharged with an orange-red, acrid juice, and sending up in earliest spring a rounded, palmately lobed leaf and a one-flowered naked scape. *Flower* white, handsome; *sepals* 2; *petals* 8 to 12; *stamens* about 24; *style* short; *stigma* two-grooved; *pod* oblong, turgid, one-celled.

HABITAT.—Rich woods of North America.

DESCRIPTION OF DRUG.—A horizontal cylindrical rhizome about 50 mm. (2 in.) long and 10 mm. ($\frac{2}{5}$ in.) thick, slightly tapering and branched; **externally** reddish-brown, rough, wrinkled, and annulate;

internally spongy, dotted with small resin cells of a ruby color. The color of a cut surface varies from a light to a very dark red, and presents a glossy, dotted appearance; bark thin, with resin cells scattered in the parenchyma; frequently the transverse surface shows either a uniform dark blood-red color, or a whitish, starchy surface scattered with numerous red dots; **odor slight; taste bitter and acrid;** the powder is sternutatory. The infusion of the drug becomes blood-red with sulphuric or hydrochloric acid.

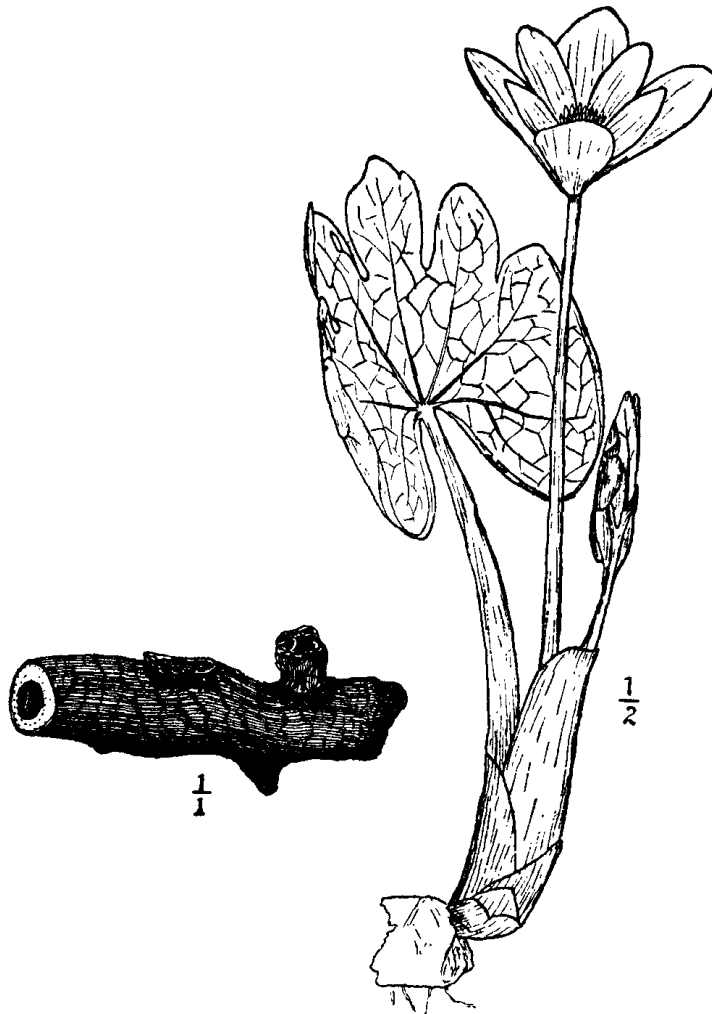


FIG. 104.—*Sanguinaria canadensis*—Plant and rhizome.

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

ADULTERATION.—E. M. Holmes calls attention to an adulteration of *Helionas rhizome* (q.v.), false unicorn, a rather expensive admixture amounting, in one case, to 40 per cent. This root has a different transverse surface, being of a dirty white hue and horny texture, and

exhibits a well-defined central column, occupying about one-third of the diameter, and containing irregularly placed vascular bundles.

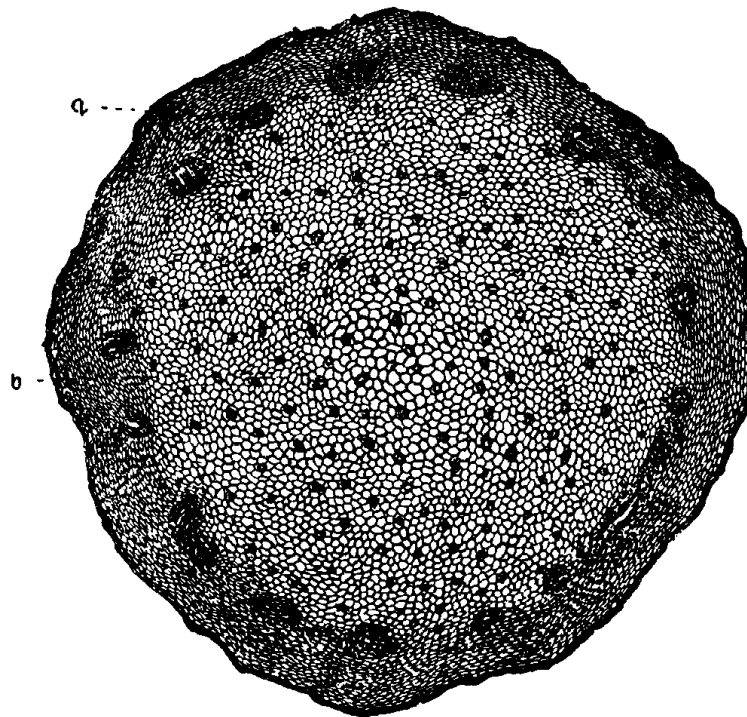


FIG. 105.—Sanguinaria. *a.* Wood-bundle. *b.* Pith.

CONSTITUENTS.—**Sanguinarine**, $C_{20}H_{15}NO_2$, a colorless alkaloid yielding red salts, chelerythrine yielding lemon-yellow salts, homochelidonine and protopine. See Alkaloids, under Chelidonium (183). “A careful analysis of sanguinaria shows that the yield of sanguinarine scarcely reaches 1 per cent.” Schlotterbeck believes that “the name Sanguinarine should be applied to the predominating alkaloid, to chelerythrine which forms yellow salts. Sanguinarine nitrate is becoming recognized more and more by the medical profession as a remedy in respiratory disorders and throat troubles.” Ash, not exceeding 3 per cent.

Preparation of Sanguinarine.—Treat infusion of the powdered rhizome with dilute HCl or acetic acid, add NH_4OH , collect precipitate, redissolve in alcohol, decolorize, and evaporate. It is white, soluble in alcohol, ether, benzene; yields bright red salts of an acrid taste.

ACTION AND USES.—An acrid emetic, stimulant, narcotic. Moderate doses produce nausea and circulatory depression, and in large doses it inflames the stomach, causing intense burning, thirst, vomiting,

dimness of vision, vertigo, great prostration, and collapse.

Powdered sanguinaria snuffed up the nostrils is sternutatory, and applied locally it acts as a stimulant to indolent ulcers and as an escharotic to fungous granulations. The physiological action of sanguinaria bears no relation to its principal therapeutic application, namely, as a stimulating expectorant in subacute and chronic bronchitis. Dose: Expectorant, 0.2 Gm. (3 gr.); emetic, 1 Gm. (15 gr.).

OFFICIAL PREPARATION.

Tinctura Sanguinariae (10 per cent.) Dose: 15 to 30 drops (1 to 2 mls)

186. **RHOEAS**.—RED Poppy. The petals of **Papa'verrhoe'as** Linné, the red or corn poppy of our gardens, growing abundantly as a wild plant in Europe. Nearly round, 50 mm. (2 in.) broad, contracted below into a short blackish claw; when fresh, they are of a scarlet-red color, but become brownish-purple on drying, and have an opium-like odor and a somewhat bitter taste. All parts of the plant contain the alkaloid rhoeadine, which produces interesting reactions with acid and alkalis. It does not appear to be poisonous. Acid solutions produce a purple color, which disappears when neutralized. One part of the alkaloid produces a deep purple with 10,000 parts of water, rose with 20,000, and a perceptible redness with 800,000 parts. According to Hesse, the milky juice also contains meconic acid. Red poppy is a weak and uncertain opiate; **used in pharmacy almost wholly in the fresh state for coloring preparations.**

FUMARIACEÆ.—Fumitory Family

Erect or climbing herbs with alternate leaves. Slightly bitter, innocent plants. *Bocconia cordata* (= *Macleya cordata*), Tree Celandine, belongs to this order (see *Chelidonium*). Yields protopine.

187. **CORYDALIS**, N.F.—TURKEY CORN. Tubers of **Dicen'tra canadensis** De Candolle. *Habitat*: Canada and the mountains of the United States south to Kentucky. Small, heavy, **pebble-like tubers**, often united, three around a common center; of a dull yellowish to a dull black color, semitranslucent; inodorous; bitter. They contain four alkaloids, the chief of which is corydaline ($C_{18}H_{19}NO_4$), four-sided prisms, inodorous, tasteless, insoluble in water, soluble in ether, alcohol, and chloroform. This interesting alkaloid has been found in other species of corydalid, as *C. cava*.

Preparation of Corydaline.—Treat the residue from evaporated tincture with dilute HCl. Precipitate with ammonia and dissolve precipitate in boiling alcohol; on evaporation of this solution four-sided prisms of the alkaloid are deposited.

CRUCIFERAE.—Mustard Family

Herbs with pungent, watery juice; *sepals* and *petals* 4 each, cruciform; *stamens* 6, tetradynamous; *capsule* usually spuriously 2-celled; *fruit* a silique or silicle.

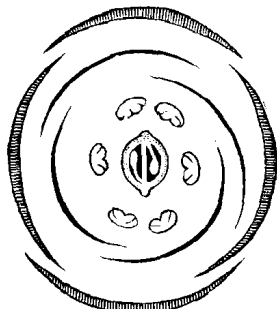


FIG. 106.—Diagram of a flower of the *Cruciferae*.



FIG. 107.—The embryo of *Brassica pumias orientalis*.

Synopsis of Drugs from the Cruciferae

- | | | |
|---------------------|----------------------|-----------------|
| A. <i>Seeds.</i> | B. <i>Herb.</i> | C. <i>Root.</i> |
| SINAPIS ALBA, 188. | Bursa Pastoris, 190. | Armoracia, 191. |
| SINAPIS NIGRA, 189. | | |

188. SINAPIS ALBA

WHITE MUSTARD

The seed of **Sina'pis al'ba** Linné.

BOTANICAL CHARACTERISTICS.—Stem 1 to 2 feet high, round, smooth. *Leaves* lyrate-pinnatifid. *Flowers* yellow. *Silique* hispid. *Seeds* whitish, with the *embryo* folded upon the surface of one of the cotyledons, which is also folded so as to inclose it.

HABITAT.—Asia and Southern Europe; cultivated.

DESCRIPTION OF DRUG.—The principal difference between this and black mustard is that of color and size, being 1 to 2 mm. in diam., of a yellowish color, and less pungent. **The oily embryo consists of a curved caudicle and two cotyledons, one folded over the other.** Both the black and white seeds are practically free from starch. Commercial ground mustard is an unctuous yellowish powder which cakes on pressure; it is usually a mixture of the ground white mustard (dull yellow) and the black mustard (yellowish-green). The mixture is, however, often rendered brighter by the addition of turmeric; when this is the case, it will respond to the test for starch, and will acquire a red-brown color with a solution of borax or boric acid. The “limit of starch”

test of the U.S.P., page 394 (8th ed.), will betray dilution with starchy substances. Moistened with water the powder quickly develops a pungent odor.

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

CONSTITUENTS OF BLACK AND WHITE MUSTARD.—Both contain a fixed Oil, 22 to 23 per cent.; mucilage about 19 per cent. Both seeds contain the ferment myrosin, the white having usually the larger quantity. The quantity of myrosin in these seeds is quite variable, sometimes being as low as 2 per cent., then as high as 18 per cent. A glucoside exists in the white mustard, *sinalbin* ($C_{30}H_{44}N_2S_2O_{16}$), which, decomposed by myrosin, yields glucose, sinapine sulphate, and a fixed oil, which is the *sulphocyanate of acrynyl*, and is found to be identical with *para oxyphenylacetic acid*. H. Salkowski manufactured this principle synthetically. The black mustard contains *sinigrin* ($C_{10}H_{18}KNS_2O_{10}$), which yields, when decomposed by the ferment myrosin, glucose, potassium sulphate, and a volatile oil, *allyl isothiocyanate* ($CS:K.C_3H_5$), the common mustard oil. Ash, not exceeding 9 per cent.

ACTION AND USES.—Same as *Sinapis Nigra*. Average dose: 2 dr. (8 Gm.).

Preparation of Sinalbin.—Extract powdered white mustard with benzene (CH) to remove oil. Treat the dried dregs with four times its weight of boiling alcohol. Filter the alcoholic liquid while hot. On standing in a cool place the liquid deposits crystals of sinalbin.

Preparation of Sinigrin.—Oil is removed, as in the case of sinalbin. The oil cake is then boiled in alcohol and evaporated to dryness. Repowder and extract with cold water. Treat the resulting liquid with barium carbonate and evaporate on a waterbath to dryness. Extract the residue with strong boiling alcohol and filter while hot. On cooling and standing the solution deposits silky needles of sinigrin, or potassium myronate.

189. SINAPIS NIGRA

BLACK MUSTARD

The ripe seed of **Bras'sica ni'gra** Linné.

BOTANICAL CHARACTERISTICS.—Similar to *S. alba* (see above), but has larger flowers, a longer hispid silique, and a smaller blackish seed.



FIG. 108.—*Sinapis nigra*—Branch.

HABITAT.—Asia and Southern Europe; cultivated.

DESCRIPTION OF DRUG.—A globular seed about 1 mm. ($\frac{1}{25}$ in.) in diameter, with a circular hilum and a short beak not filled with albumen; **testa hard**, black, or reddish-brown, **finely pitted**. The yellow embryo and cotyledons are folded and bent along the midrib. Inodorous when dry, but **pungent and penetrating when moist**; taste hot, acrid. The powder should give only a faint reaction for starch by the iodine test. Ash, not exceeding 9 per cent.

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

ACTION AND USES.—Externally a **powerful rubefacient and counter-irritant**, internally **emetic**, especially valuable in cases of

poisoning by narcotics from its reflex stimulation of the heart and respiration. Dose: 1 to 4 dr. (4 to 15 Gm.).

OFFICIAL PRODUCTS.

189a. **Oleum Sinapis Volatile.** U.S.P. IX. A product yielding not less than 92 per cent. of "allyl isothiocyanate." It is produced synthetically or obtained from the seed of *Brassica Nigra* by maceration with water and subsequent distillation, and must conform in name to the source from which it is derived.

Great caution should be exercised in smelling this oil. It should not be tasted except when highly diluted.

DESCRIPTION AND SOURCE.—Volatile oil of mustard is not contained as such in seeds but is formed by the decomposition of "sinigrin" or "potassium myronate" in the presence of emulsin. The ground mustard seed is deprived of its fatty oil with the aid of hydraulic presses. The press cakes are mixed with tepid water, allowed to undergo fermentation, and then distilled with water vapor. The yield varies between 0.5 to 0.75 per cent. of the original seed. At a temperature exceeding 70°C. (158°F.) no fermentation takes place because the myrosin is coagulated and rendered inactive.

PROPERTIES.—Oil of mustard is a colorless or yellowish, limpid and refractive liquid with an exceedingly pungent and acrid odor. Inasmuch as it draws blisters when in contact with the skin, it should not be tasted.

COMPOSITION.—In addition to "mustard oil," C_3H_5SCN , or allyl isosulphocyanate, the oil from black mustard contains variable amounts of "allyl cyanide," C_3H_5CN , and carbon disulphide, CS_2 .

ACTION AND USES.—Volatile oil of mustard is rarely given internally. Locally it may be employed as a counter-irritant. Diluted with olive oil, it may be used as a substitute for mustard papers and as a stimulating liniment. Dose: $\frac{1}{125}$ mil ($\frac{1}{8}$ drops).

189b. **OLEUM SINAPIS EXPRESSUM** (Unofficial).—Crushed seeds of the black and white mustard yield, by cold expression, about 22 per cent. of a bright yellow (white) or brownish-yellow (black) oil, of a bland taste. This oil is a commercial oil and not infrequently used for the adulteration of other oils. Rapeseed, or colza, oil is obtained from the seeds of different varieties of the genus *Brassica*, rape (*Brassica napus*) in particular. In Europe the term rapeseed oil is sometimes applied to the product of rape alone, colza being restricted to the oil obtained from the ruta-baga, or Swedish turnip (*B. campestris*), while "Rubsen" oil is furnished by the common turnip (*B. rapa*). There is great confusion among authors in the use both of the common names of the oils and the scientific names of the varieties of *Brassica* which produce them. The seeds of rape contain from 33 to 43 per cent. of oil, which, when crude, is a dark yellow-brown and used for lubricating. Refined and freed from albumen and mucilage the oil becomes bright yellow. Rape oil is extensively used for lamps,

lubricating machinery, and for adulterating both almond and olive oils.

190. **BURSA PASTORIS**.—SHEPHERD'S PURSE. The herb of **Capsella bursa-pastoris**, Moench, a small plant very common along our roadsides. It derives its name from its inversely heart-shaped fruit in elongated racemes. The small white flowers are in corymbose racemes. Nearly inodorous; taste acrid, pungent, and bitter. Contains a little volatile oil of mustard. An active diuretic, also tonic and stimulant. Dose: 15 to 60 gr. (1 to 4 Gm.).

191. **ARMORACIA**.—HORSE RADISH. The root of **Cochlearia armoracia** Linné. Indigenous to Europe, but cultivated in our gardens as a condiment. A cylindrical root 300 mm. (12 in.) long, 12 to 25 mm. (1/2 to 1 in.) thick; externally pale yellowish-brown, warty; internally white; fracture short; odor when crushed pungent; taste sharp and acrid. Contains a volatile oil similar to oil of mustard. Used only in fresh state as a stimulant to digestion, as a diuretic, and externally as a rubefacient. Dose: 1 to 2 dr. (4 to 8 Gm.).

SARRACENIACEÆ.-Pitcher-plant Family

192. **SARRACENIA FLAVA** and **S. PURPUREA** Linné.—The curious pitcher-plant, fly-trap, or side-saddle plant of our Southern States, where their rhizomes are much used in dyspepsia. They are tonic and diuretic. Dose: 15 to 30 gr. (1 to 2 Gm.).

DROSERACEÆ.-Sundew Family.

193. **DROSER**, N.F.—SUNDEW. The herb of **Drosera rotundifolia** Linné. (See *Conspectus*.) *Habitat*: North America and Europe. Used principally as a pectoral in bronchitis, coughs, etc. Dose: 5 to 15 gr. (0.3 to 1 Gm.).

CRASSULACEÆ.-Orpine Family

194. **SEDUM ACRE**.—BITING STONE-CROP. ENGLISH MASS. The whole plant, **Sedum acre** Linné. *Habitat*: Europe; cultivated in New England gardens. It is said to be very successful in the treatment of diphtheritic sore throat, by dissolving and expelling the false membrane. Dose: 15 to 30 gr. (1 to 2 Gm.).

195. **PENTHORUM**.—VIRGINIA STONE-CROP. The herb of **Penthorum sedoides** Linné. Astringent, demulcent, and laxative, in diseases of the mucous membranes. Dose: 15 to 30 gr. (1 to 4 Gm.).

SAXIFRAGEÆ.-Saxifrage Family

196. **HEUCHERA**.—ALUM ROOT. The root of **Heuchera americana** Linné. (See *Conspectus*.) *Habitat*: United States. It contains about 14 per cent. of tannin, and is a powerful astringent in doses of 15 to 30 gr. (1 to 2 Gm.).

197. **HYDRANGEA**, N.F.—The root of **Hydran'gea arbores'cens** Linné. (See *Conspectus*.) *Habitat*: United States. It consists of several bent, branched roots, arising from a thick, knotty head, or, as usually seen, of pieces of these roots cut up into various lengths. The rather thick, light gray, or pale brown bark is longitudinally ridged and covered with rust-colored patches, and separates easily from the tough, white, tasteless wood; wood-wedges long, narrow; odorless; taste of bark sweetish, afterward pungent. Used as a diuretic and as an antilithic in those cases where there is an alkalinity of the urine and a tendency toward the deposition of phosphatic calculi. Dose: 30 to 60 gr. (2 to 4 Gm.).

198. **MITELLA NUDA** Linné.—COOLWORT. (Leaves.) Diuretic; used in inflammatory and catarrhal affections of the bladder and kidneys.

HAMAMELIDACEÆ.—Witchhazel Family

Shrubs or trees with alternate, simple leaves and deciduous stipules. *Flowers* in heads or spikes, often polygamous or monoecious. *Fruit* a woody capsule, 2-beaked, 2-celled, 2-seeded. A family which contains but few species, but is dispersed over both hemispheres. The wood of a tree, Parrolin, is extremely hard, and in Persia is called iron-wood.

Synopsis of Drugs from the Hamamelidaceæ

- | | |
|-----------------------------------|----------------------|
| A. <i>Leaves.</i> | C. <i>Balsam.</i> |
| * HAMAMELIDIS Folia , 199. | STYRAX , 201. |
| B. <i>Bark.</i> | Liquidambar, 202. |
| HAMAMELIDIS CORTEX , 200. | |

199. HAMAMELIDIS FOLIA, N.F.—HAMAMELIS LEAVES

WITCHHAZEL

The dried leaves of **Hamame'lisvirgin'iana** Linné, collected in autumn before the flowering of the plants. Not more than 10 per cent. of stems and foreign matter permitted.

HABITAT.—North America.

DESCRIPTION OF DRUG.—Leaves broadly elliptical to obovate, more or less unequal, 3.5 to 12 cm. long, 2.5 to 7 cm. broad; apex rounded, acute or acuminate; base obliquely cordate; margin sinuate or sinuate-dentate. Upper surface dark green, midrib and veins prominent, veins of the first order running nearly parallel to the margin; under surface light green, texture coarse, brittle; odor slight; taste astringent.

Twigs with nodes 2-ranked giving the younger portions frequently a zigzag outline; externally yellowish-brown, with a purplish tinge, nearly smooth, faintly longitudinally wrinkled and with small circular lenticels; fracture tough, fibrous bark easily separable from the whitish or green white, finely radiate wood, in which the annular

rings are not very distinct; odor slight and characteristic.

Powder.—Dull green. Characteristic elements: The trichomes, one-celled, in groups of 8 to 15, radiating from a center; crystal fibers, calcium oxalate prisms, and stomata. Seldom employed as powder.

CONSTITUENTS.—Gallic acid; hamamelo-tannic acid, $C_{14}H_{14}O_9 + 5H_2O$, resin, and extractive. **Distilled Extract of Witchhazel, Hamamelis Water, Aqua Hamamelidis**, is prepared from hamamelis bark by macerating the bark in water for twenty-four hours, then distilling the product until the distillate reaches 85 per cent. of the bark used; then add 15 per cent. of alcohol. It has a peculiar odor, a somewhat saccharine taste, is quite stable, and presents no pharmaceutical, chemical, or therapeutical incompatibility. Its mode of preparation has been to some extent a trade secret, but the above formula furnishes a good preparation. This preparation has built up quite an industry along the Connecticut Valley, where the distillation of the liquid is performed almost exclusively.

ACTION AND USES.—It has come into extensive use as an **astrigent** in hemorrhoids and internal hemorrhages, and as a general **vulnerary**. The distillate, known as “Extract of Witchhazel,” is alleged to have properties which are not professionally recognized. Average dose: 30 gr. (2 Gm.).

Fluidextractum Hamamelidis Foliorum, Dose: 10 to 60 drops (0.6 to 4 mils)-

200. **HAMAMELIDIS CORTEX.**—WITCH-HAZEL BARK. Thin pieces covered with an easily separable grayish or grayish-brown cork, more or less covered with blackish dots and scars. When deprived of this layer, the bark is pale cinnamon-brown, fibrous. Odorless; taste astringent, bitter, and somewhat pungent. Its medical properties are the same as those of the leaves. The bark and twigs are official under the above title.

201. STYRAX.—STORAX

LIQUID STORAX

A balsam obtained from the wood and inner bark of **Liquid'ambar orienta'lis** Miller.

SOURCE AND DESCRIPTION.—This balsam is not a natural part of the plant but is produced as a result of the stimulus from wounds in the bark. The outer bark is bruised, then the inner bark becomes saturated with this pathological exudation. The outer bark is removed and the inner is boiled in sea water, the storax is skimmed off the surface as it rises, then afterward the boiled bark is pressed. The bark which yet contains some balsam is dried and used chiefly as incense. Good storax should not contain over 30 per cent. of water and 60 per cent. should be soluble in alcohol.



FIG. 109.—*Liquidambar orientalis*—Branch.

The *Liquidambar orientalis*, growing in the southwest districts of Asia Minor, produces the balsam also, it is said. It is a gigantic tree “like the great oak, having clusters (of berries) like those of the oak, but its berries are larger.” The inner bark of the tree is boiled in water and the balsam pressed out. A superior kind is said to be obtained by simply pressing the bark before it is boiled. Another kind of liquid storax is mentioned—that which exudes naturally.

HABITAT.—Asia Minor.

DESCRIPTION OF DRUG.—It is a viscid, gray semi-liquid, with an agreeable odor, and a balsamic, somewhat acrid taste; a heavier dark brown layer separates on standing.

CONSTITUENTS.—Containing a volatile oil and a resin, and cinnamic and benzoic acids, storax is rightly classed as a balsam. Its most

abundant constituent is **storesin**, $C_{36}H_{58}O_3$, existing both free and as a cinnamic ether. **Cinnamic acid** exists to the extent of 6 to 12 per cent., various ethers of it occurring, **styracin** being the cinnamate of cinnamyl. Storax also contains a liquid hydrocarbon, **styrol**, C_8H_8 , or **cinnamene**, having the storax odor and taste, and another fragrant constituent, **vanillin**, not more than 1 per cent. of ash.

ACTION AND USES.—Stimulant expectorant. Dose: 5 to 20 gr. (0.3 to 1.3 Gm.).

OFFICIAL PREPARATION.

Tinctura Benzoini Composita (8 per cent.), Dose: $1/2$ to 2 fl. dr. (2 to 8 mils).

202. **LIQUIDAMBAR.**—SWEET Gum. A balsam exuding spontaneously or from incisions made in the trunk of **Liquidam'barstyraci'flua**. Habitat: Southern United States and Central America. It is a pale yellowish, opaque liquid of honey-like consistence, or thick, golden brown, solidifying on exposure to a transparent, amber-colored mass, which softens at the heat of the hand; odor storax-like; taste aromatic and pungent. Stimulant expectorant, mostly used in the manufacture of chewing-gum.

ROSACEÆ.-Rose Family

Herbs, shrubs, or trees, with pinnate, palmate, or simple, alternate *leaves*. *Flowers*, regular, *sepals*, usually 5, united *petals* 5, perigynous; *stamens* numerous distinct, perigynous; *pistils* 1 to many. The different tribes are characterized by the fruit—a drupe in Prunææ, follicles in Spiræææ, druples in Rubeææ, dry akenes in Potentilleææ and Poterieææ, bony akenes in Roseææ, and pomes in Pomeææ. Except in the seeds of the drupe-fruits, which develop the poison hydrocyanic acid, this order is destitute of noxious qualities.

Synopsis of Drugs from the Rosaceæ

<p>A. <i>Barks.</i> PRUNUS VIRGIN- IANA, 203. Choke Cherry, 204. Malus, 207. *RUBUS, 217. *Quillaja, 212.</p>	<p>B. <i>Seeds.</i> AMYGDALA AM- ARA, 209. AMYGDALA DUL- CIS, 210. Cydonium, 208.</p>	<p>C. <i>Fruits.</i> *Prunum, 205. *Rubus Idæus, 218. Crætegus, 219. Pyrus Malus, 207</p>
<p>D. <i>Leaves.</i> Persica, 206. Laurocerasus, 220. Fragaria, 221.</p>	<p>F. <i>Rhizomes.</i> Tormentilla, 223. Geum Urbanum, 224. Geum Rivale, 225. Gillenia, 226.</p>	<p>H. <i>Volatile Oils.</i> OLEUM ROSÆ, 216. OLEUM AMYGDA- LÆ AMARÆ, 209 a.</p>
<p>E. <i>Flowers and Petals.</i> ROSA GALLICA, 213. Rosa Centifolia, 214. *Cusso, 222.</p>	<p>G. <i>Herbs.</i> Agrimonia, 227. Potentilla, 228. Spiræa, 229. Rosa Canina, 215.</p>	<p>I. <i>Fixed Oils.</i> OLEUM AMYGDA- LÆ EXPRESSUM, 211.</p>

203. PRUNUS VIRGINIANA.—WILD CHERRY

WILD CHERRY BARK

The bark of *Prunus serotina* Ehrhart, collected in autumn and carefully dried and preserved.

BOTANICAL CHARACTERISTICS.—A large forest tree. *Leaves* oval-oblong or lance-oblong, brilliant green, smooth on both sides, unequally serrate; *flowers* white, in racemes; *drupes* purplish-black and shining; bitter.

SOURCE.—United States and Canada. Although the name *Prunus virginiana* has been held as the official and medicinal name, the botanical name is *P. serotina*. This leads to confusion among botanists, who strongly urge the discontinuance of the above official title. *Prunus virginiana* is the botanical name of the common choke cherry, not of the black wild cherry. *Prunus Pennsylvanica*, the wild red cherry, growing in rock woods and along the lake shores, is frequently mistaken for the *P. serotina*.

DESCRIPTION OF DRUG.—About 2 mm. ($\frac{1}{12}$ in.) or more in thickness, curved or flat. The newer bark is covered with a smooth, **greenish periderm**, but bark collected from the older parts usually has the corky layer removed, leaving a rough, **rust-brown surface, inner surface lighter colored, finely striate**; fracture granular. Almost inodorous, but **emits the characteristic odor of bitter almonds when moistened**; taste astringent, aromatic, and bitter, at the last bitter almond-like.

STRUCTURE.—Beneath the corky layer are found numerous clusters of stone cells, forming an interrupted zone. Just beneath this layer the medullary rays, which in the whole bark are wavy, terminate very obliquely. Between the medullary rays

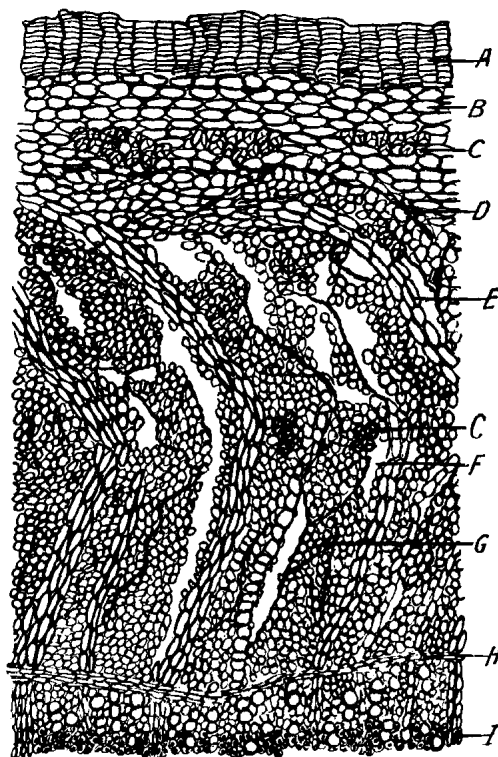


FIG. III.—Cross-section of bark of stem of *Prunus Virginiana* (*P. serotina*). A. Cork. B. Middle or green layer of bark. C. Clusters of stone cells. D. Compressed sieve tissue. E. Medullary ray. F. Fissure between medullary ray and bast. G. Bast tissue. H. Cambium zone. I. Ducts in mature wood.

are found masses of stone cells and more elongated bast fibers.

The bark of the root is thought to be the most active, but that of the whole tree is collected indiscriminately.

RELATIVE VALUE OF THE OLD AND NEW BARK.—Experiments by Dohme and by Stevens have been made to decide whether the green bark is richer in hydrocyanic acid than the older, thick, brown bark. The results of the experiments of these gentlemen are somewhat contradictory. Dohme obtains 0.216 and 0.183 per cent. of HCN respectively, while the older bark assays 0.167 and 0.159 per cent. Stevens found in the older bark 0.335 per cent., while the younger assayed only 0.25 per cent. It is probably safe to say that the older thick bark is not so unworthy of recognition as some believe.

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

CONSTITUENTS.—Tannin, a bitter glucoside, resin, starch, etc. The **volatile oil and hydrocyanic acid**, to which the sedative action is due, do not preexist in the bark, but, as in the bitter almond, are formed by the action on amygdalin, in the presence of water, of a ferment analogous to, if not identical with, emulsin; **the action of this ferment is destroyed at a boiling temperature**, and therefore heat should never be used in making preparations of this bark.

ACTION AND USES.—Tonic and sedative. Owing to the bitter principle it is a stomachic and bitter tonic. Useful in gastric atony and general debility. The syrup forms the basis of many of the cough syrups. Dose: 30 to 60 gr. (2 to 4 Gm.).

OFFICIAL PREPARATION.

Syrupus Pruni Virginianæ Dose: 1 to 4 fl. dr. (4 to 15 mils) .

204. **CHOKE CHERRY.**—The bark of **Pru'nus virginia'na** Linné, a small tree growing in the Northern and Western States. Tonic and antiperiodic.

205. PRUNUM, N.F.—PRUNE

PRUNE

The partly dried ripe fruit of **Pru'nus domes'tica** Linné.

BOTANICAL CHARACTERISTICS.—The French variety, or *Juliana*, the principal commercial prune, bears ovate-oblong, deep-purple *drupes*, not depressed at the insertion of the stalk, and with a scarcely visible suture and no furrow; pulp greenish and rather austere. The tree is small, with smooth branches and elliptical *leaves*; *flower-buds* formed of one or two flowers; *petals* white, oblong-ovate.

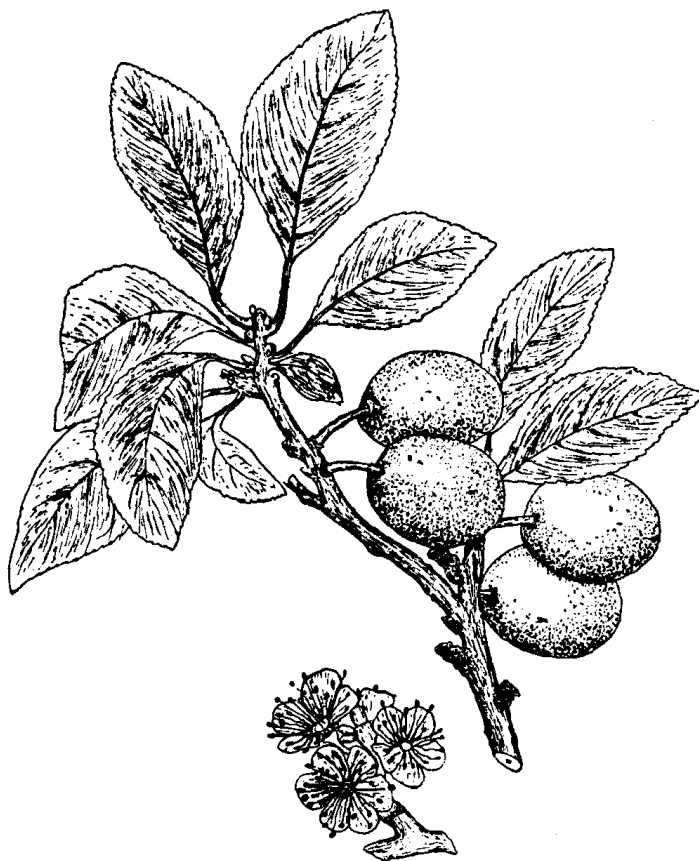


FIG. 112.—*Prunus domestica*—Fruiting branch and flowering branch.

HABITAT.—Western Asia; cultivated in temperate regions. Most of the prunes come from France, the best from Bordeaux.

DESCRIPTION OF DRUG.—Dried shriveled, oblong, almost globular, about 30 mm. ($1\frac{1}{3}$ in.) long; externally brownish-black. The sarcocarp (the medicinal portion) consists of a brownish-yellow pulp having a sweet, acidulous taste, and surrounds a single stone (putamen), which is very hard, smooth or ridged, and incloses a white, bitter seed.

CONSTITUENTS.—Sugar 12 to 25 per cent., pectin, malic acid, and salts. The seeds contain fixed oil, amygdalin, and emulsin.

Preparation of Amygdalin.—Obtained by solvent action of boiling alcohol upon the “oil cake,” evaporating off alcohol, fermenting residue by yeast, and precipitating amygdalin and gum. Boiling alcohol takes up the principle which is deposited on

cooling.

ACTION AND USES.—Laxative and nutrient, as an article of food or in laxative confections. **Confectio Sennæ** (U.S.P. VIII). Dose: 1 to 3 dr. (4 to 12 GM.).

206. **PERSICA**.—PEACH LEAVES. From **Pru'nus per'sica** Linné. Mild sedative, generally administered in infusion. Dose: 15 to 30 gr. (1 to 2 Gm.).

207. **MALUS**.—APPLE TREE. The bark of **Pyr'us ma'lus** Linné. Tonic and febrifuge. Dose of fluidextract: 15 to 60 drops (1 to 4 mils) .

SUCCUS POMARUM, N.F.—The freshly expressed juice of sound, ripe, sour apples, of cultivated varieties.

208. **CYDONIUM**.—QUINCE SEED. **Pyr'us cydo'nia** Linné. *Habitat*: Western Asia; cultivated. About 6 mm. ($\frac{1}{4}$ in.) long, ovate, somewhat triangularly compressed, with the hilum near the pointed end; testa dark brown, covered with a thin, mucilaginous membrane or epithelium, causing the seeds to adhere in masses. The two cotyledons are thick and oily, veined, with a short conical radicle. Taste and odor of the embryo like bitter almonds, of the unbroken seed mucilaginous and insipid. The testa contains a large amount of mucilage; the embryo, fixed oil. A decoction is often used as a demulcent, and as an addition to eye-lotions.

209. AMYGDALA AMARA.—BITTER ALMOND (U.S.P. VIII)

BITTER ALMOND

The ripe seed of **Pru'nus Amygd'alus**, var. *Amara*, De Candolle.

This is an oblong-ovate flattened seed with marked numerous longitudinal lines. Inodorous, bitter. Constituents: Fixed Oil, 45 per cent. and amygdalin a crystalline glycoside, which by the action of emulsin, a ferment existing in the seed in the presence of water, splits up into glucose, HCN and benzaldehyde. Used as a sedative. From the seed is extracted the fixed oil by expression, and, from the residue, the volatile oil by distillation.

209a. **OLEUM AMYGDALÆ AMARÆ**, U.S.—OIL OF BITTER ALMOND. A pale yellowish volatile oil obtained by macerating in water the residue left from bitter almonds after the fixed oil has been expressed, and distilling. It has a bitter, acrid taste, and a **strong odor of hydrocyanic acid**. It consists chiefly of benzoic aldehyde, to the oxidation of which is due the sediment, benzoic acid, thrown down on long exposure to air. The source from which it is derived in every case to be stated on the label. It should yield when assayed by the U.S.P. process not less than 85 per cent. of benzaldehyde and not less than 2 per cent. nor more than 4 per cent. of HCN. This oil is intended for

medicinal use and not for flavoring foods. Sedative. Dose: $\frac{1}{4}$ to 1 drops (0.0164 to 0.0650 mil), in emulsion.

OFFICIAL PREPARATIONS.

Aqua Amygdalæ Amaræ (0. 1 per cent.), Dose: $\frac{1}{2}$ to 2 fl. dr. (2 to 8 mils).

Spiritus Amygdalæ Amaræ (1 per cent.), Dose: 5 drops (0.3 mil)-

210. AMYGDALA DULCIS.—SWEET ALMOND

SWEET ALMOND

The ripe seed of **Pru'nus Amyg'dalus**, var. *Dulcis*, De Candolle.



FIG. 113.—*Prunus amygdalus*—Branch, flower, and fruit.

BOTANICAL CHARACTERISTICS.—Like *Amygdala Amara*, except that the *style* is much longer than the *stamens*, and the *seed* is sweet.

SOURCE.—Western Asia and Barbary; extensively cultivated in Southern Europe, Spain and Southern France chiefly supplying the market.

DESCRIPTION OF DRUG.—Closely resembles the bitter almond, but is somewhat larger, with more convex sides, and has a **bland, sweetish taste**, free from rancidity. When triturated with water, it forms a milk-white emulsion, free from the odor of hydrocyanic acid.

CONSTITUENTS.—Fixed oil from 50 to 55 per cent., nitrogenous compounds 25 per cent. (**myrosin, vitellin, conglutin**) precipitated by acetic acid, **emulsin**, mucilage, and sugar amounting to about 6 per cent. Ash, not exceeding 4 per cent.

ACTION AND USES.—Nutrient and demulcent; being free from starch, sweet almonds are often used as a diet in diabetes.

OFFICIAL PREPARATION.

Emulsum Amygdalae (6 per cent.), Dose: 2 to 8 fl. oz. (60 to 240 mls)

211. OLEUM AMYGDALÆ, EXPRESSUM.—
EXPRESSED OIL OF ALMOND

ALMOND OIL

A fixed oil expressed from Bitter or Sweet Almond.

DESCRIPTION.—A thin, clear, colorless or straw-colored liquid, with a mild, sweet taste and slight odor.

CONSTITUENTS.—Chiefly olein, with a slight quantity of palmitin.

ACTION AND USES.—Lenitive in pulmonary affections, in the form of emulsion. Dose: 1 to 4 fl dr. (4 to 15 mls),

OFFICIAL PREPARATION.

Unguentum Aquæ Rosæ (56 per cent., with spermaceti, white wax, stronger rose-water and borax).

212. QUILLAJA, N.F.—QUILLAJA

SOAPBARK

The dried bark derived of the periderm of *Quilla'ja sapona'ria* Molina.



FIG. 114.—Quillaja—Cross-section of bark. (25 diam.) A, Medullary ray. B, Bast fibers and stone cells. (Photomicrograph.)

DESCRIPTION OF DRUG.—In rather thick, flattish pieces of various sizes, deprived of the corky layer; outer surface brownish-white, sometimes with patches of the reddish-brown cork adhering; when held up to the light it shows **numerous glistening crystals** of calcium oxalate, which are scattered throughout the tissue. Fracture tough and is fibrous, a **transverse section showing a checkered arrangement** of pale brown bast fibers imbedded in the white wood. Odorless; taste persistently **acid**. The powder is sternutatory. The powder of quillaja has been suspected as an adulterant of senega. It is not at all difficult to detect its presence in such admixtures, as in quillaja powder there are found elements not at all represented in senega. In quillaja there is a considerable amount of sclerotic tissue, numerous bast fibers, and prismatic crystals of calcium oxalate. Any and all of these clearly mark the powder of quillaja, and would at once betray its presence in the powder of senega.

Powder.—Grayish. Inner parenchyma of cortex colorless (15 to 25 μ by 50 to 150 μ in diam.), mostly with large, long prisms of calcium oxalate; parenchyma of cortex with starch (3 to 10 μ in diam.); sclerenchyma with bast fibers (20 to 30 μ in diam.), thick-walled, porous, occasionally branched; stone cells (50 to 150 μ in diam.).

CONSTITUENTS.—Its irritant property is due to the presence of **saponin**, $C_{19}H_{30}O_{10}$, a mixture of the two glucosides, **quillaic acid** and **sapotoxin**.



FIG. 115.—*Quillaja saponaria*—Branch.

Preparation of Saponin.—Exhaust quillaja with hot alcohol, from which it separates upon cooling. Saponin is regarded as a mixture of two glucosides, quillaiac acid and sapotoxin.

ACTION AND USES.—Containing about the same principles as senega, it has been recommended as a substitute for that drug as an expectorant in pulmonary affections. Dose: 15 to 30 gr. (1 to 2 Gm.).

213. ROSA GALLICA.—RED ROSE

RED ROSE

The dried petals of **Ro'sa gal'lica** Linné, collected before expanding.

BOTANICAL CHARACTERISTICS.—A dwarfish bush, with odd-pinnate *leaves* and adnate *stipules*; *leaflets* elliptical, rugose. *Flowers* large, red; *stamens* many. *Carpels* several, becoming bony akenes in *fruit*. Receptacle urn-shaped, with *styles* rising from inner surface.

HABITAT.—Asia and Europe; cultivated.

DESCRIPTION OF DRUGS.—The buds are collected before expanding, the petals being loosely imbricated in the form of cones, or separate and crumpled. They are roundish-obovate, with a dark red, velvety appearance, which they retain after drying, during which process the fresh petals lose go per cent. of their weight; claws yellow; odor fragrant; taste bitter and astringent.

Powder.—Elements in: See Part iv, Chap. I, B.

CONSTITUENTS.—The astringency is due principally to **quercitrin**, with which their color is also doubtless connected. They contain some tannin, fat, and volatile oil. Boiling water extracts their virtues.

Not more than 3.5 per cent. of ash.

ACTION AND USES.—Mild tonic and astringent; chiefly employed as a vehicle for tonic and astringent preparations. Dose: 15 to 60 gr. (1 to 4 Gm.).

OFFICIAL PREPARATIONS.

Fluidextractum Rosæ Dose: 15 to 60 drops (1 to 4 mils).
Mel Rosæ (12 per cent.).

214. ROSA CENTIFOLIA.—PALE ROSE, HUNDRED-LEAVED OR CABBAGE ROSE.

The petals of **Ro'sa centifo'lia** Linné. Off. U.S.P. 1890. The full-blown flower is picked off just below the calyx, and the petals separated. They are a beautiful pink when fresh, dull brown when dry; thin and delicate, roundish-obovate, sometimes obcordate, with a fragrant odor, and a bitter, faintly astringent taste. They may be preserved fresh for a considerable time by packing them in half their weight of common salt. These petals were formerly used in making the compound syrup of

sarsaparilla, but wisely have been dropped as one of the ingredients. *Constituents:* Malic and tartaric acids, tannin, etc. Their odor depends upon a volatile oil existing in small quantity, about 0.04 per cent. Seldom, if ever, used medicinally, In pharmacy used principally for preparing rose-water.

215. **ROSA CANINA.**—Hips. DOG ROSE. The fruit of **Ro'sa cani'na** Linné, common in Europe. Ovoid, or pitcher-shaped, about 18 mm. ($\frac{3}{4}$ in.) long, with a smooth, shining, red surface. It consists of the ripened fleshy calyx, surmounted by the five calyx teeth; its cavity is hairy inside, and contains numerous hard, hairy akenes, but these akenes and hairs are removed before the hips are used. Taste acidulous, slightly astringent, due to the malic and citric acids and slight quantity of tannin contained; odorless. Refrigerant, mild astringent, and diuretic. Confection of hips is a familiar preparation abroad.

216. OLEUM ROSÆ.—OIL OF ROSE,

ATTAR OF ROSES

A volatile oil distilled from the fresh flowers of **Ro'sa damasce'na** Miller.

SOURCE.—District of Kisanlik, in southern slope of the Balkans.

DESCRIPTION.—A pale yellow liquid having a specific gravity of 0.87, an agreeable rose odor, and sweetish taste. It solidifies between 16° and 21°C. into a transparent solid, containing numerous slender, iridescent crystals of the stearopten, which float on the surface when the solid is melted, as by the heat of the hand.

CONSTITUENTS.—It consists of two parts, one of which is fragrant and the other comparatively inodorous. The fragrant principles are mainly geraniol and citronellol; the other a white crystalline stearopten, $C_{16}H_{34}$, melting at 36.5° to 38°C. Used as a perfume in ointments, pomades, etc.

217. RUBUS, N.F.—RUBUS

BLACKBERRY ROOT

The dried bark of the rhizome of **Ru'bus villo'sus** Aiton, *Rubus Nigrobaccus*; Bailey, and *Rubus cuneifolius* Pursh.

DESCRIPTION OF DRUG.—In thin, tough, pliable bands 1 to 2 mm. ($\frac{1}{25}$ to $\frac{1}{12}$ in.) thick, having a blackish-gray outer surface, longitudinally wrinkled, and a pale brown inner surface; bast layers tangential, the fibers easily removed. Odorless; taste

astringent and somewhat bitter. The root of *Rubus canadensis* Linné (dewberry) very closely resembles that of blackberry in medical properties.

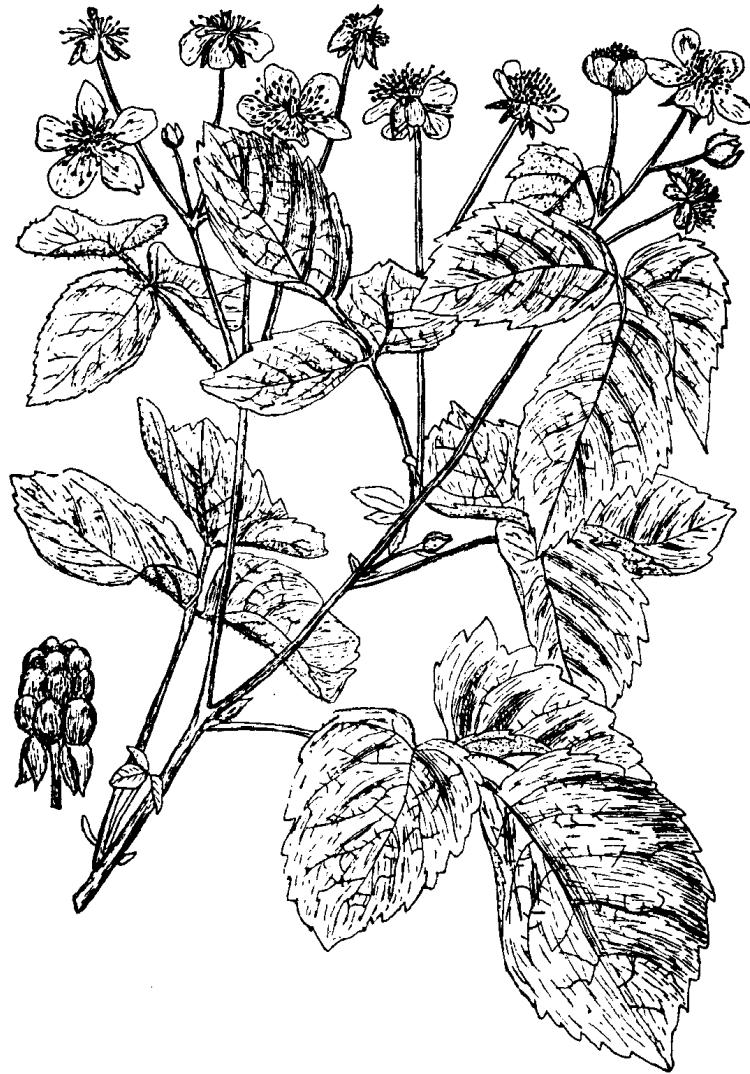


FIG. 116.—*Rubus villosus*—Branch and fruit.

Powder.—Light brown. Characteristic elements: Parenchyma of cortex, thin walled, with starch, spherical (3 to 7 μ in diam.), thick, porous, elongated; bast fibers, walls of medium thickness, with some starch; wood fibers, ducts and tracheids, numerous with simple pores; cork considerable (20 to 30 μ in diam.); calcium oxalate crystals, aggregate (25 to 30 μ in diam.).

CONSTITUENTS.—The virtues of the bark depend chiefly upon the tannin present, about 10 to 15 per cent.

ACTION AND USES.—Tonic and astringent. From a popular domestic remedy it has come into extensive use in the treatment of diarrhea, dysentery, and relaxed conditions of the bowels generally. Dose: 15 to 30 gr. (1 to 2 Gm.).

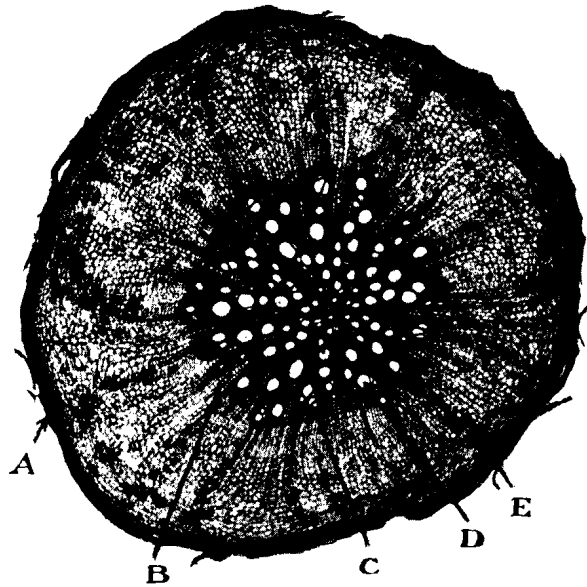


FIG. 117.—*Rubus villosus*—Cross-section of root, showing bark attached to wood. (17 diam.) A, Cork. B, Medullary ray. C, Xylem. D, Water tube. E, Groups of bast fibers. (Photomicrograph.)

PREPARATIONS: Fluidextractum Rubi, Syrupus Rubi, N.F.

RUBI FRUCTUS, N.F.—Includes two varieties of ripe fruits: *Nigrobaccus* and *Villosus*. A Syrup is recognized in the N.F.

218. **RUBUS IDÆUS**.—RASPBERRY. The fruit of **Ru'bus idæ'us** Linné. Off. U.S.P. 1890. A collective fruit, hemispherical, about 12 mm. ($1/2$ in.) broad; it consists of numerous small, red, hairy drupes united at the base around the receptacle, from which the coalesced fruits are easily removed, leaving a conical cavity. Contains a bright red, acidulous juice; odor agreeable. Used only in the fresh state. The purplish-black fruit of *Rubus occidentalis* Linné may be substituted for it.

SYRUPUS RUBI IDÆI—**Rubi Idæi Fructus**, N.F., includes two varieties: *Idæus* and *Strigosus*.

219. **CRATÆGUS**.—The fruit of **Cratæ'gusoxycan'tha**, English Hawthorn. Heart tonic. Its value as a cardiac stimulant and tonic has recently come to the medical profession through Dr. M. C. Jennings, of Chicago. Dose of fluidextract: 10 to 15 drops (0.6 to 0.9 mil).

220. **LAUROCERASUS**.—CHERRY LAUREL. The leaves of **Pru'nus laurocera'sus** Linné, an ornamental shrub native to Western Asia. They contain an amygdalin-like principle, **laurocerasin**, and a ferment. Odor bitter, almond-like; taste aromatic and bitter. Used in making cherry-laurel water, a preparation much employed in Europe as a sedative narcotic, much as the dilute hydrocyanic acid is used here.



FIG. 118.—*Rubus idæus*—Branch.

221. **FRAGARIA VESCA** Linné.—STRAWBERRY. (Leaves.) Mild astringent and diuretic. Dose: 1 dr. (4 Gm.), in infusion.

222. BRAYERA, KOOSO, N.F.

The dried panicles of the pistillate flowers of **Hage'nia abyssin'ica** Gmelin, without the presence of more than 10 per cent. of the staminate flowers, other parts of the tree, or other foreign matter. Reject any portions of the stem over 3 mm. in diameter and any binding material before the drug is powdered or used.

HABITAT.—Abyssinia.

DESCRIPTION.—Small, reddish, pistillate flowers, consisting of two reddish bracts and a calyx of five reddish, hairy sepals inclosing one or two nutlets. They come into

market in cylindrical bundles of the compressed panicles, or detached, on short, hairy peduncles; odor tea-like; taste bitter and nauseous. In trade the "brown" and "red" kusso are known. The former are mixed with male flowers. In the "red," the best variety, the sepals are reddish; in the "brown" they are greenish or brownish and smaller.



FIG. 119.—*Hagenia abyssinica*—Flowering branch, and male and female flowers.

Powder.—Light brown. Characteristic elements: These are to be found in the glandular trichomes consisting of stalks, 2 to 3 celled, head 1, 2, 4 celled; non-glandular trichomes, one-celled, curved; few ellipsoidal pollen grains with 3 pores. Powder seldom dispensed.

CONSTITUENTS.—The chief constituents are **kosotoxin** (amorphous), a muscle poison, and **protokosin** (crystalline), inactive. Kosotoxin with baryta water yields a neutral body said to be identical with commercial **kosin**, an active principle soluble in alkalies; a neutral principle, Koussein (dose: 15 to 30 gr.) is marketed; tannin 24 per cent., and a tasteless and an acrid resin. Ash, not more than 9 per cent.

Preparation of Kosin.—Heat cusso repeatedly with alcohol to which calcium hydrate has been added, boil residue with water, mix liquids, filter, and distil. Kosin is then precipitated by treating the solution with acetic acid. Is in flocculent form, soon becoming dense and resin-like. Purified by crystallization.

ACTION AND USES.—Tæniifuge. Dose: 15 Gm. (240 gr.).

Fluidextractum Cusso (U.S.P. 1890),. Dose: 1 to 4 fl. dr. (4 to 15 mls).

223. **TORMENTILLA**.—TORMENTIL. The rhizome of **Potentilla tormentilla** Sibthorp. *Habitat*: Europe. Large, somewhat fusiform, longitudinally wrinkled, and rough from numerous stem and rootlet scars; externally dull reddish-brown; fracture smooth, showing a pale reddish interior, consisting of one or two distinct circles of wood-fiber around a large central pith; inodorous; taste astringent. Used as a tonic and astringent. Dose: 10 to 30 gr. (0.6 to 2 Gm.), in powder or decoction.

224. **GEUM URBANUM**.—AVENS. EUROPEAN AVENS. The rhizome of **Geum urbanum** Linné. *Habitat*: Europe. Short, oblong, hard, with a dark-brown, warty, and scaly surface; a cross-section shows a thin bark, and a large, reddish pith surrounded by a circle of whitish wood, The rootlets are long and fibrous, light brown in color, and have a comparatively thicker bark. Odor aromatic, slightly clove-like when fresh, but nearly absent when dry; taste aromatic, bitter, and astringent. Used as an astringent and tonic. Dose: 15 to 45 gr. (1 to 3 Gm.), in powder or decoction.

225. **GEUM RIVALE** Linné.—WATER AVENS. (Rhizome.—See Conspectus.) Astringent and tonic. Dose: 15 to 45 gr. (1 to 3 Gm.).

226. **GILLENIA**.—AMERICAN IPECAC. The rhizome of **Gillenia stipulacea** Nuttall. *Habitat*: Western United States. A knotty rhizome, with numerous tortuous, annulate rootlets, the thick bark of which is in two reddish layers and incloses a tough, whitish, finely-rayed wood. *Gillenia trifoliata* Moench, growing east of the Allegheny Mountains, is a smaller and less knotty rhizome, and the rootlets are nearly straight and smooth. Both rhizomes are similar in medical properties, being mildly emetic and cathartic, somewhat resembling ipecac in action. Dose: 15 to 30 gr. (1 to 2 Gm.).

227. **AGRIMONIA**.—AGRIMONY. The herb of **Agrimo'nia eupatoria** Linné. Common in the United States west to the Rocky Mountains, and in Europe. Tonic and astringent. Dose: 30 to 60 gr. (2 to 4 Gm.).

228. **POTENTILLA CANADENSIS** Linné.—CINQUEFOIL. Habitat: North America. (Herb.) Astringent. Dose: 30 to 60 gr. (2 to 4 Gm.) in infusion.

229. **SPIRÆA TOMENTOSA** Linné.-HARDHACK. An indigenous herb used as astringent and tonic in doses of 30 to 60 gr. (2 to 4 Gm.). As found in market it consists of the slender, reddish-brown stems, broken leaves covered below with a rust-brown wool, and a few of the dull reddish flower-petals. Odor slight, aromatic; taste astringent and bitter.