

SAYRE'S MATERIA MEDICA - Part IV

RHAMNACEÆ.-Buckthorn Family

Shrubs or small trees with simple leaves; branches somewhat spinescent. *Flowers* somewhat dioecious. *Fruit* an indehiscent, fleshy, winged drupe, with a hard, woody endocarp, or a pod not arilled.

333. FRANGULA.—FRANGULA

BUCKTHORN

The dried bark of **Rham'nus fran'gula** Linné, collected at least one year before using.

BOTANICAL CHARACTERISTICS.—An elegant arborescent shrub, known as the berry-bearing alder. *Leaves* entire, with about 7 pairs of nearly opposite parallel veins. *Flowers* perfect, style simple; the fleshy berry is round, red, and on ripening becomes black and juicy.

HABITAT.—Europe and Northern Asia.

DESCRIPTION OF DRUG.—Quilled, about 1 mm. ($1/25$ in.) thick; outer surface grayish-brown, or blackish-brown, with numerous small, whitish, transversely-elongated lenticels and occasional patches of foliaceous lichens; inner surface smooth, pale brownish-yellow; fracture in the outer layer short, of a purplish tint; in the inner layer fibrous and pale yellow; when masticated, coloring the saliva yellow; odor distinct; taste sweetish and bitterish.

Medullary rays not converging at the outer ends (distinction from *Rhamnus Purshiana*); stone cells absent (distinction from *Rhamnus Purshiana* and *Rhamnus Californica*).

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

CONSTITUENTS.—Frangulin, or rhamno-xanthin, $C_{20}H_{20}O_{10}$, is a crystalline, lemon-yellow, odorless, tasteless glucoside; and emodin, a reddish principle, exists in the old bark; these develop by age. Two products are obtained from frangulin by hydrolysis—emodin, $C_{15}H_{10}O_5$, and rhamnose, $C_6H_{12}O_5$, Frangula-emodin differs from the rhubarb-emodin in melting-point, and in some color reactions. Senna and aloes

also contain an isomeric emodin. (See *Rhamnus Purshiana*.) Ash, not exceeding 6 per cent.



FIG. 168.—*Rhamnus frangula*—Branch.

Preparation of Frangulin.—Macerate the bark for four days in carbon disulphide. Evaporate; exhaust residue with alcohol; evaporate alcoholic solution to dryness; crystallize from ethereal solution. Forms sublimable yellow crys. tals; becomes purple when treated with alkalies. Dyes cotton, silk, wool, etc., yellow.

ACTION AND USES.—A mild laxative or cathartic, acting like senna and often used in its stead. Dose: $\frac{1}{2}$ to 2 dr. (2 to 8 Gm.).

OFFICIAL PREPARATION.

Fluidextractum Frangulae Dose: $\frac{1}{3}$ to 2 fl. dr. (1.3 to 8 mils).

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334. CASCARA SAGRADA.—CASCARA SAGRADA
CHITTEM DARK

The dried bark of the trunk and branches of **Rham'nus purshian'a** De Candolle.

BOTANICAL CHARACTERISTICS.—Plants of this species of *Rhamnus* attain a height of 10 to 20 feet. The leaves are ovoid, 3 to 5 in. in length, and about $\frac{1}{2}$ in. in their greatest width, serrate except at base (?—*MM*). *Flowers* are small and white, appearing after the leaves have matured. The *fruit* is a plain, round, black berry about $\frac{1}{4}$ in. in diameter, and contains three seeds. This species differs from other species of *Rhamnus* in that it is a larger tree and bears a larger fruit.

SOURCE.—Several allied species growing in the cascara district in California seem to contribute the cascara sagrada bark of the market. The official species grows abundantly in Northern California, Oregon, and Washington. "If the bark comes and is actually collected from Northern California, it is presumptive evidence that it is genuine. The probabilities of adulteration increase with its southward sources, and if collected in, or south of Central California, it is to be looked upon with greatest suspicion" (Rusby).

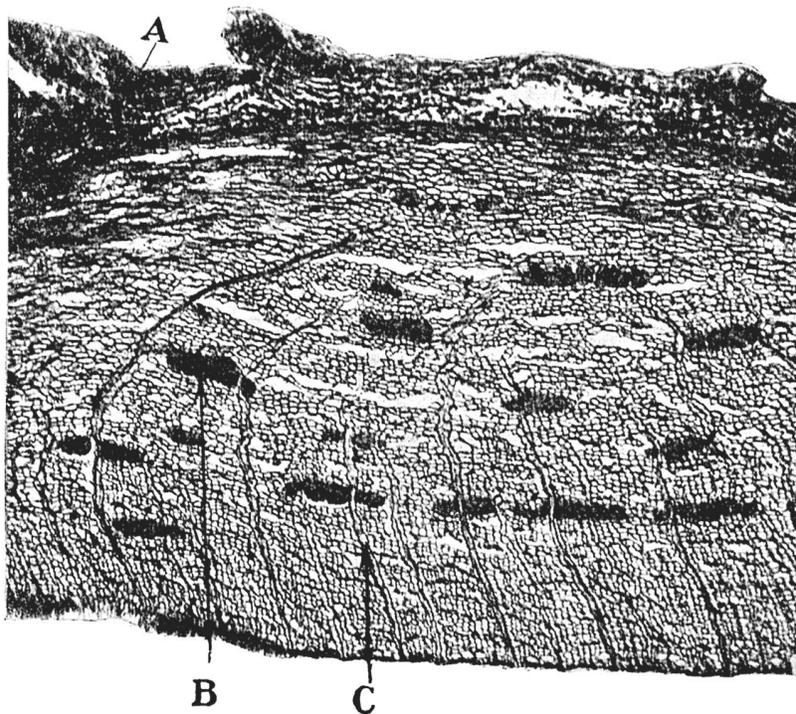


FIG. 169.—*Rhamnus frangula*—Cross-section of bark. (37 diam.) A, Cork. B, Group of bast fibers. C, Medullary ray. (Photomicrograph.)

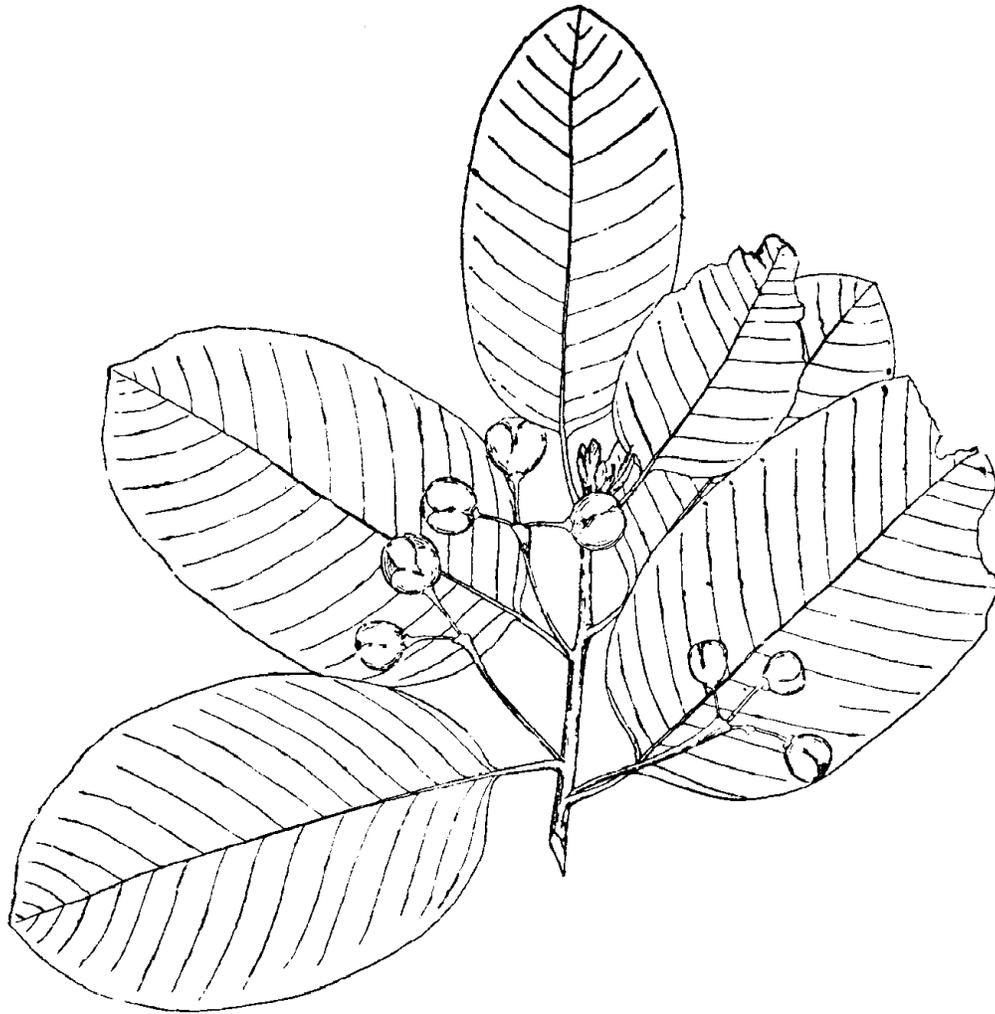


FIG. 170.—*Rhamnus purshiana*—Branch.

DESCRIPTION OF DRUG.—Curved pieces or quills 1 to 4 mm. to ($\frac{1}{25}$ to $\frac{1}{6}$ in.) thick, and about 100 mm. (4 in.) long. The outer surface is reddish brown, frequently more or less covered with grayish or whitish lichens, the young bark having numerous rather broad, pale-colored warts; sometimes mottled or figured; inner surface smooth and finely striate, yellowish, turning brown or nearly black on exposure; fracture short, yellowish, of the inner layer somewhat fibrous and thick. A cross-section shows numerous thin, almost straight, broadening medullary rays, which run on an average about three-fourths of the distance across the bark. Medullary rays in groups converging at their outer ends (distinction from *Rhamnus Californica*); stone cells present (distinction from *Rhamnus frangula*). If to a small quantity of the powdered barks an alkaline solution be added, the color developed in

the *Rhamnus Californica* is a deep red, while that of *R. Purshiana* is orange. Odor distinct; taste bitter and slightly acrid.

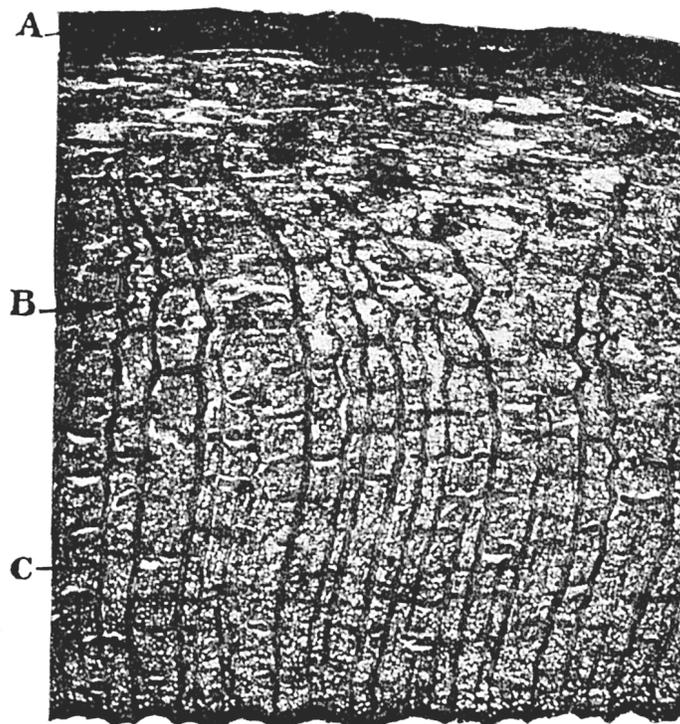


FIG. 171.—*Rhamnus purshiana*—Cross-section of bark. (20 diam.) A, Cork. B, Group of bast fibers and stone cells. C, Medullary ray. (Photomicrograph.)

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

CONSTITUENTS.—Emodin and frangulic acid; frangulin and purshianin—the two latter being glucosides, yielding, on hydrolysis, emodin and sugar. The principle, emodin, is found in many purgative drugs. Its composition, and its relation to several carbon compounds are shown in the following:

$C_{14}H_{10}$	$C_{14}HSO_2$	$C_{14}H_6(OH)_2O_2$	$C_{14}H_4CH_3(OH)_3O_2$
Anthracene	Anthraquinone	Chrysophanic Acid	Emodin

Emodin is, therefore, said to be a trioxy-methyl-anthraquinone. It is contained in rhubarb, senna, aloes, etc. See emodin test under Rhubarb (120). The resins are turned a vivid purple-red by caustic potash. The fresh bark is active as a purgative, causing much griping. By keeping and properly curing, however, this griping principle is destroyed, and the bark becomes more accurate in action and less likely to cause this discomfort. Ash, usually about 8 per cent.

Purshianin is a glucoside reported by Dohme and Englehardt. Obtained by first removing oil, etc., from the drug by means of chloroform, then extracting the residue with alcohol, etc. It crystallizes from acetone and ethylic acetate in dark brown-red needles, melting at 237°. On heating with alcoholic hydrochloric acid it yields sugar and emodin.

ACTION AND USES.—A valuable laxative in chronic constipation. Dose: 30 to 60 gr. (2 to 4 Gm.).

OFFICIAL PREPARATIONS.

Extractum Cascara Sagradæ,	Dose: 4 gr. (0.25 Gm.).
Fluidextractum Cascara Sagradæ,	15 ʒ (1 mil).
Fluidextractum Cascara Sagradæ Aromaticum, .	30 ʒ (2 mils).

335. **RHAMNUS CATHARTICA**, N.F.—BUCKTHORN. The fruit of **Rham'nus cathar'tica** Linné. *Habitat*: Europe, Northern Asia, and naturalized in North America. Small, berry-like fruits about the size of a pea, borne on a receptacle at the end of a slender stalk; apex tipped with the style remnants. Smooth, purplish or black when fresh, in which state they are generally used; wrinkled on drying; four-celled, each containing a single triangular seed, surrounded by a brownish-green pulp; odor unpleasant; taste sweetish, afterward bitter and nauseous. They contain rhamnocathartin, rhamninn, sugar, gum, and tannin. A syrup is made from the juice, having strong purgative properties. Dose of syrup: 2 to 5 fl. dr. (8 to 20 mils). The green fruit treated with lime yields a pigment, sap-green.

336. **CEANOTHUS**.—NEW JERSEY TEA. RED ROOT. The root of **Ceano'thus america'na** Linné. *Habitat*: North America. About 300 mm. (12 in.) long, and 12 to 25 mm. (1/2 to 1 in.) thick, contorted and knotty; bark reddish brown, thin, inclosing a tough, light brown wood, finely rayed; odor none; taste astringent and bitter. It contains ceanothine, tannin, mucilage, etc. Astringent and expectorant. Dose: 10 to 30 gr. (0.6 to 2 Gm.).

337. **GOUANIA**.—CHEWSTICK. The stems of **Goua'nia domingen'sis** Linné. *Habitat*: West Indies. Brownish-gray, wrinkled pieces of the stems, with a thin bark, and a yellowish-gray, fibrous, porous wood. It contains a bitter principle and is used as a tonic.

AMPELIDEÆ

Mostly climbing shrubs. Stems and branches nodose; tendrils and flower clusters opposite the leaves. Fruit a two-celled berry. Plants abounding in the Tropics.

338. **UVA PASSA**.—RAISIN. The dried fruit of **Vi'tis vinif'era** Linné. *Habitat*: Western Asia, Europe, and California; the Valencia raisins are the kind generally used in pharmacy. Shriveled and pressed; brown, slightly translucent; internally pulpy, two-celled, with two seeds in each cell; taste sweet. Chiefly used as an agreeable

saccharine addition to preparations.

339. **AMPELOPSIS QUINQUEFOLIA** Michaux.—AMERICAN IVY. WOODBINE. (Root-bark.) Alterative, tonic, astringent, and expectorant. Dose of fluidextract: 30 to 60 drops (2 to 4 mls).

TILIACEÆ.-Linden Family

Mostly tropical trees, some of the species of the genus *Tilia*, yielding tenacious fibers for cordage. Flowers balsamic, furnishing infusions which are antispasmodic and diaphoretic.

340. **TILIA AMERICANA** Linné.—LINDEN FLOWERS. BASSWOOD LIME, TREE. *Habitat*: North America. Flowers yellowish; petals notched at base; odor pleasant; taste sweet and mucilaginous. Stimulant, diaphoretic, and lenitive. Dose: 15 to 30 gr. (1 to 2 Gm.). The bark is used as a demulcent, emollient and vulnerary.

MALVACEÆ.-Mallow Family

Mucilaginous, innocent plants, with tough bark and palmately-veined leaves; stamens monadelphous, in a column, and united with the short claws of the petals; pistils several, the ovaries united in a ring, or forming a several-celled pod.

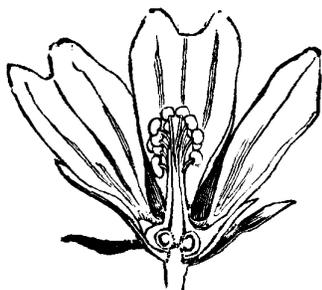


FIG. 173.—Vertical section of Mallow flower.

Synopsis of Drugs from the Malvaceæ

A. *Root.*

ALTHÆA, 341.

B. *Flowers.*

Althæa Rosea, 342.

Malva, 343.

344. DERIVATIVES OF THE COTTON PLANT.

Bark, 344 a. Filamentous Hairs, 344 b. Oil, 344 c.

341. ALTHÆA.—ALTHEA

MARSHMALLOW

The dried root of *Althæa officinalis* Linné, deprived of the brown corky layer and small roots.

BOTANICAL CHARACTERISTICS.—Stem 2 to 4 feet high. Leaves ovate, or slightly heart-shaped, toothed, downy. Flowers pale rose color.

HABITAT.—Europe, Asia, United States, and Australia.

DESCRIPTION OF DRUG.—Whitish, cylindrical, or conical pieces deprived of the outer corky layer, from 75 to 150 mm. (3 to 6 in.) long, and about 10 mm. (2/5 in.) or more in diameter; longitudinally wrinkled, and marked with numerous brownish scars; **somewhat hairy externally from loosened bast fibers**; it



FIG. 174.—*Althaea officinalis*—Flowering branch.

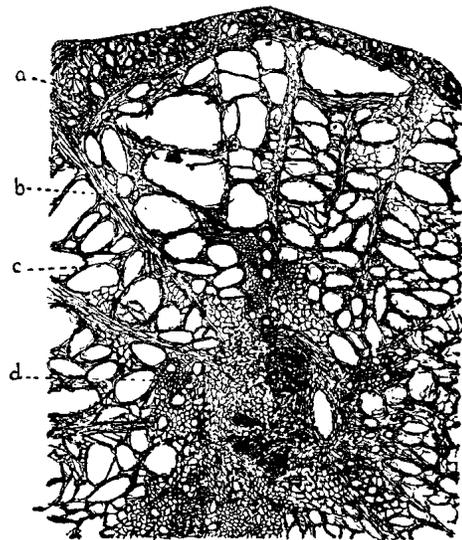


FIG. 174a.—Cross-section of a portion of the trimmed branch of *Althaea*. *a.* Bark. *b.* Medullary ray. *c.* Parenchyma. *d.* Wood-bundle. Magnified 18 diam.

breaks with a short mealy fracture, with projecting fiber-ends near the outer edge; odor faint, but characteristic, stronger in infusion; taste sweetish and **mucilaginous**. A cross-section shows small wood-bundles of scalariform and pitted vessels scattered throughout the prevailing parenchymatous tissue, but with an indistinctly radiate arrangement near the edge. The cells of the **parenchyma contain starch** and mucilage, with a few stellate raphides. Most of this drug now appears cut into fine pieces or granules. This often looks beautifully white, but on scrutiny it is found coated with lime. (Rusby.)

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

CONSTITUENTS.—**Asparagin**, $C_4H_8N_2O_3H_2O$, 1 per cent. (a colorless, nearly tasteless, crystalline principle), **bassorin**, $C_{12}H_{20}O_{10}$, 25 per cent. (althæa mucilage, a turbid, slimy, non-adhesive mucilage, which when dried forms a very coherent mass), sugar 8 per cent., **pectin** 10 per cent., ash 5 per cent., starch 35 per cent., a fixed oil, and a trace of tannin. Ash, not to exceed 8 per cent.

ACTION AND USES.—Used as a demulcent application to inflamed mucous tissues, as in bronchitis. Powdered marshmallow root being exceedingly absorbent, is used advantageously to impart consistency to soft pill-masses. (In Mass. Hydrarg., 15 per cent. In Blaud's Pills and Pil. Phosphorus.)

ALTHEA FOLIA—recognized by the N.F.

342. **ALTHÆA RO'SEA** Cevanilles.—HOLLYHOCK. (Petals.) Indigenous to Western Asia, but cultivated in gardens for its large, purple, ornamental flowers. Petals broadly obovate, notched above and with a claw at base; odor slight; taste sweetish, mucilaginous, and astringent. They contain tannin, mucilage, and a coloring matter. An infusion is occasionally used as a demulcent.

343. **MALVA**.—MALLOW. The flowers of **Mal'va sylves'tris** Linné, an herbaceous plant growing abundantly in Europe. When fresh, of a rose-red or purple color, becoming blue when dried; odor slight; taste sweetish and mucilaginous. Emollient and demulcent.

MALVÆ FOLIA—recognized by the N.F.

344. DERIVATIVES OF THE COTTON PLANT

Bark, Hairs of Seed, and the Oil of **Gossyp'ium herba'ceum** Linné, and other species of Gossypium.

BOTANICAL CHARACTERISTICS OF GOSSYPIUM HERBACEUM.—Large herbs with alternate *leaves*, which are more or less palmately-lobed. *Flowers* are large, showy, more or less yellow or red; pistils 5, united at their base. *Stamens* numerous, united below and adhering to the petals. *Capsule* roundish, 3- to 9-celled, opening at the top by as many valves. The numerous *seeds* are glossy, covered with long, woolly hairs, which constitute the cotton.

HABITAT.—Asia and Africa; cultivated in the United States.

344a. **ROOT BARK.**—**Gossypii Cortex**, N.F. COTTON-ROOT BARK.—Long bands or curved pieces, sometimes in quills. The outer surface is of a yellowish-brown color, dotted with a few small black spots, and, from the abrasion of the thin cork, numbers of orange-brown patches; the inner surface is whitish and has a silky luster; the bast fibers are long and tough, and may easily be separated into papery layers; inodorous; taste very slightly acrid and astringent.



FIG. 175.—*Gossypium herbaceum*—Branch.

Powder.—Light brown. The microscopical elements are: The simple and compound starch grains, the aggregate calcium oxalate crystals, colored resin, and tannin masses; the numerous long, slender, and thick-walled bast fibers (8 to 15 μ thick), large cork cells, etc.

CONSTITUENTS.—A yellow resin, fixed oil, tannin (small quantity), sugar, starch, and, in the fresh bark, a yellow chromogen, which becomes red and resinous on exposure to the air. To this change is due the red color of old specimens, and old preparations, of the bark.

ACTION AND USES.—Emmenagogue and oxytocic, stimulating uterine contractions probably by direct action on the uterine center in the spinal cord; said to be as efficient and more safe than ergot. Dose: 15 to 60 gr. (1 to 4 Gm.).

344b. **HAIRS OF SEED.**—**Gossypium Purificatum.** PURIFIED COTTON, Fine, white, soft filaments, which, under the microscope, appear as hollow, flattened, and twisted bands; unacted upon by ordinary solvents. Ordinary raw cotton contains among other impurities fatty substances, which, when removed by chemical means, such as alkaline or ethereal solvents, changes its character so that the fiber, which formerly was almost impenetrable by aqueous liquids, now becomes so absorbent that it no longer floats on water, but when placed on the surface of that liquid will readily absorb it and sink.

CONSTITUENTS.—Almost pure cellulose; by the action of nitric acid this is converted into soluble gun-cotton.

ACTION AND USES.—Employed as a dressing for burns, scalds, and excoriated surfaces, and for making antiseptic cottons, such as salicylated cotton, benzoinated cotton., iodoform cotton, etc.

Pyroxylinum (Soluble Gun-cotton), the basis of the various official collodions.

344c. **OIL.**—OLEUM GOSSYPII SEMINIS A fixed oil expressed from the seeds. Pale yellowish, odorless, with a bland, nut-like taste; specific gravity 0.920 to 0.930 at 15°C (59°F.), solidifying at about 0° to —5°C. (32° to 23°F.); very sparingly soluble in alcohol. Brought into contact with concentrated sulphuric acid, the oil at once assumes a dark reddish-brown Color. Color reactions with nitric acid and silver nitrate (see U.S.P. tests) distinguish this oil from other similar oils. The oil is used as a basis for Linimentum Ammoniae, Linimentum Camphoræ, etc. Processes have been invented for purifying the crude oil to abstract its acrid resin, and so leave it bland and as palatable as the olive oil, for which it is oftentimes substituted as a table or salad oil.

CONSTITUENTS.—Palmitin, olein, and a pale-yellow coloring-matter that is non-saponifiable.

STERCULIACEÆ

Trees or shrubs with soft wood; sometimes climbing. *Fruit* dry, rarely fleshy (*Theobroma*, 346); *seeds* globose or ovoid, with coriaceous or crustaceous testa. The two plants of interest of the order are the one mentioned and *Cola*, 70.

345. **COLA** N.F.—COLA (KOLA). The dried kernel of the seed of *Cola acuminata* R. Brown (Fam. *Sterculiaceæ*), yielding by assay 1 per cent. of total alkaloids. Occurring in irregular somewhat plano-convex Pieces; cotyledons from 15 to 30 mm. long and 5 to 10 mm. thick; dark brown or reddish-brown; fracture short, tough; odor faintly aromatic, taste astringent and somewhat aromatic. The drug contains alkaloids consisting mostly of caffeine and theobromine, about 40 per cent. of starch, a little volatile oil, fat, and tannin. The kolanin of Knebel is simply a kolatannate of caffeine. Kolatannic acid differs from caffeotannic acid in being free from sugar. Tonic, stimulant, and nervine; used as a beverage by the natives of Africa as is coca by the natives of South America. Dose: 10 to 30 gr. (0.6 to 2 Gm.).



FIG. 176.—Cola (Kola Nut). Showing longitudinal section of fruit $\times \frac{1}{6}$; cross-section of red seed $\times \frac{1}{4}$; longitudinal section of red seed showing embryo $\times \frac{1}{4}$; cross-section of red seed $\times \frac{1}{4}$; longitudinal section of white seed. (After Kohler.)

“Bissey nuts” are the seed of the *Cola* naturalized and cultivated in the West Indies. It should be said with regard to the many preparations of *Cola* that they seem to lack a certain degree of permanence: the fluidextract of the *Cola*, for example, is an unsatisfactory preparation, because of the immense precipitation which goes on for a long time after the preparation is made.

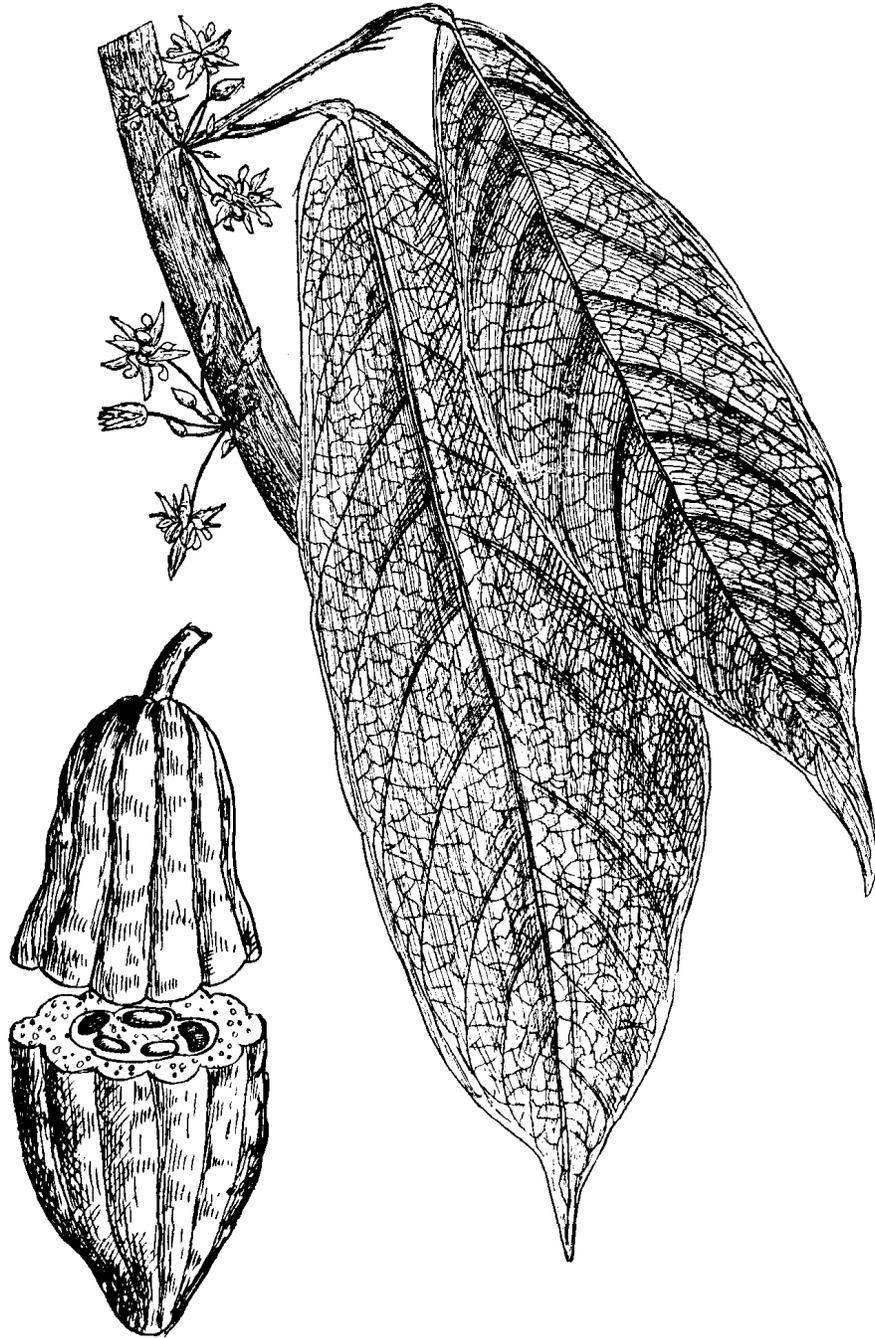


FIG. 172.—*Theobroma cacao*—Branch and fruit.

346. **THEOBROMA**.—CACAO. CHOCOLATE NUT. The seed of **Theobro'ma caca'o** Linné. *Habitat*: Mexico; cultivated in the West Indies. About the size of an almond, flattened, invested with a thin, longitudinally wrinkled testa, varying from reddish to grayish-brown in color; somewhat ovate in shape, the hilum being situated on the broader end. The cotyledons are brown, oily, somewhat ridged. Odor agreeable when bruised; taste bitterish, oily. Contains 45 to 53 per cent. of fixed oil (Cacao Butter), and 1.5 per cent. of theobromine, an alkaloid similar to caffeine. **Chocolate** is

made by roasting the seed, removing the testa, then powdering the kernels, forming the powder into cakes with water, and flavoring with vanilla or other substances.

THEOBROMINE AND ITS COMPOUNDS.—**THEOBROMINA**, $C_7H_7N_4O_2$.—3,7-dimethyl-xanthine, occurs also in Kola (Cola, 345), etc., also made synthetically, action and uses same as caffeine.

THEOBROMINE SODIUM SALICYLATE (“Diuretin”).—A white powder, odorless, soluble in water. Dose: 15 gr. (1 Gm.).

Theobromine Sodium Acetate (Agurin), has great solubility and is well tolerated by the stomach. Dose: 15 gr. (1 Gm.).

Preparations of Theobromine.—Obtained from an infusion of cacao, precipitating it with lead acetate, removing excess of lead by H_2S , evaporating, and exhausting the residue with boiling alcohol. The alkaloid separates on cooling. Sparingly soluble in cold water, alcohol, and ether.

346a. **OLEUM THEOBROMATIS**, U. S.—**CACAO BUTTER**. A fixed oil expressed from the seed. A yellowish-white, brittle, fatty solid, of tallow-like consistence, melting at 30° to $33^{\circ}C$. (86° to $91.4^{\circ}F$.), about the temperature of the body; has a faint, chocolate-like taste and agreeable odor. Should respond to the various important official tests (see U.S.P.). Contains palmitin, stearin, laurin, olein (small quantity), theobromine, and glycerides of formic, acetic, and butyric acids. Employed largely in making suppositories.

TERNSTRÆMIACEÆ.—Tea or Camellia Family

Trees or shrubs with simple, usually alternate, leaves, often fascicled at the tops of the branches.

347. **THEA**.—**TEA**. The leaves of **Camellia the'a** Link. *Habitat*: Southern Asia; cultivated. From 25 to 75 mm. (1 to 3 in.) long, petiolate, acute at both ends, irregularly serrate except at base, and with anastomosing veins near the margin; bluish-green or blackish. The green color of tea is not infrequently intensified by a mixture of Prussian-blue and gypsum. Odor peculiar, taste bitter and astringent. Contains volatile oil and an alkaloid, theine, which is analogous to, if not identical with, caffeine. Much of the caffeine of commerce is made from tea siftings. Astringent, tonic, stimulant, and nervine; one of the most valuable stimulating and restorative agents.

GUTTIFERÆ

Trees or shrubs with opposite or whorled coriaceous leaves; *stamens* indefinite; *stigmassessile*, radiant. Many species, like the gamboge, yield a yellow juice; the *seeds* of others are oily. Among the edible *fruits* of the order is the mangosteen, regarded as the most delicious fruit in the world.

348. CAMBOGIA.—GAMBOGE

GAMBOGE

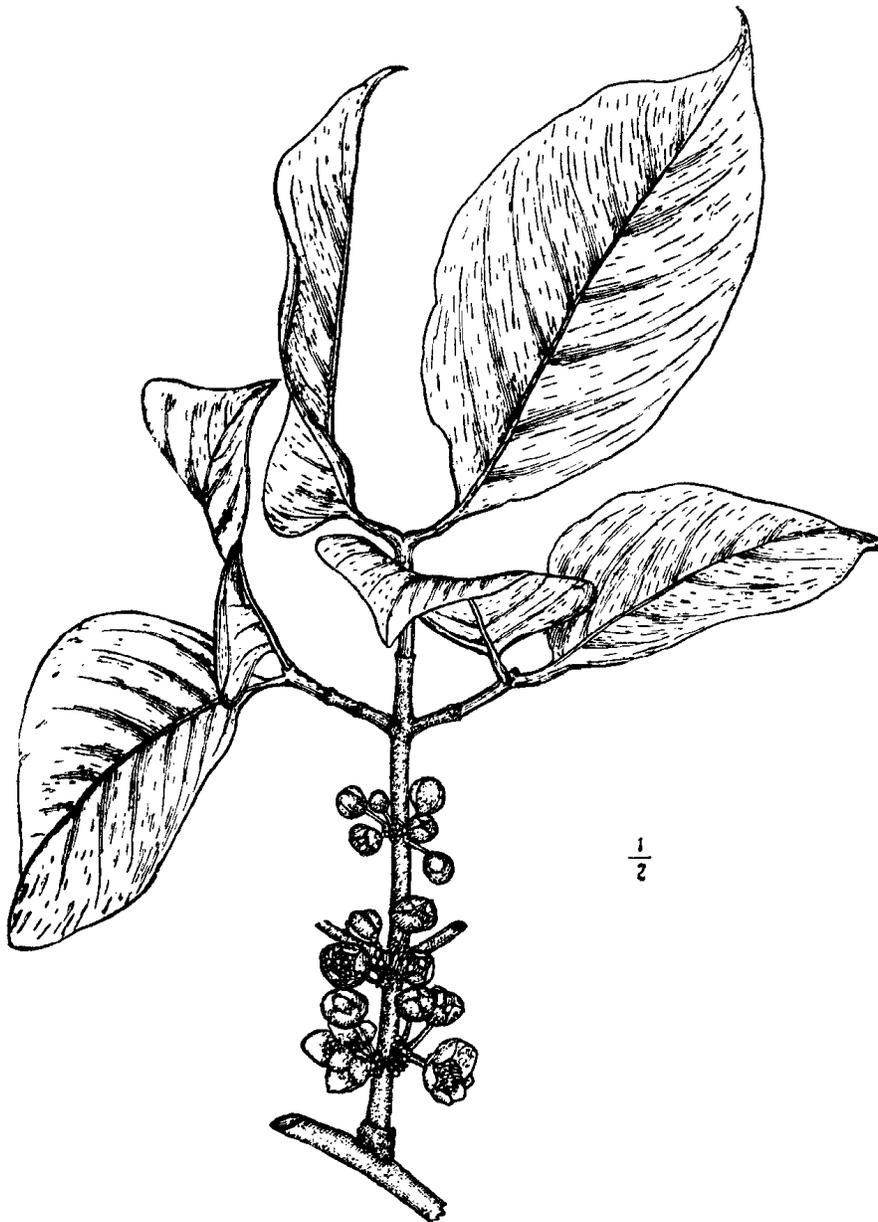


FIG. 177.—*Garcinia hanburii*—Branch.

A gum-resin from **Garcinia hanbu'rii** Hooker filius.

BOTANICAL CHARACTERISTICS.—The gamboge tree has dioecious flowers and a foliage resembling that of laurel. *Flowers* yellow; *male flowers* in axillary clusters, on short, one-flowered pedicels. Female flowers sessile. Fruit a berry, about the size of a large cherry, reddish-brown, containing a sweet pulp.

HABITAT.—Anam, Camboja, Siam, and Cochin-China.

DESCRIPTION OF DRUG.—**Lumps**, or **cylindrical sticks** (pipes), 25 to 50 mm. (1 to 2 in.) in diameter, and 100 to 200 mm. (4 to 8 in.) in length, striated lengthwise by impressions from the bamboo in which it is collected. Externally, grayish-brown. It has a smooth, conchoidal fracture of **a waxy luster and orange-red in color**. The powder is bright yellow and sometimes adheres to the drug, giving it a yellow appearance. Taste at first mild, afterward very acrid; odor irritating, sternutatory. The cake or lump gamboge is sold in masses weighing two or three pounds. It is less uniform, less brittle, and is sometimes called “coarse gamboge.” Adulterated specimens are easily recognized by their general inferior appearance, by the grayish or bronze appearance of a broken surface, and by giving a blue or green color with iodine when starch is one of the impurities. Pure gamboge is completely soluble by successive treatment with ether or alcohol and then water.

CONSTITUENTS.—A bright yellow **resin** (gambogic acid) 73 per cent., soluble in alcohol and ether, turned to a red color by alkalis, and blackbrown by ferric chloride; **gum** 16 to 26 per cent., which, with the resin and hot water, forms a yellow emulsion; wax 4 per cent. and ash not more than 2 per cent.

ACTION AND USES.—A drastic **hydragogue cathartic**, but so liable to produce vomiting and griping that its action is usually modified by combining it with other milder purgatives. Dose: $\frac{1}{2}$ to 5 gr. (0.0324 to 0.3 Gm.), generally in pill form.

OFFICIAL PREPARATION.

Pilulæ Catharticae Compositæ Dose: 2 to 5 pills.

349. **MANGOSTANA.**—MANGO FRUIT. MANGOSTEEN. The pericarp of the fruit of **Garcinia mangostana** Linné, of India. Astringent; used in various diseases of the mucous membrane, in injections, etc. Mangostin has been isolated from the pericarp. It is golden-yellow in color, crystallizes in scales, soluble in alcohol and ether. The fruit yields a fatty oil, concrete oil of mangosteen, called kokum butter, used in soap-

making. It is well adapted for pharmaceutical preparations and candle-making. Dose: 15 to 60 gr. (1 to 4 Gm.).

HYPERICINEÆ.-St. John's-wort Family

350. **HYPERICUM**.—ST. JOHN'S-WORT. The herb of **Hype'ricum perfora'tum** Linné. *Habitat*: Europe, Asia, and North America. The drug as it appears in market is composed of a mixture of oblong-ovate, pellucid-punctate leaves, thread-like branches, and less slender, brittle stems, with occasionally blackdotted flower petals, the whole having a greenish-brown appearance. Constituents: Resin, tannin, and a red coloring matter. Used as a stimulant, diuretic, and astringent. Dose: 30 to 60 gr. (2 to 4 Gm.).

DIPTEROCARPEÆ

Trees often gigantic, exuding a resinous juice; rarely shrubs.

351. **GURJUN**.—GURJUN BALSAM. WOOD-OIL. An oleoresin exuding from **Dipterocar'pusturbina'tus** Gaertner, and other species of *Dipterocarpus*. *Habitat*: India and the East Indies. **A thick, viscid balsam with uses and properties similar to copaiba.** Opaque, and grayish, greenish or brownish in reflected light; transparent and reddish-brown or brown in transmitted light; odor copaiba-like; taste bitter. It contains a volatile oil, 40 to 70 per cent., which is similar to oil of copaiba in composition, and produces a red or violet color with a drop of H_2SO_4 and HNO_3 mixed; also gurjunic acid (crystalline), resin, and a bitter principle. Owing to its close resemblance to copaiba it has been used in considerable quantities for the purpose of adulterating the latter.

352. **BORNEO CAMPHOR**.—SUMATRA CAMPHOR AND BORNEOL. A stearopten, or camphor, $C_{10}H_{18}O$, obtained in solid crystalline form from fissures and cavities in a gigantic forest tree, **Dryoba'lanopsaroma'tica** Colebrook, growing in the Malay Archipelago. It occurs in masses some pounds in weight. Differs from the ordinary camphor in having a higher specific gravity (heavier than water) and in being less volatile, With nitric acid it yields the Japan (laurel) camphor, $C_{10}H_{16}O$.

FRANKENIACEÆ

353. **FRANKENIA**.—YERB'A REUM'A. (Herb.) A California plant, **Frankenia grandiflo'ra** Chamisso et Schlechtendal. A valuable topical application in catarrhal affections, and in diseases of the mucous membranes generally. Dose of fluidextract: 10 to 30 drops (0.6 to 2 mils), diluted.

CISTINEÆ.—Rock-rose Family

354. **HELIANTHEMUM**, N.F.—FROSTWORT. The herb of **Helian'themum canadense** Michaux. *Habitat*: North America. As found in commerce it consists of broken branches or stems not longer than 1 to 1½ inches, mixed with a few broken roots, crushed, woolly leaves, and, occasionally, yellow petals; the stems are red-brown, thread-like, slightly pubescent, internally whitish, with a large pith; taste astringent and bitter. It contains a bitter glucoside, soluble in water, alcohol, and benzol, and 11 per cent. of tannin, with sugar and gum. Tonic, astringent, and alterative, in the treatment of scrofulous diseases. Dose: 5 to 20 gr. (0.3 to 1.3 Gm.).

BIXINEÆ

Trees and shrubs with alternate simple leaves and regular, symmetrical flowers. The fruits of some species are edible, and gums are obtained from a few others.

355. **GYNOCARDIA**.—CHAULMOO'GRA. The seed of **Gynocar'dia odora'ta** R. Brown. *Habitat*: Malayan Peninsula. Contains an acrid, whitish fat, known in market as **chaulmoogra oil**, separated from the kernels by expression or by boiling water, then taken up by ether or chloroform, which, when evaporated, leaves the oil almost pure. Gynocardic acid, a constituent, is sometimes employed in medicine. "The oil is a very successful remedy in eczema of the third stage." The oil is esteemed in India for the treatment of all manner of skin diseases. Its unctuous smoothness has been compared to that of goose-grease. Dose (Of Oil): 10 to 20 drops (0.6 to 1.3 mls), in gelatin capsules or in emulsion.

356. **ANNATO**.—A coloring substance obtained from a tropical American tree, **Bix'a orella'na**. The seeds steeped in water and allowed to ferment, and this liquid evaporated to a paste, becomes the **anna'to of commerce, used as a cheese and butter color**. By the natives the fragrant reddish pulp of the seeds is used as an astringent in diarrhea. It is also used as a dyestuff for silks and other fabrics.

CANELLACEÆ

An order furnishing mostly aromatic trees.

357. **CANELLA**.—CANELLA, N.F. The bark of **Canel'la al'ba** Murray. A native of Florida, West Indies, etc. In quills or broken pieces deprived of the corky layer; outer surface orange-red, marked with small scars and depressions; inner surface whitish; odor slight, aromatic; taste bitter and very pungent and biting. It contains a reddish volatile oil (about 2 per cent.), a portion of which is closely related to eugenol of oil of cloves, with resin, ash, mannite, a bitter principle, cellulose, albumen, and starch. Aromatic and stimulant, used as an adjuvant. The powder is used in making "hiera picra," Pulv. aloes et canellae, at one time recognized as an official preparation.

358. **CINNAMODENDRON**.—The bark of **Cinnamoden'dron cortico'sum** Miers. An aromatic bark from Jamaica, coming in curved or quilled pieces. Odor cinnamon-like; taste bitter, biting, giving a suggestion of canella, but this bark contains tannin, which canella does not. Used as an aromatic stimulant. Enters commerce solely from the Bahamas, where it is known as cinnamon bark, or as white wood bark.

VIOLARIEAE.—Violet Family

Herbs with alternate or radical leaves; corolla of 5 unequal petals, one being spurred; stamens 5, connivent, alternate with the petals; fruit a 3-valved capsule.

359. **VIOLA TRICOLOR**.—PANSY. HEART'S-EASE. The herb of **Viola tricolor** Linné. *Habitat*: Europe, North America, and Northern Asia; cultivated. The drug consists of the herbaceous upper portion of the plant, including green leaves, straw-colored, broken stems, and the variegated flowers. Odor slight, pleasant; taste somewhat bitter. It contains salicylic acid 1 per cent., sugar, mucilage, a bitter principle, resin, and violin (in small quantity). Mucilaginous, emollient; much used in Europe as an alterative in skin diseases, especially eczema. Dose: $\frac{1}{2}$ to 2 dr. (2 to 8 Gm.).

TURNERACEÆ

360. **TURNERA**.—DAMIANA, N.F. The leaves of a Mexican plant, **Turnera aphrodisiaca** (**T. diffu'sa** Willdenow). About 8 to 16 mm. ($\frac{1}{3}$ to $\frac{2}{3}$ in.) long, obovate or lanceolate, with a few-toothed margin; surface smooth or with a few hairs on the under side along the ribs. They generally have mixed with them pieces of the slender, woody stem, which is reddish-brown and hairy, the branches being terminated by hairs; odor somewhat aromatic, due to the presence of about 0.5 per cent. of volatile oil. Damiana leaves form the basis of a number of the quack aphrodisiacs. It is not known as a drug in Mexico, but as a general tea-like beverage. Dose: about 1 dr. (4 Gm.), in infusion.

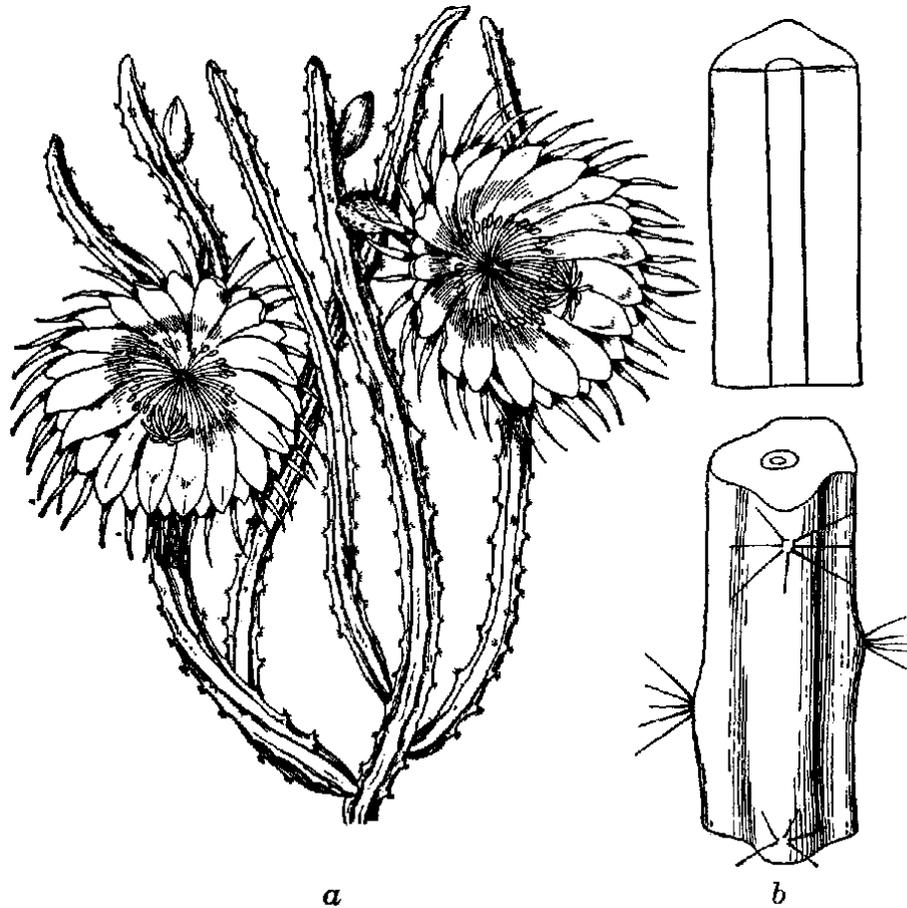
PASSIFLOREÆ.—Passion-flower Family

361. **CARICA PAPAYA**.—MELON-TREE. TRUE PAPAWE (wholly different from the common papaw, **Asim'ina trilo'ba**, of our Southern States). *Habitat*: Tropics; cultivated. Although the inspissated juice (papain) of the unripe fruit has been for a long time known as a medicinal agent, having a reputation in its native country as a remedy for hæmoptysis, bleeding piles, and ulcers of urinary passages, and for ringworm, etc., it has only comparatively recently attracted attention as a digestive agent. Dymock, in his treatise on the drugs of British India, says: "Its digestive action on meat was probably known in the West Indies at a very early date. * * * It has long been the practice to render meat tender by rubbing it with the juice of the unripe fruit or by rubbing it with the leaves. Its therapeutic value, in the form of papain, is

specially commended in aggravated symptoms of dyspepsia." Its constituents are mainly globulin, albumin, and albumoses. Dose: 1 to 3 gr. (0.065 to 0.2 Gm.).

362. **PASSIFLORA**, N.F.—PASSION FLOWER. The herb of **Passiflo'ra incarna'ta** Linné; indigenous. Said by eclectic and homoeopathic practitioners to be a somnifacient, useful in neuralgia, sleeplessness, dysmenorrhœa, etc. Dose of a saturated tincture: 15 to 30 drops (1 to 2 Mils).

CACTEÆ.—Cactus Family



Selenicereus grandiflorus: *a*, flowering stem; *b*, section of stem, showing cross and longitudinal sections.

363. **CACTUS GRANDIFLORUS**, N.F. Linné.—NIGHT-BLOOMING CEREUS. *Habitat*: Tropical America; cultivated as an ornamental herb. The fleshy, hexagonal flowering branches are used in the fresh state. Sedative and diuretic; useful in diseases of the heart when there is an irregularity of action. The tincture and fluidextract have of recent years been growing in popularity, but the supply of the drug seems difficult to obtain, and for this reason, partly, the drug is not official. Dose: 5 gr. (0.3 Gm.) .

364. **ANHALONIUM LEWINI**, Henning.—A Mexican cactus, acting powerfully as a cardiac and respiratory stimulant; it has been used to a slight extent in medicine in angina pectoris and asthmatic dyspnea. A source of **mescal buttons**. A powerful habit-forming narcotic and intoxicant.

THYMELEACEAE.—Mezereum Family

Shrubby plants, with the bark containing strong bast fibers, and very bitter.

365. **MEZEREUM.—MEZEREUM**



FIG. 178.—*Daphne mezereum*—Fruiting branch and flowers.

MEZEREON BARK

The dried bark of **Daph'ne meze'reum** Linné, or **Daphne guidium** Linné or of **Daphne Laureola**.

BOTANICAL CHARACTERISTICS.—A small shrub with smooth, evergreen, lanceolate *leaves*. *Flowers* spicate, appearing before the leaves, rose-colored, 4-lobed. *Berry* bright red, fleshy, 1-seeded.

HABITAT.—Mountainous regions of Europe, Siberia, Canada, and New England.

DESCRIPTION OF DRUG.—This bark comes to us in **tough, pliable strips**, from 2 to 4 feet long, 25 MM. (1 in.) or less broad, always rolled into bundles or balls; the very thin periderm is of a **greenish-orange or purple color**, marked with transverse scars and minute black dots; beneath it is a **soft, greenish parenchymatous layer**, from which it separates easily. The inner surface is whitish, covered with irregular layers of **white silky bast fibers**, tangentially arranged. Fracture tough. Odorless; **taste exceedingly acrid**.

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

CONSTITUENTS.—It contains a crystalline glucoside, daphnin, C₁₅H₁₆O₉, which is not the active principle, however, the medical virtues depending upon an acrid resin termed **mezerein**.

ACTION AND USES.—Sialagogue, stimulant, and alterative. Externally vesicant, in ointment or applied in the form of a small square, moistened. Dose: 1 to 8 gr. (0.065 to 0.6 Gm.).

OFFICIAL PREPARATION.

Fluidextractum Sarsaparillæ Compositum,
(3 per cent.) Dose: 1/2 to 1 1/2 fl. dr. (2 to 6 mils).

PUNICACEÆ.—Pomegranate Family

366. GRANATUM—POMEGRANATE

POMEGRANATE

The stem-bark and root-bark of **Pu'nica grana'tum** Linné, without more than 2 per cent. of adhering wood and other foreign matter.



FIG. 179.—*Punica granatum*—Branch with flowers.

BOTANICAL CHARACTERISTICS.—Tree shrubby, 20 feet in height; branches erous, sometimes bearing thorns. Leaves opposite, entire, oblong, pointed at each end. Flowers large, rich scarlet, terminal. Fruit a berry about the size of an orange; rind thick, having a reddish-yellow exterior; pulp many-seeded, acidulous.

HABITAT.—Mediterranean Basin and various portions of Asia; cultivated in all warm climates for its ornamental flowers.

DESCRIPTION OF DRUG.—The stem bark comes occasionally in quills, more frequently in curved pieces 20 to 80 mm. long, 5 to 20 mm. in diameter; bark 0.5 to 2 mm. thick, outer surface yellowish-brown, with grayish patches; longitudinally wrinkled; small lenticels. Inner surface light yellow or brownish-yellow, finely striate, smooth. Fracture short, smooth, inner layer of bark (phelloderm) dark green, inner bark light brown, odor slight; taste astringent, somewhat bitter.

The root bark has a rough, yellowish-gray to brown outer surface, marked with more or less longitudinal patches of cork, green inner layer of bark absent. Medullary rays extending nearly to the outer layer; inner surface smooth and yellowish with irregular brownish blotches.

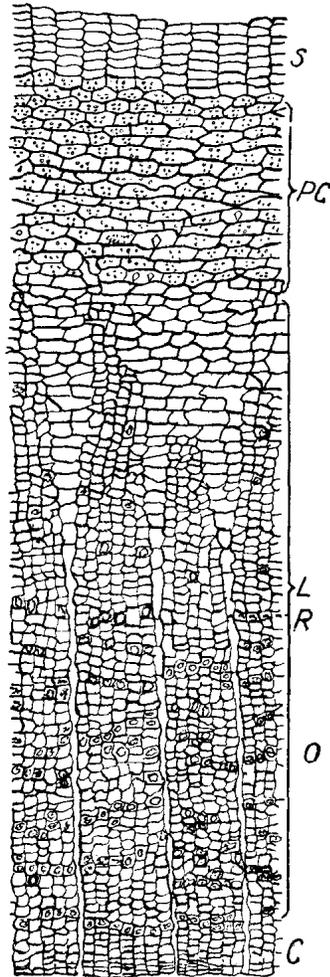


FIG. 180.—*Punica granatum*—Cross-section of bark of the stem. *S*, Suberous layer. *PC*, Cortical parenchyma. *L*, Liber. *R*, Dotted line extends to narrow medullary ray. *O*, Stands opposite a tangential row of oxalate of calcium crystals, which are numerous throughout the phloem. *C*, Cambium.

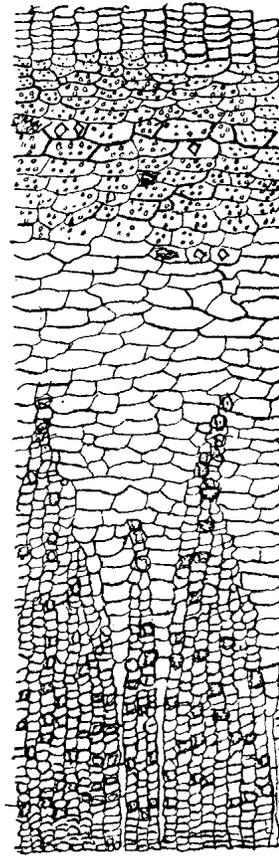


FIG. 181.—*Punica granatum*—Cross-section of the bark of the root.

Assay of the drug consists in the extraction and separation of the alkaloid from the drug by acidulated water, washing out the aqueous solution of the salt (after neutralization) with chloroform, again washing the latter solution with $N/10$ hydrochloric acid and titrating final solution in the usual way. No authoritative standard has been fixed.

STRUCTURE.—The tissue consists chiefly of large-celled parenchyma, traversed by one-rowed medullary rays of quadratic cells, each ray accompanied by a single row of crystal cells. The inner bark steeped in water and then **rubbed on paper produces a yellow stain**, which is

rendered blue by ferrous sulphate, and rose-red by nitric acid, soon vanishing. These properties distinguish it from the bark of the box-root and the barberry, with which it is sometimes adulterated.

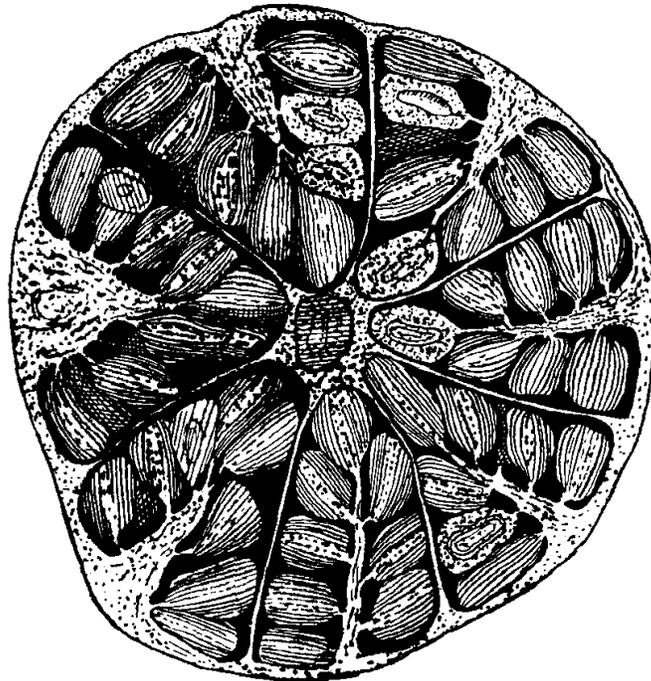


FIG. 182.—*Pomegranate*—Cross-section of fruit.

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

CONSTITUENTS.—Mannite, punico-tannic acid, 22 per cent. (resolved by hydrolysis into sugar and ellagic acid), and the active constituent, **pelletierine**, $C_8H_{13}NO$, with its three allied alkaloids, **methyl-pelletierine**, $C_9H_{17}NO$, **pseudo-pelletierine**, $C_9H_{15}NO$, and **iso-pelletierine**. Pelletierine is a liquid alkaloid, readily soluble in water, alcohol, and ether. Several salts of it are made, but the **tannate** is the **official** one. This is yellowish, hygroscopic, and pulverescent, with a pungent astringent taste, soluble in 700 parts of water and 80 parts of alcohol. Ash, not exceeding 16 per cent.

Preparation of Pelletierine.—Displace powder with water mixed with lime, exhaust percolate with chloroform, etc. It is claimed by Tanret to be the anthelmintic constituent. Is probably a mixture of several alkaloids.

ACTION AND USES.—Astringent, **tæniafuge**. Dose: $\frac{1}{2}$ to $1\frac{1}{2}$ dr. (2 to 6 Gm.). The alkaloid pelletierine is a tæniafuge in extensive use; it is given in the form of tannate in doses of about 5 gr. (0.3 Gm.).

PREPARATION. OFFICIAL

Fluidextractum Granati

Dose: 1 to 2 fl. dr. (4 to 8 mils).

367. **GRANATI FRUCTUS CORTEX.**—POMEGRANATE RIND. Irregular fragments, of a yellowish or reddish-brown color; outer surface rough from tubercles; inner surface marked with small depressions; hard; brittle. It contains a greater proportion of tannin than the bark, but has the same medical properties.

MYRTACEÆ

Trees and shrubs, without stipules. *Leaves* opposite, entire, pellucid-punctate, usually with a vein running close to the margin; they are usually fragrant and pungent, due to volatile oil residing chiefly in the pellucid dots or glands.

Synopsis of Drugs from the Myrtaceæ

A. *Leaves.*

EUCALYPTUS, 368.

Myrcia, 369.

Chekan, 370.

B. *Flower.*

CARYOPHYLLUS, 371.

C. *Fruits.*

Caryophylli Fructus, 371 a.

* **PIMENTA**, 372.

D. *Seed.*

Jambul, 373.

E. *Volatile Oils.*

OLEUM EUCALYPTI, 368 a.

OLEUM MYRCIÆ, 369 a.

OLEUM CARYOPHYLLI, 371 b.

OLEUM PIMENTÆ, 372 a.

OLEUM CAJUPUTI, 374.

368. EUCALYPTUS.—EUCALYPTUS

EUCALYPTUS

The dried leaves of **Eucalyptus glob'ulus** Labillardierre, collected from the older parts of the tree with not more than 3 per cent. of the stems and fruit of the tree or other foreign matter.

BOTANICAL CHARACTERISTICS.—Rapid-growing trees, attaining the height of 200 to 300 feet. *Flowers* solitary, or in clusters of 2 or 3, axillary; peduncles broad, somewhat hemispherical in shape, prolonged into a cone, and united with the petals and 4- or 5-celled ovary, making a peculiar hard, brittle, floral envelope, which is quite aromatic. Wood exceedingly hard, remarkable for toughness and durability.

SOURCE.—This is an Australian tree, but is cultivated extensively, especially in malarial districts in various subtropical portions of the world. In California the tree is abundant. At the State Forestry Station at San Monica forty-four species are cultivated. Among these, the Globulus is the most valuable. The Amygdalina possesses the best emollient properties. *E. rostrata* Schlecht (red gum) furnishes an

inspissated juice, which is used for the same purpose as kino.



FIG. 183.—*Eucalyptus globulus*—Branch.

It has been stated that the anti-malarial property attributed to these trees is probably due to their power of absorbing moisture rather than from emanations from them. They probably act in a dual capacity.

DESCRIPTION OF DRUG.—Petiolate, **scythe-shaped**, from 150 to 300 mm. (6 to 12 in.) long, 20 to 40 mm. ($\frac{4}{5}$ to $1\frac{3}{5}$ in.) broad, tapering from near the base to the apex; pale grayish-green, smooth, and of a leathery texture; margin entire, with a **parallel vein** a short distance from it, running from base to apex of the leaf; odor camphoraceous; taste cooling, bitter, astringent, and aromatic.

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

CONSTITUENTS.—The virtues of the leaves depend upon a volatile oil (which contains the valuable antiseptic, **Eucalyptol**) existing to the extent of 2 to 6 per cent.; the freshly-dried leaves yield the greatest proportion.

ACTION AND USES.—Used as a febrifuge, stimulant, and astringent. Its principal action, however, is that of the volatile oil, or rather its chief constituent, eucalyptol, $C_{10}H_{18}O$, **antiseptic**. Dose: $\frac{1}{2}$ to 2 dr. (2 to 8 Gm.). Dose of eucalyptol cineol: 5 drops (0.3 mil)

OFFICIAL PREPARATION.

Fluidextractum Eucalypti Dose: 5 to 60 drops (0.3 to 4 mils)-

368a. OLEUM EUCALYPTI.—A colorless or yellowish volatile oil, distilled from the fresh leaves. It has a spicy, cooling taste, and somewhat camphoraceous odor. Consists of two hydrocarbons (cymene, $C_{10}H_{14}$, and eucalyptene, $C_{10}H_{16}$), a terpene, and **Eucalyptol**, $C_{10}H_{18}O$, upon which its value depends; it is obtained as one of the fractions in the distillation of the oil, coming over between 170° to $178^{\circ}C$. It should contain not less than 70 per cent. of Eucalyptol when assayed by the official process. Should be kept protected from light in cool place. It is a nearly colorless liquid, with a strong, aromatic, camphoraceous odor ; slightly soluble in water, but very soluble in alcohol, carbon disulphide, and glacial acetic acid. Dose: 5 to 10 drops (0.3 to 0.6 mil). Antiseptic. Used frequently as an inhalant in respiratory diseases either with atomizer or with steam. Dose of the oil: 5 to 10 drops (0.3 to 1 Mil)

368b. **EUCALYPTUS ROSTRATA** Schlecht.—RED Gum. The resin or inspissated juice. *Synonyms*: CREEK GUM, MURRAY RED Gum, RED GUM KINO, EUCALYPTI GUMMI. *Habitat*: Australia. Small, angular, ruby-red, shining pieces; in thin layers transparent. Resembles kino, but has a brighter appearance and is less astringent. The taste is bitter. Almost entirely dissolved by alcohol. *Properties*: A good astringent, similar to kino. *Preparations*: Fluid and lozenges. *Uses*: Checks the purging of mercurial pills administered for syphilis. Has been recommended for seasickness. Dose: 5 to 20 Minims of the fluid.

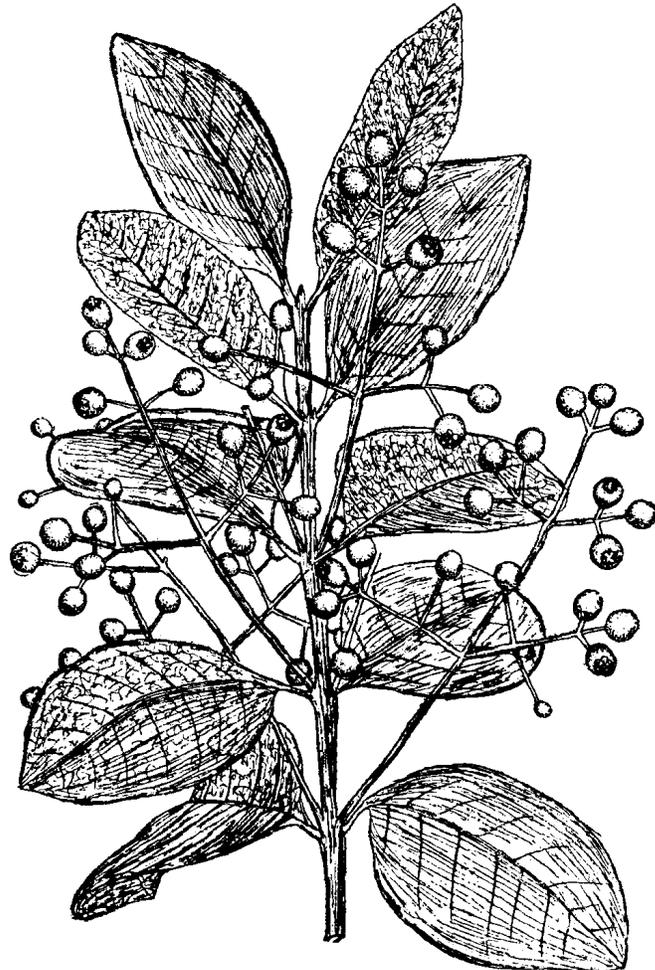


FIG. 184.—*Myrcia acris*—Branch with fruit.

369. **MYRCIA**.—BAY LEAVES. WAX MYRTLE. WILD CLOVE LEAVES. The leaves of *Myrcia acris* De Candolle, a West Indian tree. These leaves are aromatic and spicy, containing a volatile oil, which, when distilled, forms the Oleum Myrciæ, and when distilled over with rum, forms bay rum.

369a. **OLEUM MYRCIÆ** (1890).—OIL OF BAY. A volatile oil distilled from bay leaves. It is a brownish-yellow, slightly acid liquid, having an agreeable, somewhat clove-like odor, and a warm, spicy taste; sp. gr. 0.96 to 0.98. It consists of a light and a heavy oil—the light a

hydrocarbon identical with that of cloves and allspice, the heavy composed chiefly of **eugenol**.

PREPARATION.

Spiritus Myrciæ (U.S.P. 1890) (8 per cent., with the oils of orange-peel and pimenta). Artificial Bay Rum.

370. **CHEKAN**.—CHEKEN. The leaves of a Chilian evergreen shrub, **Euge'nia che'kan** Molina. Tonic, expectorant, with some diuretic action. Dose of the fluidextract: 30 to 60 drops (2 to 4 mils) .

371. CARYOPHYLLUS.—CLOVES

CLOVES

The dried flower buds of **Euge'nia aroma'tica** O. Kuntze (*Iambosa caryophyllus* (Sprengel) Niedenzu) with not more than 5 per cent. of peduncles, stems and other foreign matter.

BOTANICAL CHARACTERISTICS.—A shrubby evergreen, with hard wood, covered with a smooth, gray bark. *Leaves* opposite, ovate-lanceolate, coriaceous. *Petals* 4, globular in bud, afterward spreading, whitish, aromatic. *Ovary* 2-celled; *fruit* a large, elliptical berry.

SOURCE.—The original habitat of the clove tree was the Molucca Islands, but they have been introduced into other East Indian Islands, into Zanzibar (which now forms the principal source), and into Cayenne. They are picked singly while green and are dried in the sun. Commercial: There are several varieties, as Molucco, Sumatra, and South American, the latter being rather inferior.

DESCRIPTION OF DRUG.—Cloves are about 15 mm. ($\frac{3}{5}$ in.) long, of a dark brown or reddish-brown appearance; the calyx tube is long, nearly cylindrical, crowned with the four stiff teeth (clasping the unexpanded corolla); **corolla** of four lighter colored, **unexpanded petals, forming a hollow ball on the top of the calyx-tube**, inclosing the numerous curved stamens and the single style; the ovary is inferior, situated near the top of the calyx-tube, and consists of two cells, each containing many ovules. A **cross-section** of the lower part of the calyx-tube under the microscope shows a thin outer layer surrounding a darker zone; this outer layer contains a double ring of oil cells; the inner darker zone contains an outside circle of about thirty fibrovascular bundles, with a larger bundle running through the center. **Odor** highly aromatic,

especially when scratched; **taste** pungent and aromatic, followed by slight numbness.



FIG. 185.—*Eugenia aromatica*.

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

CONSTITUENTS.—About **18 per cent. of volatile oil**, 17 per cent. of tannin, a little fixed oil, gum, resin, etc. Two crystalline principles have been separated, caryophyllin, $C_{10}H_{16}O$, white, odorless, and tasteless, resinous, and eugenin, $C_{10}H_{12}O_2$, isomeric with eugenol of the volatile oil, soluble in boiling alcohol and ether, as is also caryophyllin, but differing from the latter in turning red with nitric acid. Water extracts

the volatile oil with scarcely any of the pungency of taste. Ash, not exceeding 8 per cent.

Preparation of Caryophyllin.—Treat ethereal extract of cloves with water, collect precipitate, and purify with ammonia.

ACTION AND USES.—Stimulant and carminative, used mostly as a **synergist**. Dose: 5 to 10 gr. (0.3 to 0.6 Gm.).

OFFICIAL PREPARATION.

Tinctura Lavandulae Composita

(0.5 per cent.) Dose: 1/2 to 2 fl. dr. (2 to 8 mils).

Tinctura Rhei Aromatica.

371a. **CAROPHILLI FRUCTUS.**—The ripe fruit, or Mother Cloves, resembles cloves in appearance, but is thicker and somewhat lighter in color and less aromatic; the corolla is absent, but the calyx-teeth still adhere.

371b. **OLEUM CARYOPHYLLI.**—OIL OF CLOVES. A pale yellowish-brown, thin liquid, becoming reddish-brown on exposure. It has a specific gravity of 1.060 and boils at about 250°C.; slightly acid; taste aromatic and hot; odor characteristic, aromatic. Oil of cloves consists of two oils—one lighter than water, the other heavier; the light oil, caryophyllene, $C_{15}H_{24}$, sp. gr. 0.91, is a pure hydrocarbon, and is thought to be inactive; the heavy oil is a phenol-like liquid termed **eugenol**, or eugenic acid, $C_{10}H_{12}O_2$, sp. gr. 1.064 to 1.070

ACTION AND USES.—Used for the same purposes as cloves, more commonly, however, for introduction into an **aching, carious tooth**. Dose: 1 to 5 drops (0.065 to 0.3 mil)

372. PIMENTA, N.F.—PIMENTA

ALLSPICE

The nearly ripe dried fruit of **Pimen'ta officina'lis** Lindley, including not more than 5 per cent. of stems and foreign matter.

BOTANICAL CHARACTERISTICS.—An elegant tree about 30 feet high, evergreen. *Leaves* pellucid-punctate, petiolate. *Flowers* in racemes, white. *Calyx* and *petals* 4-fold, the latter greenish-white. *Fruit* a berry, covered by the roundish, persistent base of the calyx. After ripening, they lose their aromatic warmth and acquire a somewhat juniper-like taste; hence they are gathered in the unripe state.

SOURCE.—West Indies, Mexico, and South America, the principal source being Jamaica—from which it has received the name of Jamaica pepper.

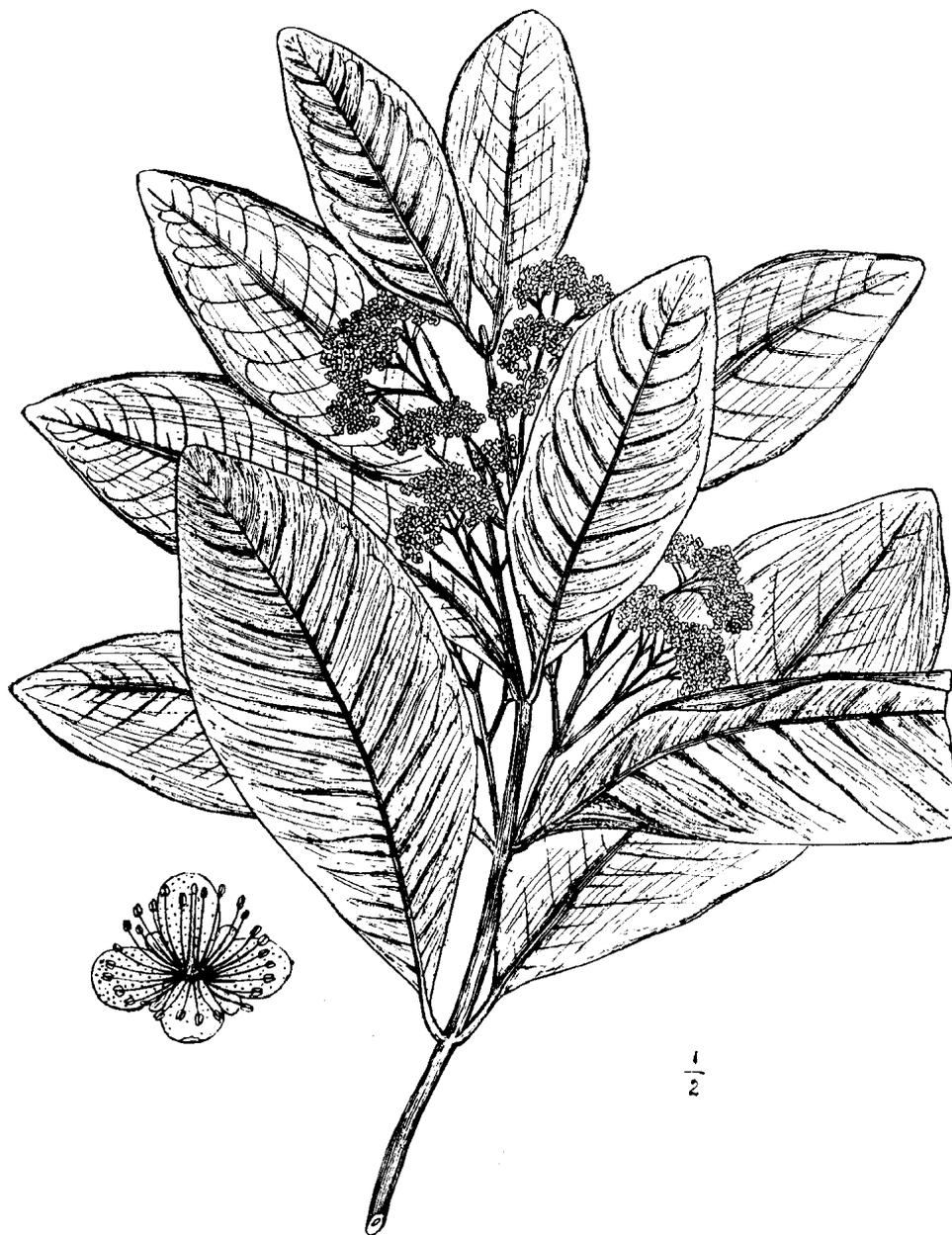


FIG. 186.—*Pimenta officinalis*—Branch and flower.

DESCRIPTION OF DRUG.—Globular, about the size of a large pea; picked while yet green, becoming wrinkled and brownish on drying, with the four calyx-teeth and the short style still adherent to the apex, or a raised ring marking the position of the calyx-teeth; it is divided into two cells, each of which contains a single, brownish, plano-convex seed. The pericarp is finely tuberculated with numerous oil tubercles.

Odor spicy and agreeably pungent; **taste** clove-like.

Powder.—Reddish-brown. Characteristic elements: Parenchyma of endosperm, with starch and resin; parenchyma of pericarp, with starch, resin, and calcium oxalate in aggregate crystals about 10 μ , in diam.; sclerenchyma with stone cells, having simple, branching pores; trichomes, short, one-celled; large oil and resin ducts; starch grains, spherical, 10 μ simple or compound. See Fig. 301

CONSTITUENTS.—The properties depend upon a volatile oil and a green, acrid **fixed oil**, existing to the extent of 10 per cent. and 8 per cent. respectively in the pericarp, and in considerably less quantities in the embryo. The yield of total ash should not exceed: 6 per cent. of which the amount soluble in dilute HCl should not exceed 0.5 per cent.

ACTION AND USES.—Stimulant and carminative, as an adjuvant to tonic and purgative mixtures. Dose: 5 to 30 gr. (0.3 to 2 Gm.).

372a. **OLEUM PIMENTÆ** (U.S.P. IX).—A colorless, or pale yellow, volatile oil, becoming thick and reddish-brown by age. Specific gravity 1.02 to 1.05, It closely resembles oil of cloves (*q.v.*), but has a more pleasant and less pungent odor; taste aromatic. Consists, like oil of cloves, of a light and a heavy oil, the heavy oil being identical with eugenol.

ACTION AND USES.—Same as the other stimulant aromatic oils. Dose: 1 to 5 drops (0.065 to 0.3 mil).

OFFICIAL PREPARATION.

Spiritus Myrciae (U.S.P. 1890) (0.05 per cent.).

373. **JAMBUL**.—JAVA PLUM. A large tree, **Eugen'iajambola'na**, growing in the East Indies, where its fruit is eaten as a food. All parts are astringent, but the bark, and especially the seeds, possess, in addition, the peculiar property of arresting the formation of sugar in diabetes, and hence are "likely to prove a valuable remedy in this disease." Dose: 5 to 10 gr. (0.3 to 0.6 Gm.).

374. **OLEUM CAJUPUTI**.—OIL OF CAJUPUT

OIL OF CAJUPUT

A volatile oil distilled from the leaves of **Melaleu'ca leucaden'dron** Linné.

BOTANICAL CHARACTERISTICS.—A tree with crooked stem and scattered branches, the branchlets drooping like those of the weeping willow; bark whitish. *Leaves* lanceolate, deep green, entire, from 3 to 4 inches long. *Flowers* small, white, inodorous, in axillary spikes.



FIG. 187.—*Melaleuca leucadendron*—Branch.

HABITAT.—East Indies.

DESCRIPTION OF DRUG.—A light bluish-green (probably due to copper), limpid liquid having a penetrating, agreeable odor, and a warm, camphoraceous, bitter, afterward saline or cooling, taste. Specific gravity 0.912 to 0.925. It has a slightly acid reaction.

CONSTITUENTS.—The principal constituent is the hydrate of the hydrocarbon, cajuputene, $C_{10}H_{16}$ (**Cajuputol**, $C_{10}H_{16}H_2O$ said to be identical with eucalyptol, or cineol, from eucalyptus. The commercial oil often contains a trace of copper, not in large enough quantities to be dangerous, however.

ACTION AND USES.—Highly stimulant, carminative, and a counterirritant in rheumatism. Dose: 1 to 10 drops (0.065 to 0.65 mil).

COMBRETACEÆ

375. **MYROBOLANUS.**—MYROBOLANS. The fruit of **Termina'lia chebu'la**, and of other species of Terminalia growing in the East Indies. Oblong, pyriform, or roundish-oval, from 30 to 50 mm. ($1\frac{1}{5}$ to 2 in.) in length, dark brown or orange color. Several varieties of the fruit are used occasionally as a mild laxative and astringent, but now principally in the arts for tanning, etc.

ONAGRACEÆ.—Evening Primrose Family

376. **EPILOBIUM.**—WILLOW-HERB. The herb of **Epilo'bium angustifo'lium** Linné. *Habitat:* Northern Hemisphere. It has a smooth, reddish stem, branching above, arising from a long, yellowish-white root, and bearing the purplish-pink flowers in a raceme resembling those of the willow; hence the name willow-herb. Demulcent and astringent. Dose: 30 to 60 gr. (2 to 4 Gm.).

377. **ŒNOTHERA BIENNIS** Linné.—EVENING PRIMROSE. *Habitat:* North America. Astringent, alterative.

ARALIACEÆ.-Ginseng -Family

Synopsis of Drugs from the Araliaceæ

A. *Root.*
Panax, 378.

B. *Rhizome.*
Aralia Nudicaulis, 379.
*Aralia Racemosa, 379 a.
Aralia Hispida, 380.

378. **PANAX.**—GINSENG. (Official, 1840-1880). The root of **Pa'nax quinquefo'lium** Willdenow. Cultivated in Ohio, West Virginia, Minnesota, and quite extensively and profitably in Michigan, and exported to China, where, from its fancied resemblance to the human figure, it is supposed to possess miraculous powers in preventing and curing diseases, and where at one time it was valued at its weight in gold. It has, however, little medicinal properties except as a demulcent and aromatic stimulant; not used extensively in medicine. It is a soft, yellowish-white, fusiform root, about the thickness of the finger, with two or three equal branches below. A **cross-section** shows a hard central portion, surrounded by a thick, soft, white inner cortical layer; with thin bark, containing numerous reddish resin-cells; wood-wedges narrow; medullary rays broad; odor feeble; taste sweet, slightly aromatic. The sweet principle is **panaquilon**, $C_{12}H_{25}O_9$.

Preparation of Panaquilon.—Concentrate the cold infusion to a syrup, precipitate by concentrated solution of sodium sulphate, wash the precipitate thoroughly with the saline solution, then treat with alcohol, which dissolves the principle; evaporate to dryness.

379. **ARALIA NUDICAULIS** Linné.—FALSE SARSAPARILLA. WILD LICORICE. *Habitat:* North America. (Rhizome.) Horizontal, often 300 mm. (12 in.) in length, and about the thickness of the little finger; it has a yellowish-brown, wrinkled, and annulate bark, inclosing a yellow wood and spongy pith; somewhat aromatic; taste warm, aromatic, and sweetish. The rhizome of **Ara'lia racemo'sa**, N.F. Linné (American Spikenard) is short and from 25 to 50 mm. (1 to 2 in.) thick, marked above by prominent stem-scars and beset below with long, branching rootlets; externally pale brown, internally whitish; more aromatic and spicy than *A. nudicaulis*. Both rhizomes are used extensively in domestic practice as stimulant, diaphoretic, and alterative. Dose: 30 to 60 gr. (2 to 4 Gm.), in infusion.

380. **ARALIA HISPIDA** Ventenat.—DWARF ELDER. *Habitat:* United States. (Rhizome.) Diuretic; used in dropsy, etc. Dose of fluidextract: 1 to 2 fl. dr. (4 to 8 mils).

UMBELLIFERÆ.-Parsley Family

Herbs with hollow stems. The umbellate inflorescence—the general character of the order—gives rise to its name. The *fruit*, called a cremocarp (from *cremao*, to support, and *karpos*, fruit), is perhaps the most marked characteristic of the order; it originates from one ovary surmounted by 2 styles and often crowned by the limb of the calyx, and has 2 cells and 2 seeds. The entire fruit is usually ellipsoidal, but in the case of the coriander it is spherical; it divides itself into two *mericarps* (half-fruits) suspended by their summits from a slender axis (carpophore), usually 2-forked; each mericarp has 5 to 10 more or less prominent ridges (*juga*), in the furrows or grooves between which are several oil-tubes (*vittæ*), usually -visible in cross-section; in anise there are usually 15, in coriander 2. The roots contain an abundance of aromatic resin.

Synopsis of Drugs from the Umbelliferæ

A. *Fruits.*

ANISUM, 381.
FÆNICULUM, 382.
 ***Conium**, 383.
CARUM, 385.
CORIANDRUM, 386.
 Anethum, 387.
 ***Apium**, 388.
 Ajowan, 389.
 ***Petroselinum**, 391.
 Phellandrium, 392.
 Cuminum, 393.
 Carota, 394.

E. *Searopten.*

THYMOL, 390.

F. *Roots.*

SUMBUL, 400.
 Imperatoria, 401.
 Laserpitium, 402.
 ***Angelica Atropurpurea**, 395.
 Angelica, 396.

B. *Leaves.*

Conii Folia, 384.

C. *Volatile Oils.*

OLEUM ANISI, 381 a.
OLEUM FÆNICULI, 382 a.
OLEUM CARI, 385 a.
OLEUM CORIANDRI, 386 a.
 Oleum Anethi, 387 a.

D. *Gum Resins.*

ASAFÆTIDA, 397.
 Galbanum, 398.
 Ammoniacum, 399.

F. *Roots.*—(Continued.)

Levisticum, 403.
 ***Petroselinum**, 391.
 ***Pimpinella**, 404.
 Thapsia, 405.
 Cicuta, 406.
 Eryngium, 407.
 Osmorrhiza, 408.

381. ANISUM.—ANISE

ANISE

The ripe fruit of *Pimpinella anisum* Linné, with not more than 3 per cent. of foreign seeds and other vegetable matter.

BOTANICAL CHARACTERISTICS.—Stem about 1 foot high. Umbels on long stalks without involucre; flowers small, white; calyx obsolete; carpels 5, with filiform ridges.

HABITAT.—Levant and Egypt; extensively cultivated in Europe.

DESCRIPTION OF DRUG.—Two or three varieties have been produced by cultivation, the Spanish being the smallest, and usually preferred. In general appearance **anise resembles conium very much**, but it is distinguished from the latter in being usually longer and more ovate, the mericarps, which usually adhere together, having their five ribs more or less hairy and not jagged, and having about 15 oil tubes, of which conium has none; odor fragrant; taste aromatic, sweetish. The fruit is often accompanied with its adhering short peduncle.

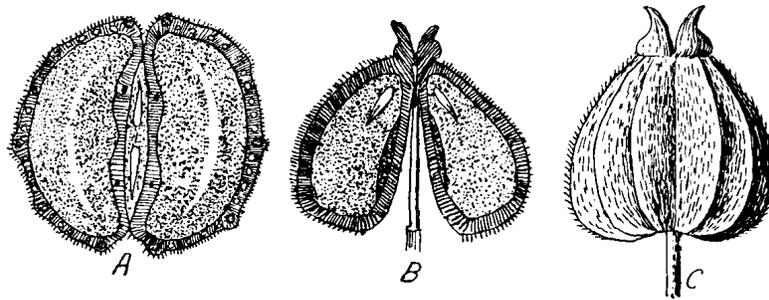


FIG. 188.—*Anisum*. A. Transverse section. B. Longitudinal section. C. Fruit (enlarged).

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

CONSTITUENTS.—Volatile oil ($1\frac{1}{2}$ to 3 per cent.). Ash, not exceeding 9 per cent.

ACTION AND USES.—Stimulant and aromatic carminative. Dose: 8 to 30 gr. (0.5 to 3 Gm.).

381a. **OLEUM ANISI**, U.S.—A colorless or pale yellow volatile oil, having the aromatic odor and taste of the fruit; neutral in reaction; sp. gr. 0.98 to 0.99, depending upon age. Dose: 5 drops (0.3 mil)

CONSTITUENTS.—It contains a slight quantity of a light hydrocarbon oil, but principally **anethol**, $C_{10}H_{12}O$, which is present in both liquid (liquid anethol) and solid form (anise camphor); by oxidation this anethol is converted into **anisic acid**; anethol is the principal constituent also of fennel and star anise, the most of the commercial anise oil being derived from the last-named fruit. Anethol is recognized in the National Formulary.

Preparation of Anethol.—Obtained by fractional distillation; by oxidation is converted into anisic acid.

OFFICIAL PREPARATIONS.

Aqua Anisi (0.2 per cent.)	Dose: 4 fl. dr. (16 mils).
Spiritus Anisi (10 per cent.)	90 drops (6 mils).
Spiritus Aurantii Compositus (0.5 per cent.),	
Tinctura Opii Camphorata (0.4 per cent.),	2 fl. dr. (8 mils).

382. FŒNICULUM.—FENNEL

FENNEL

The dried nearly ripe fruit of **Fœnic'ulum vulga're** Miller with not more than 4 per cent. of foreign matter.

BOTANICAL CHARACTERISTICS.—Stem somewhat furrowed, 3 feet high. *Leaves* much compounded, cut into fringe-like segments. Umbels with 6 to 8 rays, without involucre or involucl.

HABITAT.—Chiefly imported from Germany, although the cultivated plants in the gardens of this country* partially supply the market.

DESCRIPTION OF DRUG.—Varying in size, the longest often being 12 mm. ($\frac{1}{2}$ in.) in length; oblong, terete, a cross-section showing a nearly circular surface; the mericarps are usually separated, however, and slightly curved, their surface dark brown and smooth, with the exception of the five prominent, filiform, lighter colored ribs, the two lateral ones rather broader; in each depression is one oil tube, and on the flat side or commissure there are two. There are two prominent varieties: Saxon, or German, about 4 mm. ($\frac{1}{6}$ in.) long, dark brown, usually in half-fruits without foot-stalks. The other (Roman) is about 12 mm. ($\frac{1}{2}$ in.) in length, lighter brown, with more prominent ribs, and often in the whole state and furnished with footstalk. Both, however,

are about the same in aromatic properties, and have a warm, sweet, aromatic taste. Bitter fennel, from a wild plant of Southern France, is a small fruit, bitter and spicy. Indian fennel (6.7 mm. in length), anise-like odor used in the preparation of compound infusion of senna (2 per cent.).



FIG. 189.—*Foeniculum capillaceum*—Branch and fruit entire and in cross-section.

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

CONSTITUENTS.—From 2.5 to 4 per cent. of volatile oil, almost chemically identical with that of anise. It contains phellandrene, C₁₀H₁₆. Ash, not exceeding 9 per cent.

ACTION AND USES.—Stimulant, carminative, stomachic, corrective. Dose: 8 to 30 gr. (0.5 to 2 Gm.), in infusion or powder.

OFFICIAL PREPARATION.

Infusum Sennæ Compositum Dose: 4 fl. dr. (120 Mils).

382a. **OLEUM FŒNICULI**.—A colorless or pale yellow volatile oil, having a specific gravity of 0.96. It usually solidifies at from 5° to 10°C. (41° to 50°F.). It has essentially the same constituents as the oil of anise. Stimulant and carminative, and a corrective of harsh, purgative preparations. Dose: 1 to 5 drops (0.06 to 0.3 mil)

OFFICIAL PREPARATIONS.

Aqua Fœniculi (0.2 per cent.) Dose: 1/4 to 1 fl. oz, (8 to 30 mils) .

Pulvis Glycyrrhizæ Compositus (0.4 per cent.) 1/2 to 2 dr. (2 to 8 Gm.).

Spiritus juniperi Compositus (0.05 per cent.) 1 to 4 fl. dr. (4 to 15 mils).

383. CONIUM.—CONIUM

POISON HEMLOCK. Ger. SCHIERLINGSFRCÛHTE

The full-grown, but unripe fruit of **Con'ium macula'tum** Linné, carefully dried and preserved, should yield by assay, not less than 0.5 per cent. of coniine. It should not be kept longer than two years.

DESCRIPTION OF DRUG.—Gathered when full grown but yet green, the yield of alkaloid being greatest at this time. Small, roundish-ovate, laterally compressed, grayish-green. The mericarps, which are often separated, have five **jagged ribs but no oil-tubes**; the flat side or commissure is deeply furrowed, giving to a transverse cut surface a reniform outline. **Almost odorless; taste disagreeable and somewhat acrid**; when triturated with a solution of KOH, conium emits the peculiar, mouse-like odor characteristic of the volatile alkaloid, coniine, which is liberated thereby. The total alkaloids in the fruit may reach as high as 3.5 per cent., rapidly diminishing as it ripens.

Powder.—Pale yellowish-brown. Characteristic elements: Parenchyma of endosperm, rather thick-walled with oil globules and aleurone (4 to 7 μ in diam.); aggregate

calcium oxalate (1 to 2 μ in diam.); other parenchyma with starch and chloroplastids; sclerenchyma, from fruit and stalk with bast fibers, long and thin-walled, with numerous pores; collenchymatous cells from mericarp, yellowish, nearly isodiametrical, irregularly thickened.

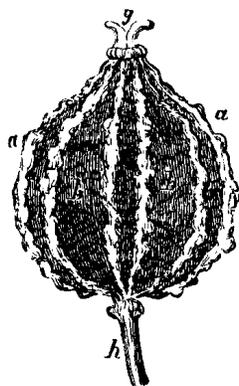


FIG. 190.—Fruit of Hemlock (*Conium maculatum*).

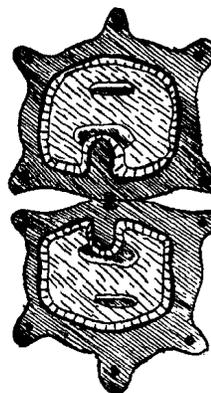


FIG. 191.—Cross-section of the fruit of *Conium maculatum*, 20 diam.

CONSTITUENTS.—The liquid alkaloid, **coniine**, $C_8H_{17}N$ (the active constituent), **methyl coniine**, $C_8H_{16}(CH_3)N$ (also liquid), conhydrine, and its isomer, pseudoconiine. Coniine is a yellowish, oily, volatile liquid (sp. gr. 0.88), very acrid, and of a strong, mouse-like odor; it is strongly basic, and is combined in the fruit with conhydric acid, from which it may instantly be freed and its odor developed in the fruit by rubbing with potassa, as noted above; its action is that of a paralyzant to the motor nervous system. Methyl coniine resembles it inaction. Conhydrine is in iridescent scales, melting at $120.6^\circ C$.

Preparation of Coniine.—Liberated from drug by distilling it with alkali. Methyl coniine and conhydrine is likely to come over with it.

Separation of Conhydrine from Coniine.—Reduce the temperature of the oily liquid containing the two by a freezing mixture. Recrystallize from ether. Occurs in iridescent scales, less poisonous than coniine.

ACTION AND USES.—Conium is narcotic and sedative; its principal action is as a **paralyzant to the motor nerves**. Dose: 3 to 5 gr. (0.2 to 0.3 Gm.). The alkaloid coniine is an active poison, the dose being from $\frac{1}{4}$ to $\frac{1}{2}$ drops (0.0164 to 0.0324 mil); dose of the hydrochlorate is probably about $\frac{1}{6}$ gr. (0.01 Gm.).

384. CONII FOLIA.—HEMLOCK LEAVES. Grayish-green, thin, smooth, from 100 to 300 mm. (4 to 12 in.) long, twice or thrice decompose, with oblong lanceolate, acute, sharply serrate divisions; petiolate, the petiole hollow; odor mouse-like; taste disagreeable. They contain coniine in very small quantity, and are less active than the fruit, but used for the same purposes -as an anodyne and antispasmodic for controlling maniacal excitement and spasmodic affections, such as whooping-cough, etc. Dose: about 5 gr. (0.3 Gm.).

385. CARUM.—CARAWAY

CARAWAY

The dried fruit of *Car'um car'vi* Linné prevented from attacks of insects by chloroform or carbon tetrachloride.

BOTANICAL CHARACTERISTICS.—A biennial 2 feet in height, with bipinnate leaves. The *umbel* rarely involucrate, *flowers* consisting of 5 obcordate, small, white petals; *carpels* with 5 filiform ridges; stylopodium (the disk-like expansion of the receptacle) depressed. *Fruit* brownish, oblong, slightly curved.

HABITAT.—Asia; introduced into America.



Carum Carvi
(*Carvi*): flower, fruit, and cross-section of fruit, enlarged.

DESCRIPTION OF DRUG.—The mericarps, which are usually separated, are about 4 to 5 mm. ($\frac{1}{6}$ to $\frac{1}{5}$ in.) in length, tapering somewhat at the ends. Surface dark brown, smooth, with the exception of the five **lighter colored**, filiform **ribs**, between which are the six large, easily visible oil-tubes. A cross-section shows the pentangular seed and oiltubes. **Odor and taste** aromatic, agreeable. "Drawn fruits." This name has been applied to a form of adulterated caraway—a partially exhausted fruit, whereby they have been deprived of a portion of the volatile oil. It is said that "Dutch seed" of fair quality should give over 5 per cent. of volatile oil. Exhausted fruits

have been found to contain but 1.5 to 1.9 per cent. of oil. They are of much darker color than the genuine. The American seed is slightly smaller than the German. The seed cultivated in Northern Germany is too deficient in essential oil for profitable distillation, but it has a fine appearance.

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

CONSTITUENTS.—Volatile Oil 4 to 5 per cent., consisting of carvone and carvene, see 385a; readily soluble in alcohol, slightly soluble in water. Ash, not more than 8 per cent.

ACTION AND USES.—Stimulant, stomachic, and carminative, and an adjuvant. Dose: 15 to 30 gr. (1 to 2 Gm.).

OFFICIAL PREPARATION.

Tinctura Cardamomi Composita (1.2

per cent.)

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

385a. **OLEUM CARI**, U.S.—A limpid, colorless or pale yellow volatile oil, specific gravity 0.92, with an aromatic odor and taste, becoming acrid and of a higher specific gravity when exposed. It consists of two portions, a light hydrocarbon, **carvene**, identical with limonene, and a heavy oil, **carvone**, isomeric with thymol.

ACTION AND USES.—Stimulant, stomachic, carminative, and adjuvant. Dose: 1 to 10 drops (0.065 to 0.6 mil).

OFFICIAL PREPARATION.

Spiritus Juniperi Compositus

(0.05 per cent.)

Dose: 2 to 4 fl. dr. (8 to 15 mils).

386. CORIANDRUM.—CORIANDER

CORIANDER

The dried ripe fruit of **Corian'drumsati'vum** Linné without admixture of more than 5 per cent. of other fruit, seeds or other foreign matter.

BOTANICAL CHARACTERISTICS.—An annual herb about two feet high, with an offensive, bedbug-like odor, with smooth stem and bipinnate *leaves*. *Calyx* 5-toothed; *petals* obcordate (the exterior ones bifid), white, often with a pink tinge. *Capsules* with primary ridges obsolete, the four secondary ones prominently keeled. *Fruit* globose; seed covered with a loose membrane.

HABITAT.—Italy; cultivated in all parts of Europe and United States.

DESCRIPTION OF DRUG.—**Almost globular**, about 3 mm. (1/8 in.) in diameter, slightly pointed at the apex (style) and with the persistent calyx-teeth around the pedicel-scar at the base. The two concave, hemispherical **mericarps are closely united at the edge** by the woody pericarp; their outer surface is pale yellowish-brown, sometimes purplish-tinted, with five primary ribs merely indicated by wavy, slightly raised lines, and four more prominent secondary ribs. The interior of the fruit is a lenticular cavity. Odor fragrant (the odor of the

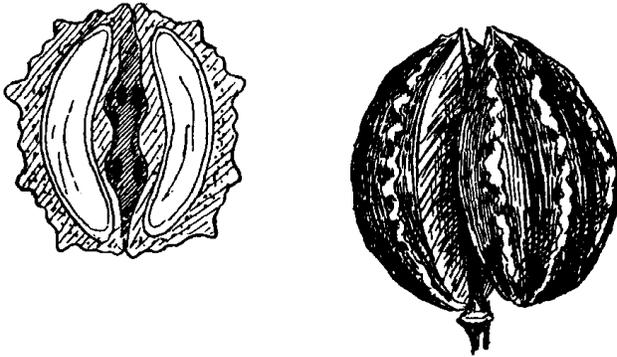


FIG. 192.—*Coriandrum sativum*—Whole fruit and cross-section.

fresh plant and fruit is foetid, resembling bedbugs); **taste** aromatic.

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

CONSTITUENTS.—**Volatile oil**, $\frac{1}{2}$ to 1 per cent., containing coriandrol, $C_{10}H_{18}O$. also dextropinene, fat, mucilage. Ash, not exceeding 7 per cent. Soluble

ether extract, 0.5 per cent.

ACTION AND USES.—Feeble aromatic and stimulant; mostly used as an aromatic addition to, or a **corrective** of, purgative preparations. Dose: 8 to 30 gr. (0.5 to 2 Gm.).

386a. **OLEUM CORIANDRI.**—An almost colorless or yellowish volatile oil with the characteristic aromatic odor and taste of the fruit; specific gravity 0.863 to 0.875; neutral in reaction. It is one of the most stable of the volatile oils in its power of resisting oxidation when exposed. It consists mainly of d-linalool or coriandrol, $C_{10}H_{18}O$. Stimulant and carminative, like the other aromatic oils. Dose: 1 to 5 drops (0.065 to 0.3 mil).

OFFICIAL PREPARATIONS.

Spiritus Aurantii Compositus (2.0 per cent.)

Dose: 1 to 4 fl. dr. (4 to 15 mils) linalool.

Syrupus Sennæ (0.5 per cent.)

1 fl. dr. (4 mils) .

387. **ANETHUM.**—DILL FRUIT OR DILL SEED. The fruit of **Anethum graveolens** Linné, an herb of Levant and Southern Europe. Oval-oblong, usually separated into the two thin mericarps; these have a smooth brown surface, with five ribs, the two lateral ones expanded into a **lighter colored, membranous wing surrounding the fruit**; oil-tubes six, two on the concave inner face and one in each interval between the ribs; odor and taste caraway-like, depending upon the volatile oil, the heavy portion of which is doubtless carvol. Stimulant, carminative, and stomachic. Dose: 8 to 30 gr. (0.5 to 2 Gm.).

387a. **OLEUM ANETHI.**—Pale yellow, with the characteristic odor of the fruit, and a pungent, sweetish, acrid taste. It is official in the British Pharmacopœia, where it is

sometimes used to prepare dill-water.

388. **APIUM**.—CELERY FRUIT. From **A'pium. graveo'lens** Linné, N.F., the common celery of our gardens, native to Levant and Southern Europe. Roundish-ovate, very small, brown cremocarps, generally separated into the two mericarps, which have five ribs and about six oil-tubes. They contain a volatile oil and a yellowish liquid principle, **apiol**, an oleoresinous substance, but somewhat analogous to the fixed oils; this apiol is chiefly extracted for medicinal use from parsley, however; it is used as an emmenagogue in doses of to to 12 drops (0.6 to 1 mil).

Preparation of Apiol.—The simplest process for its separation is to exhaust the fruit with petroleum-benzene, evaporate the solvent, and treat the residue with strong alcohol. On evaporation, the apiol remains. A process resulting in a pure, almost colorless apiol is published in "Pharm. Archiv," Feb., 1899. Dose: 7½ to 23 gr. (0.5 to 1.5 Gm.).

Celery is stimulant, antispasmodic, and carminative. Dose of fl'ext.: 5 to 15 drops (0.3 to 1 mil)

389. **AJOWAN**.—The fruit of **Ca'rum ajow'an** Bentham and Hooker. *Habitat*: Southern Asia and Egypt. Ovate, somewhat compressed laterally, about 2 mm- (1/12 in.) long, with a rough, grayish-brown surface; mericarps usually separated, containing six oil-tubes. The large fruits much resemble those of common parsley, but are readily distinguished from them and other small umbelliferæ by their odor and very rough surface. **Odor** thyme-like; taste pungent and aromatic, due to a volatile oil, 5 to 6 per cent., which consists of a terpene, cymene, and the stearopten, **thymol**. Ajowan is one of the commercial sources of this stearopten. Oil of ajowan, when freshly distilled, is color. less, but soon acquires a slightly yellow tinge. It has an acrid, burning taste. Carminative, stomachic, having the same properties as thymol (see below). Dose: 10 to 30 gr. (0.6 to 0.2 Gm.).

390. THYMOL

THYMOL

A phenol, C₁₀H₁₃OH, obtained by fractional distillation of oils from **Thymus vulgaris**, **Carum ajowan**, and **Monarda punctata**. That portion coming over at 392°F. (260°C.) is separately collected and subjected to freezing, when thymol crystallizes out; or by distilling off a greater part of the light oils or hydrocarbons and obtaining the thymol from the remaining heavier liquid by the use of caustic soda and HCl.

DESCRIPTION.—Small, colorless scales or large, translucent crystals of the hexagonal system having a thyme-like odor arid pungent taste, somewhat caustic to the lips. It melts at about 50°C. (122°F.), but does not crystallize again until a much lower temperature is reached. Sparingly soluble in water (1:1200), but dissolves in less than its own

weight of alcohol, ether, or chloroform. The crystals have a specific gravity of 1.069, but the melted liquid is lighter than water. Chemically, thymol is considered as isopropyl-meta-cresol ($C_6H_3.CH_3.OH.C_3H_7$), and is closely related to carvacrol, which is regarded as isopropyl-ortho-cresol. the two differing in the relative position of the hydroxyl group. When 2 Gm. are volatilized on waterbath not more than 0.05 per cent. of residue should remain. It should melt from 48° to 51°C.

As a solid it is heavier than water but when liquefied by fusion is lighter than water.

ACTION AND USES.—Stimulant and **powerful antiseptic**, generally applied externally in ointment or lotion, or in a spray, considered almost as a specific in Hookworm disease. **Aristol.**—A name applied to thymol iodide (q.v.). Internal dose: 1 to 2 gr. (0.065 to 0.13 Gm.).

391. **PETROSELINI RADIX**, N.F.—PARSLEY. The root of **Petroselinum sativum** Hoffman, native to Southern Europe, but cultivated extensively as a common garden plant. A tapering root from 100 to 200 mm. (4 to 8 in.) long, and about 12 mm. ($1/2$ in.) thick externally yellowish or light brown, marked with close annular rings above and longitudinal wrinkles at the lower end; fracture short, showing a thick bark dotted with resin cells, and a porous, pale yellow wood, with very irregular, white medullary rays. When fresh, it has a strong, aromatic odor, but is only faintly so when dry; taste sweetish, slightly aromatic. It is the chief source of **apiol** (also found in celery), a yellowish liquid somewhat analogous to the fixed oils, given as an emmenagogue in doses of 10 to 15 drops (0.6 to 1 mil). The root is given in infusion as a carminative, and as a laxative and diuretic in nephritic and dropsical affections. Dose: 30 to 60 gr. (2 to 4 Gm.).

391a. **PETROSELINUM**, U.S.P. IX, applies this term to the fruit which is ovate, about 2 mm. ($1/12$ in.) long, with a greenish or brownish-gray surface, the mericarps usually separated. It contains the same principal ingredients, and is used for about the same purposes as the root. Dose: 8 to 30 gr. (0.5 to 2 Gm.). See **Apiol** 391b.

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

Official Preparation.—Oleoresina Petroselini.

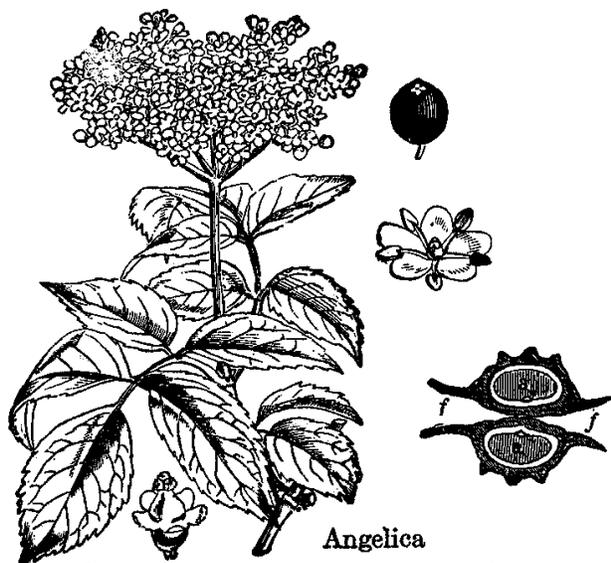
391b. **APIOL** (L. *apinum*, parsley, + ol), an oleoresinous liquid, heavier than water, of a persistent odor, distinct from the plant, and an acrid, pungent taste; from certain umbelliferous fruits, chiefly parsley "seed" (fruit). A crystalline compound, $C_{12}H_{14}O_4$, a purified *apiol* (parsley camphor) is obtainable. Dill oil yields a liquid *apiol* which has the same composition as the crystallizable *apiol* from the parsley. (See also 388.)

392. **PELLANDRIUM**.—WATER DROPWORT. FIVE-LEAVED WATER HEMLOCK. The fruit of a European aquatic plant, **Enan'the phellan'drium** Lamarck. From 2 to 3 mm. ($\frac{1}{12}$ to $\frac{1}{8}$ in.) in length, terete, oblong, narrowed at one end, and crowned with the stylopodium; yellowish-brown or blackishbrown in color; taste aromatic, slightly acrid; odor strong, somewhat carawaylike, but disagreeable. Its aromatic properties depend upon a volatile oil, but there are indications of a narcotic alkaloid, **possibly coniine**, as the characteristic mouse-like odor is developed when the powdered seeds are rubbed with a solution of potassa. Slightly narcotic, stimulant, but more particularly used in chronic affections of the air-passages, as bronchitis, etc. Dose of powder about 5 gr. (0.3 Gm.), cautiously increased.

393. **CUMINUM**—CUMIN SEED. The fruit of **Cumi'num cym'inum** Linné. *Habitat*: Egypt; cultivated in Southern Europe. Resembles caraway, but may be distinguished by its entirely different, peculiar, heavy odor, and in being whole fruits and not half-fruits, as in the latter; surface brown, rough, and hairy; ribs 18, oil-tubes 6; taste aromatic, bitterish, disagreeable. It contains a volatile oil, often used as a carminative, which consists of three different oils (two hydrocarbons and cuminol). Cumin is much stronger as a stimulant than the other umbelliferous fruits. Dose: 8 to 30 gr. (0.5 to 2 Gm.).

394. **CAROTA**.—CARROT FRUIT. From wild plants of **Dau'cus caro'ta** Linné. *Habitat*: United States and Europe. Light, oval-oblong fruits, dorsally compressed; mericarps usually united, brownish, each with five hairy primary ribs and four more prominent secondary ones **beset with long, white bristles**; odor aromatic; taste warm, bitterish. Aromatic stimulant, diuretic. Dose: 8 to 30 gr. (0.5 to 2 Gm.).

395. **ANGELICA ATROPURPUREA**.—AMERICAN ANGELICA. (Root.) This highly aromatic root was official in the U.S.P., 1860-70. It is similar to



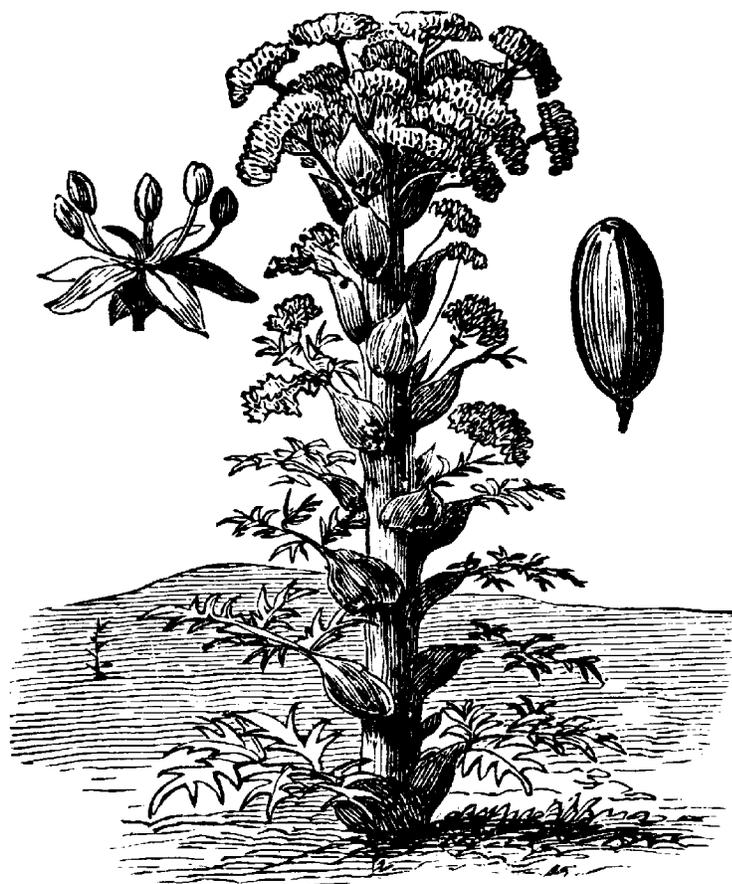
Angelica
flowering stem and cross-section of cremocarp:
a, the seed; f, the 2-ribbed wings (mericarps).

396. **ANGELICA, A. OFFICINALIS**.—EUROPEAN OR GARDEN ANGELICA. (Root.) The aroma is due to a fragrant volatile oil. Also contains **angelic acid** (also found in sumbul), which has an action on the nerves. *Description*: Rootstock 5 to 10 cm. (2 to 4 in.) long, 2.5 to 5 cm. ($\frac{1}{2}$ in.) thick, crowned with remnants of leaf-bases, rather thick bark, curved yellowish, porous wood-wedges, a whitish pith, spongy, especially in root-branches, radiating lines of large resin-ducts in the bark, bast rays destitute of bast fibers. Aromatic stimulant, stomachic, and carminative. Dose: 30 to 60 gr. (2 to 4 Gm.).

Angelica Fructus, the ripe fruits of Angelica Archangelica, Linné, and Angelica Radix, the rhizome and roots of Angelica Atropurpurea, Linné, are recognized in the National Formulary.

397. ASAFETIDA.—ASAFETIDA

ASAFETIDA



Ferula foetida

A gum-resin obtained by incising the rhizomes and roots of **Ferula asafetida**, Linné, of **Ferula foetida** Regel, and some other species of *Ferula*.

BOTANICAL

CHARACTERISTICS.—A gigantic herbaceous plant, 10 feet high, with radical leaves 18 inches long, bipinnate; calyx nearly obsolete, consisting of 5 minute points. Fruit broadly elliptical, thin, foliaceous, with dilated border; vittæ inconspicuous.

SOURCE.—This plant, and other species from which commercial asafetida is procured, grows in Western Thibet, Kashmir, Persia, Turkestan, and Afghanistan. The plant is cut off at the root, and the milky juice exuding is allowed to harden, the sun being

excluded by branches and leaves thrown over the cut surface; when it has solidified it is scraped off, and another slice of the root is cut off to expose a fresh surface, this operation being continued until the root is exhausted.

DESCRIPTION OF DRUG.—Masses composed of white tears of various shapes and sizes, imbedded in a brown, sticky mass, along with vegetable trash and earthy impurities. These masses are at first soft, but harden on exposure, the tears breaking with a conchoidal fracture, at

first milk-white, but gradually turning pink, and at last brown. It resembles galbanum very much in appearance, but is easily distinguished by its **strong, disagreeable, alliaceous odor**, due to a sulphuretted volatile oil present to the extent of 3 to 9 per cent. On adding ammonia to a decoction of the sublimated resin, a blue fluorescence is exhibited. Taste acrid, bitter, and alliaceous.

When assayed by the official process asafœtida should contain not less than 60 per cent. of alcohol soluble constituents.

VARIETIES.—Besides the above-described variety, the amygdaloid, which is the most common, there are other forms in which it enters the market:

- Liquid asafœtida is a permanent, syrupy liquid, white, turning brown on exposure.
- Asafœtida in tears is the purest variety.
- Stony asafœtida, never used medicinally, consists of pieces of gypsum or other earthy material coated with a thin layer of the milkjuice.

CONSTITUENTS.—The greater part of asafœtida consists of a gum (20 to 30 per cent.) and resin (50 to 70 per cent.). These, with the volatile oil (3 to 9 per cent.), form with water a milky emulsion. The resin is regarded by Tschirch as the ferulic ester of asaresino-tannol, $C_{24}H_{35}O_5$, which, by sublimation, yields umbelliferone. There is also contained in the drug vanillin 0.06 per cent., ferulic acid, $C_{10}H_{10}O_4$, 1.28 per cent. The resin, when fused with KOH, yields resorcin and protocatechuic acid. The mineral impurities often amount to 40%, especially in that imported from Herat, where it is adulterated with red clay. Ash (of Resin), not to exceed 15 per cent.; (Powder), not to exceed 30 per cent.

For an exhaustive treatise on Gum Resins, etc., the student is referred to "Analysis of Resins, Balsams and Gum Resins, Their Chemistry and Pharmacognosis," by Carl Dietrich (Scott, Greenwood & Co., London).

ACTION AND USES.—Asafœtida combines the properties of a stimulating **antispasmodic** with those of an efficient expectorant, making it a valuable remedy in spasmodic affections of the respiratory tract, as whooping-cough, asthma, etc. It is also a **laxative**, especially useful in cases of flatulence. Dose: 5 to 8 gr. (0.3 to 0.5 Gm.).

OFFICIAL PREPARATIONS.

Emulsum Asafoetidæ (4 per cent.),

Tinctura Asafoetidæ (20 per cent.),

Pilulæ Asafoetidæ (each pill containing

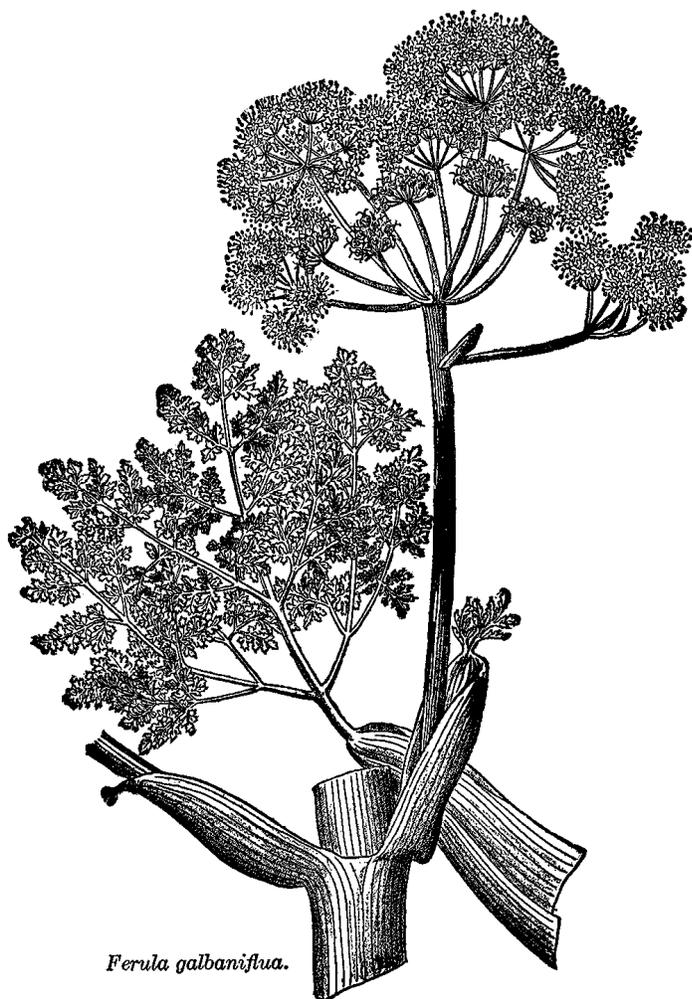
about 3 gr. of asafoetida, with soap as an excipient) 2 to 5 pills.

Dose: 2 to 4 fl. dr. (8 to 15 mils).

10 to 40 drops (0.6 to 2.6 mils).

398. **GALBANUM.**—**GALBANUM.** A gum-resin imported from Persia, but the botanical source of which is not definitely decided; it is generally considered, however,

as a spontaneous exudation from **Ferula galbaniflua** Boissier et Buhse, and other species of *Ferula*, large plants growing in that region. It is usually met with in pale yellow or brownish tears, ranging in size from a pea to a hazelnut, occasionally separate and with a shining, varnished surface, but more generally agglutinated into a more or less hard mass by means of a darker, yellowish-brown, sometimes greenish, substance. In winter this mass has the consistence of firm wax, but in the heat of summer it becomes soft and sticky; odor balsamic; taste acrid and bitter.

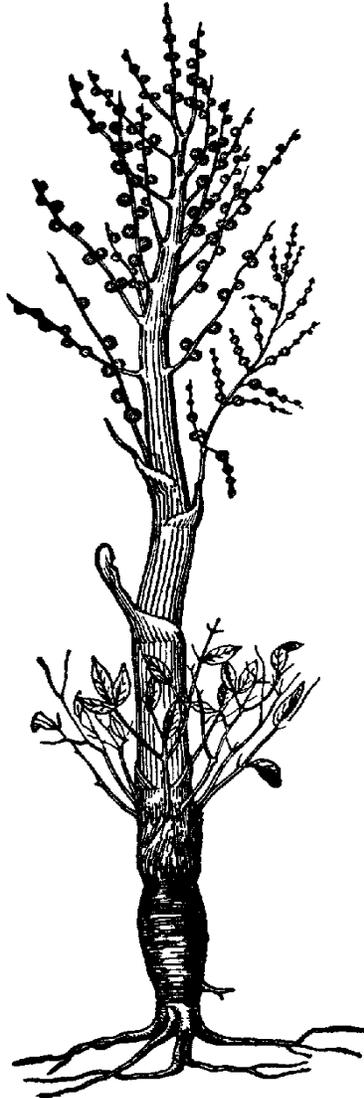


Ferula galbaniflua.

CONSTITUENTS.—Besides gum and resin, it contains the interesting principle, **umbelliferone** (common to many umbelliferous plants), acicular crystals, producing a brilliant blue fluorescence on the addition of an alkali.

ACTION AND USES.—Stimulant, expectorant, and antispasmodic. Dose: 5 to 8 gr. (0.3 to 0.5 Gm.).

399. **AMMONIACUM.**—**GUM AMMONIAC.** A gum-resin exuding from **Dore'ma ammoniacum** Don. Off. U.S.P., 1890. Roundish tears varying in size from 1.5 to 12 mm. ($\frac{1}{16}$ to $\frac{1}{2}$ in.) in diameter, externally yellow or pale yellowish-brown. When warm it is of the consistence of wax, but it becomes brittle when cold, breaking with a milk-white, waxy fracture, translucent at the edges; odor balsamic, stronger on heating;



Dorema Ammoniacum.

angelica-flavored milk-juice.

HABITAT.—Regions north and east of British India.

DESCRIPTION OF DRUG.—**Transverse segments** about 10 to 50 mm. ($\frac{2}{5}$ to 2 in.) long, and 25 mm- (1 in.) thick. They have a **dark brown**, wrinkled bark, just beneath which is a whitish, spongy, parenchymatous layer, under the microscope dotted with brown, translucent, resinous exudations from large resin-ducts. **The brownish-yellow interior** is a **spongy mass** consisting of coarse fibers, easily separable, and indiscriminately mixed and twisted with the medullary rays; fracture short and fibrous. **Odor musk-like**; taste

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taste acrid, bitter, and nauseous. Lump ammoniac is an inferior quality in which the tears are agglutinated. Cake ammoniac is a very impure, dark-colored, resinous mass exuding from the roots; imbedded in it are a few tears and much vegetable and earthy trash; it is not used internally. *Constituents.*—Volatile oil, gum resembling acacia, resin (about 70 per cent. composed of two, one acrid resin and one indifferent resin); it yields no umbelliferone. By fusing with KOH, yields protocatechuic acid and resorcin, $C_6H_6O_2$. Among the derivatives of the acid resin are salicylic acid, ammosinotannol, etc. Similar to asafoetida—stimulating expectorant, antispasmodic and laxative-but less powerful. Dose: 10 to 30 gr. (0.6 to 2 Gm.).

Emulum Ammoniaci 4 per cent.),

U.S.P. 1890 Dose: $\frac{1}{2}$ to 1 fl. oz. (1.5 to 30 mls).

Emplastrum Ammomaci cum Hydrargyro (72 per cent., with mercury,

oleate of mercury, dilute acetic acid, and lead plaster), U.S.P. 1890.

400. SUMBUL.—SUMBUL

MUSK ROOT

The rhizomes and roots of **Feru'la sum'bul** (Kauffmann) Hooker filius.

BOTANICAL CHARACTERISTICS.—*Root* fusiform; perennial stem 8 to 10 feet high. *Fruit* oblong-ovate, monocarpous. When punctured, the branches yield an

sweetish at first, becoming bitter and balsamic, and leaving a sensation, of warmth in the mouth and throat. E. M. Holmes recommends that the true root be cultivated, which he thinks possible in temperate and mountainous districts in the colonies or in ordinary gardens and fields of England. The true root has a strong, persistent, musky odor.

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

CONSTITUENTS.—**Sumbulic or angelic acid**, $C_5H_8O_2$, a small quantity of **valerianic acid**, $C_5H_{10}O_2$, and a small percentage of bluish volatile oil, to which, however, its odor is not due, but to two balsamic resins, or probably to some principle connected with them not yet isolated. The oil contains umbelliferone, $C_9H_6O_3$

ACTION AND USES.—**Antispasmodic** (due to the angelic and valerianic acids contained), stimulant, and tonic. Dose: 15 to 30 gr- (1 to 2 Gm.).

OFFICIAL PREPARATIONS.

Fluidextractum Sumbul	Dose: 30 drops (2 Mills).
Extractum Sumbul	5 to 15 gr. (0.3 to 1 Gm.).

401. **IMPERATORIA.**—MASTERWORT. The root of **Imperato'ria ostru'thium** Linné. *Habitat:* Southern Europe. A conical root with a dark brownish-gray, annulated and tuberculated bark, inclosing a whitish wood-circle and a resin-dotted central pith; odor angelica-like; taste pungent and bitter. It is a stimulant aromatic, but is rarely used in this country,

402. **LASERPITIUM.**—WHITE GENTIAN. The root of **Laserpi'tium latifo'lium** Linné. *Habitat:* Central Europe. Somewhat conical, wrinkled and annulated above, branched below; wood whitish, porous, deprived of the brown, corky layer; aromatic and bitter. Used as a tonic and stimulant. Dose: 15 to 60 gr. (1 to 4 Gm.).

403. **LEVISTICUM.**—LOVAGE. The root of an aromatic European herb, **Ligus'ticum levis'ticum** Linné. This is thick, sparingly beset with fibers, and has an annulate, reddish-brown bark, inclosing a porous yellow wood; it has an aromatic odor resembling that of angelica, and a sweetish, aromatic, and pungent taste, somewhat bitter. Its medicinal properties are similar to those of angelica, being used as an aromatic stimulant and carminative, and as an adjuvant to tonic mixtures. Dose: 8 to 30 gr. (0.5 to 2 Gm.), in infusion.

The root of **Ligus'ticum filici'num**, Osha or Colorado Cough Root, has enjoyed some notoriety as an expectorant.

404. **PIMPINELLA**.—N.F. PIMPERNEL. The root of **Pimpinella saxifraga** Linné. *Habitat*: Europe. Diaphoretic, diuretic, and stomachic. It has also been employed in chronic catarrh, asthma, dropsy, amenorrhœa, etc., and as a masticatory in toothache. Dose: 15 to 30 gr. (1 to 2 Gm.), in infusion or powder.

405. **THAPSIA GARGANICA** Linné.—(Root.) Used chiefly as a counter-irritant in rheumatism, gout, bruises, etc.

406. **CICUTA MACULATA**.—AMERICAN WATER-HEMLOCK. WILD PARSNIP. The root and leaves of *Cicuta maculata* Linné. Poisonous, sedative, narcotic; resembles conium in action and has been used in its stead, but the two drugs should not be confounded when conium is prescribed, as it sometimes is, by its old name, *cicuta*. Dose: 3 to 5 gr. (0.2 to 0.3 Gm.). Children have been poisoned by eating the fresh root, which resembles parsnip in taste and smell.

407. **ERYNGIUM AQUATICUM** Linné.—WATER ERYNGO. RATTLESNAKE'S MASTER. *Habitat*: United States. (Root.) Diaphoretic and expectorant, and has been used as a substitute for senega. Dose of fluidextract: 20 to 40 drops (1.3 to 2.6 mls).

408. **OSMORRHIZA LONGISTYLIS** De Candolle.—SWEET CICELY. *Habitat*: United States and Canada. (Root.) Aromatic, stomachic, carminative, and expectorant. It contains a volatile oil identical with oil of anise. Dose: 1 to 2 dr. (4 to 8 Gm.).

CORNACEÆ.—Dogwood Family

409. **CORNUS FLORIDA**.—DOGWOOD. *Cornus*, N.F. The root-bark of **Cor'nus flori'da** Linné. *Habitat*: North America. Appears in pieces of various sizes, generally broken up and more or less curved; about 2 mm. ($\frac{1}{12}$ in.) in thickness when deprived of its brownish-gray cork, as it generally is, with a fawn-colored outer surface; inner surface red, due to the tannin contained, plainly radially striate; **fracture short, whitish**, showing numerous striæ of brownish-yellow stone cells. Inodorous; taste astringent and bitter, the bitter principle being termed **cornin**. It yields a grayish powder, tinged with red. Tonic and astringent, and almost equal to cinchona as an **antiperiodic** in intermittent fevers. Dose: 10 to 30 gr. (0.6 to 2 Gm.). The barks of two other dogwoods, *Cor'nus circina'ta* (green osier bark or round-leaved dogwood bark) and *Cor'nus serice'a*, are often used.

410. **GARRYA FREMONTII** Torrey.—CALIFORNIA FEVER BUSH. (Leaves.) Used as a tonic and antiperiodic in chills and fevers. They contain a bitter principle similar to quinine in therapeutic action. Dose: 15 to 30 gr. (1 to 2 Gm.).

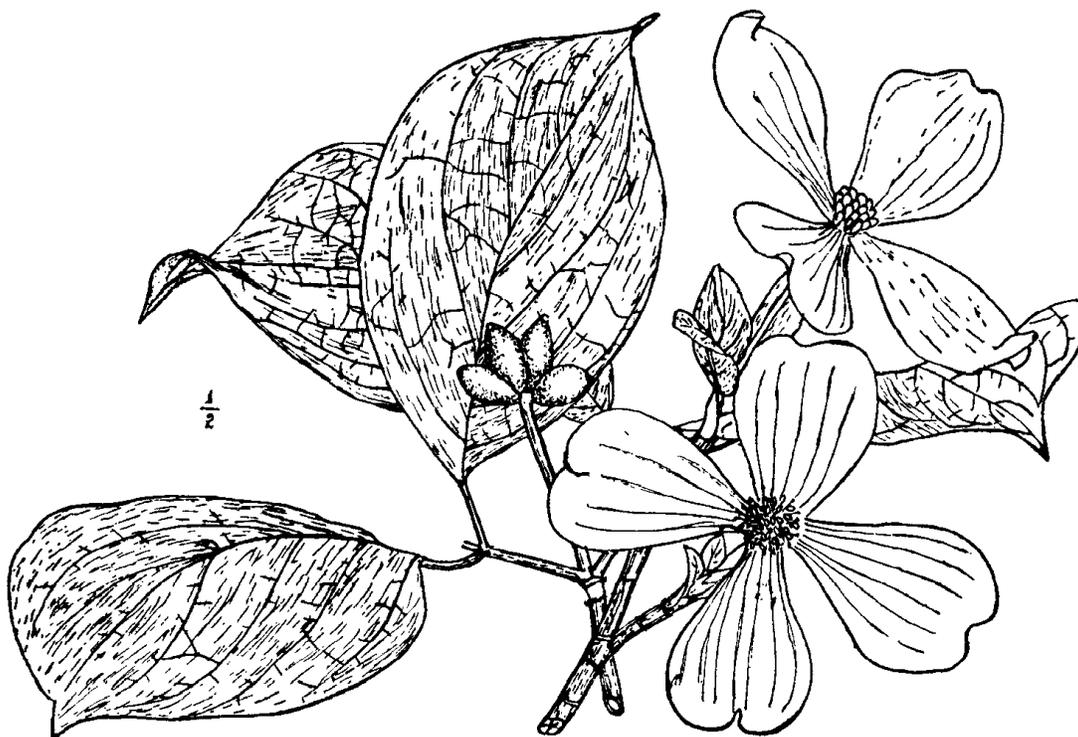


FIG. 193.—*Cornus florida*—Flowering branch.

ERICACEÆ.—Heath Family

Trees or shrubs, rarely herbs; *leaves* generally foliaceous; *flowers* regular, gamopetalous, usually bell-shaped or urn-shaped; *anthers* two-celled, with porous dehiscence. A large order, with *leaves* astringent and bitter, because of the presence of glucosides. Some species contain a poisonous principle, andromedotoxin.

Synopsis of Drugs from the Ericaceæ

A. *Leaves.*

UVA URSI, 411.
 Arctostaphylos, 412.
 Gaultheria, 413.
 *Chimaphila, 414.
 Epigæa, 415.
 Vaccinium, 416.

Kalmia, 417.

Ledum, 418.

Oxydendrum, 419.

Rhododendron, 420.

B. *Volatile Oil.*

OLEUM GAULTHERIÆ, 413 a.

411. UVA URSI.—UVA URSI

BEARBERRY

The dried leaves of **Arctostaph'ylos u'va ur'si** (Linné) Sprengel, with not more than 5 per cent. of stems or other foreign matter.

BOTANICAL CHARACTERISTICS.—Shrubs with trailing stems. *Leaves* alternate, coriaceous, evergreen, obovate or spatulate, entire. *Flowers* in terminal racemes, nearly white; *corolla* urn-shaped. *Fruit* a red drupe.

SOURCE.—In dry, sandy, or rocky soil from Hudson's Bay to New Jersey, in some parts of which it grows in abundance.

RELATED SPECIES.—*Arctostaphylos glauca*, indigenous to California (412).

DESCRIPTION OF DRUG.—**Short-stalked, rather thick, coriaceous, obovate leaves**, about 20 mm. ($\frac{4}{5}$ in.) in length, rounded at the apex and narrowed at the base; margin entire; surface smooth, glossy, grayishgreen above, lighter colored and reticulated below; taste astringent, bitter; odor slight. (The powder has a hay-like odor.)

They are sometimes adulterated with the leaves of *Vaccinium vitis idææ* (European uva ursi), distinguished from the genuine by their rounder shape, their revolute margin, which is sometimes toothed, and the dotted appearance of their under surface. Chimaphila leaves, which are occasionally mixed with uva ursi, may be readily distinguished by their greater length, their cuneiform-lanceolate shape, and their serrate edges. *Leiophyllum buxifolium* (sand myrtle) and *Epigæa repens* (trailing arbutus, 415) are also used as adulterants.

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

CONSTITUENTS.—**Tannic and gallic acids**, and the three principles, **arbutin**, $C_{12}H_{16}O_7$, **ericolin**, $C_{34}H_{56}O_{21}$, and **ursone**, $C_{10}H_{16}O_7$ which are common to the plants of the natural order Ericaceæ. Arbutin is a bitter glucoside, occurring in colorless crystals; it is resolved by hydrolysis into glucose and hydroquinone or arctuin, $C_6H_6O_2$. Ericolin is a yellow, crystalline, bitter glucoside. Ursone is in tasteless needles.

Preparation of Arbutin.—Precipitate decoction with lead acetate; filter; add H_2S evaporate; evaporate slowly, when needles crystallize out. Dilute Fe_2Cl_6 gives blue color. Dose: 5 to 1.5 gr. (0.3 to 1 Gm.).

Preparation of Ursone.—Obtained by exhausting drug with ether. The alcoholic solution of the ethereal residue yields the crystals on slow evaporation. Occurs in tasteless needles; sparingly soluble in alcohol and ether. Insoluble in water.



FIG. 194.—*Arctostaphylos uva ursi*—Branch, flower, and fruiting branch.

ACTION AND USES.—Astringent, tonic, and **diuretic**; valuable in ulcerations of the kidneys, bladder, or urinary passages. It has been recommended in cystitis, its action being due to the decomposition of arbutin in the system and the excretion of the hydroquinone, which is a powerful disinfectant and antiferment. Dose: 15 to 60 gr. (1 to 4 Gm.).

OFFICIAL PREPARATION.

Fluidextractum Uvæ Ursi Dose: 15 to 60 drops (1 to 4 mils).

412. **ARCTOSTAPHYLOS GLAUCA** Lindley.—**MANZANITO**. This is a small California evergreen tree or shrub whose leaves are there highly esteemed as an astringent, like uva ursi.

413. **GAULTHERIA.**—WINTERGREEN.



Gaultheria procumbens.

CHECKERBERRY. PARTRIDGE BERRY. The leaves of **Gaulthe'ria procum'bens** Linné. *Habitat:* Northern Hemisphere. This is a small evergreen shrub, consisting of slender, erect, reddish stems, bare below, leafy at top, rising at intervals from a creeping root to the height of eight or ten inches. Fruit a scarlet-red, berry-like, fleshy capsule. **Leaves** roundish, oval or obovate, about 37 mm. (1½ in.) long, on a short pedicel; coriaceous; margin serrate, with a few **appressed teeth**; somewhat revolute at the edges; odor fragrant, especially when chewed; taste aromatic, astringent. The fragrance is due to a volatile oil (413a). Stimulant, astringent, and **diuretic**. Dose: 15 to 60 gr. (1 to 4 Gm.).

413a. **OLEUM GAULTHERIÆ.**—OIL OF WINTERGREEN. A nearly colorless volatile oil, distilled from the fresh leaves, “consisting almost entirely of methyl salicylate, $\text{CH}_3\text{C}_7\text{H}_5\text{O}_3$, and nearly identical with volatile oil of betula.” The latter, according to Power, is composed entirely of methyl salicylate and is optically inactive, while the former is lævogyrate. As it comes into market it is of a brownish-yellow or reddish color and has a very agreeable, characteristic odor and taste. **Specific gravity of 1.172–1.182.** An aqueous solution gives, with ferric salts, a purplish color. It yields, with 6 parts of 70 per cent. alcohol at 20°C., a perfectly clear solution—a property serving to detect adulterations. (Official as Methyl Salicylas, 413 b).

413b. **METHYL SALICYLAS.**—A product yielding not less than 98 per cent. of methyl salicylate ($\text{CH}_3\text{C}_7\text{H}_5\text{O}_3$). It is produced synthetically or obtained by distillation from *Betula lenta* Linné, or from *Gaultheria procumbens* Linné, and the source from which it is derived must be stated on the label.

Specific gravity at 25°C.: Synthetic 1.18 to 1.185; when from Sweet Birch or Gaultheria 1.172 to 1.182.

Most of the so-called “true” oil of wintergreen is made by distilling a

mixture of wintergreen leaves and the bark of the sweetbirch.

Dose of Methyl Salicylas: 12 minims (0.75 mils), U.S.P. IX.

414. CHIMAPHILA.—CHIMAPHILA N.F.

PIPSISSEWA. PRINCE'S PINE

The dried leaves of **Chimaph'ila umbella'ta** Nuttall.



FIG. 195.—*Chimaphila umbellata*.

BOTANICAL CHARACTERISTICS.—A low, nearly herbaceous plant, with long, running, underground shoots. *Leaves* evergreen, thick, and shining, whorled, wedge-lanceolate, sharply serrate, not spotted. *Flowers* umbelled, on a terminal peduncle; *petals* rose-color; anthers violet. *Capsule* 2- to 5-celled.

HABITAT.—Northern Hemisphere, in dry woods.

DESCRIPTION OF DRUG.—**Oblanceolate**, about 25 to 50 mm. (1 to 2 in.) in length, **sharply serrate**, with pointed apex, **cuneiform** and entire at base; coriaceous; surfaces smooth, upper dark green, glossy, lower lighter in color; odor slight; taste astringent, slightly bitter.

Chimaphila maculata (spotted wintergreen or pipsissewa) has the same medicinal qualities, but differs physically in being oval-lanceolate, with a paler upper surface, and in being dotted with small white holes along the midrib.

RELATED PLANTS.—*Pyrola rotundifolia* (known as wintergreen or shin leaf), *P. elliptica* and *P. chlorantha* are used similarly to the above.

Powder.—Brownish-green. Characteristic elements: Parenchyma, mesophyll with irregular reddish-brown tannin masses, other cells with few starch grains, simple or compound, calcium oxalate crystals, aggregate (40 to 60 μ in diam.); stomata and few tracheids present.

CONSTITUENTS.—Same as uva ursi (411) with the addition of chimaphilin, $C_{24}H_{21}O_4$ (yellow, odorless, tasteless, volatile crystals), and several white crystalline principles.

Preparation of Chimaphilin.—When the leaves are distilled with water, yellow crystals are deposited in the neck of the retort. These, dissolved out with chloroform, will deposit from this solution on evaporation. Shaking out the tincture with chloroform will also dissolve out the principle.

ACTION AND USES.—Like uva ursi (411). Also used in scrofula and other cutaneous eruptions. Dose: 15 to 60 gr. (1 to 4 Gm.).

415. EPIGÆA.—TRAILING ARBUTUS. GRAVEL PLANT. The leaves of **Epigæ'a re'pens** Linné. *Habitat:* North America, on woody hillsides. Ovate, about 50 MM. (2 in.) long, with heart-shaped base and mucronate apex; coriaceous; margin entire. They contain the same three principles that uva ursi does and have the same general medicinal properties, but are particularly valuable in those cases of local irritation of the urinary organs in which they have often given relief when uva ursi and buchu had failed. They are also claimed to be highly beneficial in Ethic acid gravel. Dose: 15 to 60, gr. (1 to 4 Gm.), in decoction or fluidextract.

416. VACCINIUM CRASSIFOLIUM Andrzejowski.—The leaves of this indigenous shrub have properties very much resembling uva ursi and may be used in its stead.

417. **KALMIA**.—MOUNTAIN LAUREL. SPOONWOOD. The leaves of **Kal'mia latifo'lia** Linné, an evergreen shrub common on the hills and mountains of North America. They are lance-oval, acute at both ends, about 50 to 75 mm. (2 to 3 in.) in length; petiolate; coriaceous; both surfaces smooth, green. In medicinal doses kalmia is astringent, sedative to the heart, and antisyphilitic; also used externally in skin diseases. From its affirmed effect upon sheep and other small animals it is supposed to have toxic, narcotic properties, but no such principle has yet been found. Dose: 10 to 30 gr. (0.6 to 2 Gm.).

418. **LEDUM**.—LABRADOR TEA. The leaves of **Le'dum latifo'lium** Aiton. *Habitat*: Canada and Northern States. Elliptic-oblong, covered beneath with a rust-colored wool. Besides the tannin and other principles common to the Ericaceæ, they contain a poisonous principle, andromedotoxin, rendering them poisonous in large doses. Astringent, tonic, and alterative. Dose: 15 to 30 gr. (1 to 2 Gm.), in infusion.

419. **OXYDENDRUM ARBOREUM** De Candolle.—SOURWOOD. The leaves of this North American tree are tonic, diuretic, and refrigerant, used in dropsy. Dose of fluidextract: 1/2 to 2 fl. dr. (2 to 8 mils).

420. **RHODODENDRON MAXIMUM** Linné.—GREAT LAUREL. (Leaves.) Tonic, diuretic, astringent, expectorant. Dose of fluidextract: 5 to 15 gr. (0.3 to 1 Gm.).

MYRSENEÆ

421. **EMBELIA RIBES** Burman.—The pepper-corn-like, aromatic fruit of this East Indian plant is said to be an efficient tæniacuge.

PLUMBAGINEÆ.-Leadwort Family

422. **STATICE**.—MARSH ROSEMARY. The root of **Stat'ice limo'nium** Linné, growing in flat marshes along the Atlantic coast of the United States. Spindle-shaped, from 300 to 600 mm. (12 to 24 in.) long, and about 25 mm. (1 in.) thick; externally rough, purplish-brown; bark thick; wood yellowish, in narrow wood-wedges; inodorous; bitter and strongly astringent. It contains about 12 per cent. of tannin and is used like catechu and kino in diarrhea, but more particularly as an astringent gargle in ulcerations of the mouth and throat, and as an injection. Dose: 10 to 30 gr. (0.6 to 2 Gm.).

423. **BAYCURU**.—The root of **Stalicebrasilien'sis** Boissier. *Habitat*: Brazil. One of the most powerful of astringents, chiefly used locally in gargle, injection, and lotion.

PRIMULACEÆ.-Primrose Family

424. **ANAGALLIS ARVENSIS** Linné.—SCARLET PIMPERNEL. This plant, growing in the United States and Europe, is applied locally to ulcers and employed internally in consumption, dropsy, etc. It contains a pepsin-like ferment.

SAPOTACEAE. -Sapodilla Family

425. **GUTTA-PERCHA**, N.F.—The concrete juice of large trees, **Isonandra** (or *Palaquium oblongifolium*), **Dichop'sis gut'ta**, and other species, growing in the Malay Peninsula and the East Indies. In grayish or yellowish masses, often streaked with red; hard and tenacious at ordinary temperatures, with a somewhat unctuous feeling, but at a higher temperature, or when immersed in hot water, it becomes plastic, retaining, when hard and dry, the form into which it has been molded. Upon this property its uses in the arts chiefly depend. In medicine it is used as a surgical dressing in the formation of splints, supports, etc. A Liquor Guttæ Perchæ is often applied as a protective, the evaporation of its solvent, carbon disulphide, leaving a thin, flexible coating over the wounded surface.

426. **MONESIA**.—An extract obtained from a South American tree, **Lucu'ma glycyph'læa** Martius et Mohler. Dark brown, almost black, cakes, about 25 mm. (1 in.) in thickness; very brittle, often coming into the market in broken fragments; inodorous; taste sweetish, astringent, and then acrid, its acrimony being very persistent, especially in the fauces. This acidity is due to **monesin**, a principle identical with saponin. Monesia also contains tannin, glycyrrhizin, and lucumin (silky needles). Stomachic stimulant, alterative, and astringent. Used in diarrhea, hemorrhages, in astringent gargles, and in powder or ointment applied to scrofulous ulcers. Dose: 5 to 20 gr. (0.3 to 1.3 Gm.).

EBENARCEÆ.-Ebony Family

427. **DIOSPYROS**.—PERSIMMON. The unripe fruit of **Dio'spyros virginia'na** Linné. (Official, 1820-80.) Very astringent. Used in uterine hemorrhage, leucorrhœa, and sore throat. Dose: 15 to 60 gr. (1 to 4 Gm.) in infusion, syrup, or vinous tincture.

STYRACEÆ.—Storax Family

428. BENZOINUM.—BENZOTIN

BENZOIN

A balsamic resin obtained from **Sty'rax ben'zoin** Dryander, and other species of styrax.

BOTANICAL CHARACTERISTICS.—A large tree with tomentose branches. *Leaves* alternate, oblong, the under surface tomentose. *Inflorescence* compoundly racemose; *calyx* 5-toothed; *corolla* 5-parted, gray; *stamens* 10, their filaments coherent at the base into a short tube.

SOURCE AND VARIETIES.—Sumatra and Java. Sumatra-Penang, grayish-brown with many white tears, odor storax-like; Siam, reddish-brown, odor vanilla-like; Palembang resembles Sumatra, but yields

more benzoic acid; false benzoin, catappa benzoin (*Terminalia angustifolia*), whitish brown.



FIG. 196.—*Styrax benzoin*—Branch.

A deciduous shrub of the Lauraceæ, a native of Virginia, and called spice-wood or Benjamin tree, was at one time thought to be a source of benzoin. The berries of this tree are aromatic, and have been used as a substitute for allspice.

COLLECTION.—In Sumatra the benzoin is collected by making incisions in the tree during its seventh year, only the unhealthy trees yielding resin. The milky juice which flows first is the purest and most fragrant, but soon hardens upon exposure to the air. That which flows subsequently is brownish, and some is scraped out when the tree is cut down and split open, as it is soon killed by the process of tapping. These varieties are in common called head, belly, and feet benzoin, and have the relative value to each other of 105, 45, and 18, being esteemed according to their whiteness, semi-transparency, and freedom from admixture (Royle). A product of the younger tree furnishes a variety known as amygdalina benzoin, which contains whitish, almond-like tears diffused through its substance.

DESCRIPTION OF DRUG.—It exudes from incisions in the bark, hardening on exposure into agglutinated shining tears of a yellowish-brown or reddish-brown color; internally milk-white; usually, however, it is in various-sized pieces, having a resinous fracture, showing a **mottled surface** of smooth, shining white spots, tears, imbedded in the somewhat rough and porous, reddish-brown mass. It has a very agreeable **odor** and a slightly aromatic taste, leaving an irritating sensation in the mouth and fauces.

CONSTITUENTS.—Benzoin has the constitution of a balsam and is by some authors considered as a solid balsam; it contains resin, benzoic acid, $C_7H_6O_2$, 20 to 24 per cent., which comes off in dense white vapor when benzoin is heated and melted, and cinnamic acid, $C_9H_8O_2$ (in some varieties), detected by boiling in milk of lime, decomposing with HCl, and adding permanganate of potassium, when the odor of bitter almonds is given off. Siam benzoin contains vanillin, $C_8H_8O_3$, and has a vanilla-like odor. *Sumatra Benzoin*. Ash, not more than 2.5 per cent. *Siam Benzoin*. Ash, not more than 2 per cent.

Preparation of Benzoic Acid.—Obtained by simple sublimation of benzoin. Is also prepared artificially from toluol, but sometimes from phthalic acid or hippuric acid. Contamination with cinnamic acid is detected by mild oxidation when it yields the odor of oil of bitter almond.

ACTION AND USES.—Stimulant and diaphoretic, but seldom used as such except in the compound tincture of benzoin. It is used locally as a stimulant and irritant, and in tooth powders and fumigations. Dose: 9 to 30 gr. (0.5 to 2 Gm.).

OFFICIAL PREPARATIONS.

Tinctura Benzoini Composita (10 per cent.,
with aloes, storax, and tolu),. Dose: 15 to 60 drops (1 to 4 mils)
Tinctura Benzoini (20 per cent.) 10 to 40 drops (0.6 to 2.6 mils).
Adeps Benzoinatus (2 Gm. digested in 100 Gm. of lard).

OLEACEÆ.-Olive Family

Trees or shrubs with simple leaves—illustrated by the olive, the ash, the lilac, and the privet. The olive fruit contains mannite, which is converted into olive oil on ripening.



Fraxinus Ornus: branch showing leaves and flowers.

429. MANNA.—MANNA

MANNA

The concrete saccharine exudation from **Frax'inus or'nus** Linn&

BOTANICAL CHARACTERISTICS.—A tree about 25 feet high. Leaves pinnate, leaflets 7 to 9, serrate. Panicles dense; calyx 4-cleft; corolla white, divided to the base into linear segments.

SOURCE.—The tree yielding the manna is a native of Sicily, Calabria, and Apulia. The juice exudes spontaneously, or its flow is hastened by incision. Although this is the only manna officially recognized, saccharine substances known as mannas are yielded by many other trees and plants, and are obtained from the cocoons of some insects. The manna of Scripture was doubtless a lichen which grows extensively in the Sahara and Western Asia, and which occasionally falls like rain over the adjacent country.

DESCRIPTION OF DRUG.—In stalactiform pieces from 1 to 6 inches long, or irregular fragments, **yellowish or brownish-white**, internally white and porous; very friable. Manna in tears is a pure kind, but manna in flakes is chiefly valued and mostly met with. Manna in sorts, minute tears, internally crystalline, and fat manna, brownish viscid, non-crystalline masses, are also met with. **Odor honey-like; taste** sweetish, afterward nauseous. Soluble in water and alcohol. When long kept, manna darkens and deliquesces into a liquid.

OTHER MANNAS.—Manna occurs in irregular masses, consisting of brittle and soft resin-like fragments from yellowish-white to yellowish-gray color. The quantity of the yellowish-white fragments should not be less than 40 per cent. of whole. The varieties of manna generally distinguished in our commerce are large flake, small flake and sorts.

INFERIORITY.—Inferior manna may have a greenish color due to froxin, a fluorescent glucoside resembling Tsculin. A new variety of manna from Rhodesia, probably derived from *Gymnosporia deflexa* is on the market.

ADMINISTRATION.—May be given to very young children as a gentle laxative. Given by dissolving in milk. When administered to adults it is combined with senna, rhubarb, and more energetic laxatives.

CONSTITUENTS.—Chiefly **mannite** (75 per cent.), a sweet principle which separates out from the boiling alcoholic solution in crystals, also sugar, dextrin, mucilage, and a **nauseous principle**, to which its laxative action is doubtless due.

ACTION AND USES.—**Gentle laxative**, usually given in combination with other purgatives. Dose: $\frac{1}{2}$ to 2 oz. (15 to 60 Gm.).

PREPARATION.—**Infusum Sennæ Compositum**,. Dose: 1 to 4 fl. Oz. (30 to 120 Mils).

430. OLEUM OLIVÆ.—OLIVE OIL

SWEET OIL

A fixed oil expressed from the ripe fruit of **O'lea europæ'a** Linné.

BOTANICAL CHARACTERISTICS.—A small evergreen with hard wood. *Leaves* short-petiolate, opposite, ovate-lanceolate, mucronate. *Flowers* white, in axillary clusters. *Fruit* a drupe, $\frac{1}{2}$ to 1 in. long, ovoid, purple, sarcocarp firm, fleshy, filled with oil.

HABITAT.—Levant and the Mediterranean Basin and California.

DESCRIPTION OF OIL.—A pale yellow or greenish-yellow, unctuous liquid when pure, having a bland, sweetish taste, but scarcely any odor. Specific gravity 0.915 to 0.918 at 15°C. (59°F.). On exposure it absorbs oxygen and becomes thick and rancid and loses its color, but does not dry as does linseed oil.

The oil is obtained by crushing the ripe fruit and subjecting the pulp to strong pressure. The expressed oil is run into water and the floating oil is skimmed after a few days' subsidence (virgin oil); the expressed cake is now broken up, mixed with hot water, and again subjected to pressure, resulting in a second-grade oil. The remaining marc yields by solvents, such as carbon disulphide, or by a third expression after fermentation, a very inferior oil.

The oil is adulterated sometimes with cotton-seed oil chiefly, with oil of benne, and with peanut oil.

Preparations: Emplastrum plumbi, Unguentum diachylon.

Sapo, soap, is employed in: Linimentum saponis.



FIG. 197.—*Olea europaea*—Branch.

From the olive is obtained the wood so famous for its capability of receiving a fine polish; used in cabinet work of various kinds. The unripe fruit is served at the table. It is prepared by repeatedly steeping it in water containing lime and ashes, then bottling in a slightly aromatic salt solution; the small French or Provence, the finest, and the large Spanish are both used for this purpose.

CONSTITUENTS.—At about 5°C. (41°F.) white crystalline granules separate out, which consist of palmitin with possibly some stearin and

arachin. The liquid portion remaining consists almost entirely of olein, $C_3H_5(OC_{18}H_{33}O)_3$, which forms about 72 per cent. of the oil. The green color is due to chlorophyll.

ACTIONS AND USES.—Nutritive and laxative, a common ingredient in laxative enemata; externally **protective** and **emollient**. Its chief use in pharmacy is in liniments, cerates, and plasters. Dose: 1 fl. Oz. (30 mils).

431. **FRAXINUS AMERICANA** Linné.—(Fraxinus, N.F.) WHITE ASH. (Bark.) Quills or curved pieces, having an ash-gray periderm and a white inner bark, and breaking with a splintery, coarsely fibrous fracture. Emmenagogue. Dose: about 15 gr. (1 Gm.).

432. **FRAXINUS SAMBUCIFOLIA** Lambert.—BLACK ASH. (Bark.) *Habitat*: United States. Tonic and astringent. Dose: I to 4 dr. (4 to 15 Gm.).

433. **CHIONANTHUS**, N.F.—FRINGE-TREE. The root-bark of **Chionan'thus virgin'ica** Linné. *Habitat*: United States. Tonic, aperient, and diuretic. Dose: 15 to 60 gr. (1 to 4 Gm.).

434. **LIGUSTRUM**.—PRIVET. The leaves of **Ligus'trum vulga're** Linné, a shrub growing wild in the United States and Europe. Astringent; the decoction is used in sore throat, ulcerations of the mouth, stomach, and intestines.

LOGANIACEÆ.—Logania Family

Herbs, shrubs, or trees, with opposite, entire *leaves* connected by stipules or a stipular line, and with regular 4-5-merous, 4-5-androus *flowers*, the ovary free from the calyx. Many of the plants belonging to this order are extremely poisonous.

Synopsis of Drugs from the Loganiaceæ

A. *Seeds.*

NUX VOMICA, 435.

**Ignatia*, 436.

B. *Bark.*

Hoang-nan, 437.

C. *Rhizomes.*

GELSEMIUM, 438.

SPIGELIA, 439.

D. *Extractive.*

Curara, 440.

435. **NUX VOMICA**.—**NUX VOMICA**

DOG BUTTON. QUAKER BUTTON

The dried ripe seed of **Strych'nos nux vom'ica** Linné yielding, by assay, not less than 2.5 per cent. of alkaloids of Nux Vomica.

BOTANICAL CHARACTERISTICS.—A small tree with a crooked stem resembling a dogwood. *Leaves* short-petiolate, smooth, oval, mucronately, palmately, 3- to 5-

nerved. *Flowers* small, greenish-white, in terminal corymbs; corolla funnel-form. *Fruit* round, orange-like.

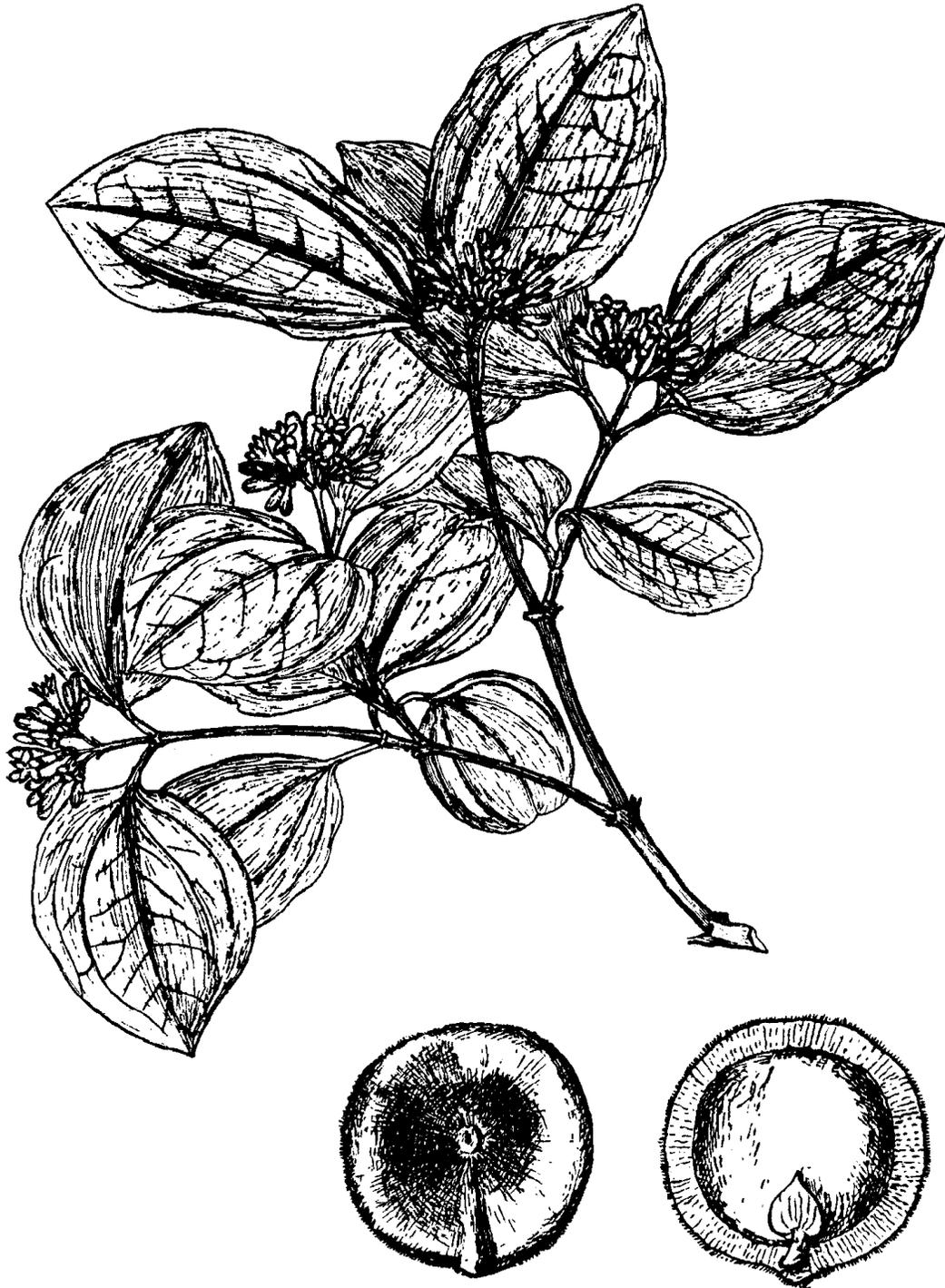


FIG. 198.—*Strychnos nux vomica*—Flowering branch and seeds.

SOURCE.—Indigenous to the coasts of most parts of India, Burmah, Siam, and northern parts of Australia. Large quantities of the drug are

brought into the London market from British India. The export from Bombay is considerable. Madras and Calcutta are also shipping points.

DESCRIPTION OF DRUG.—**Orbicular disks** from 18 to 25 mm. ($\frac{3}{4}$ to



FIG. 199.—Cross-section of the fruit of *Strychnos nuxvomica*.

1 in.) in diameter, and about 4 mm. ($\frac{1}{6}$ in.) thick; flat or slightly convex on one side and concave on the other, with a slightly raised margin on the concave side. On one side is a ridge (raphe) extending from a raised point in the center (hilum) to a point on the edge where the radicle is situated (chalaza). Both surfaces have a **grayish or a grayish-green, shiny, silky appearance, due to a large number of silky hairs, closely pressed to the seed and forming a tuft around its edge.**

Testa thin, fragile, somewhat soft,

inclosing two disks of horny, translucent or opaque, yellowish or white albumen around a large central cavity. The embryo is contained in this cavity, and consists of a short radicle and two flat, heart-shaped, veined cotyledons extending about one-fourth the distance across it. Inodorous; taste extremely bitter. **Powdered nux vomica** is yellowish-gray and has a faint, sweetish odor. Should contain 1.25 percent. of strychnine.

Considerable difficulty has been experienced in keeping nux vomica and it is recommended that the container be kept in a second container containing a layer of unslaked lime.

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

CONSTITUENTS.—The total alkaloids amount from 2.5 to 3.5 per cent. They consist principally of **strychnine**, $C_{21}H_{22}N_2O_2$, 1.25 per cent., and **brucine**, $C_{23}H_{26}N_2O_4$, the former being in excess. These are combined in the seed with igasuric acid. A third alkaloid, igasurine, has been claimed, but it is probably simply a mixture of the other two. A glucoside, loganin, $C_{25}H_{34}O_{14}$, has been found in the seeds, but it exists in greater quantity in the pulp surrounding the seed of the fruit. Other constituents are a concrete fixed oil, gum, wax, phosphates, and a yellow coloring matter.

Strychnine.—As usually found in commerce, strychnine is a white or grayish-white powder. When rapidly crystallized from an alcoholic solution, it has the form of a white granular powder; when slowly crystallized, that of an elongated octahedra, or rhombic prisms with pyramidal capping. It is officially described as “in colorless, transparent, octahedral, or prismatic crystals,” etc.

The test usually employed for its recognition is sulphuric acid with potassium bichromate; gives a deep violet or blue color. A physiological test is usually employed by toxicologists as confirmatory to the chemical tests.

Brucine.—Brucine occurs in rectangular octahedra containing $4H_2O$, readily soluble in alcohol; nitric acid colors blood-red, changing to orange and yellow, the yellow liquid becoming violet upon the addition of stannous chloride or ammonium or sodium sulphide. Ash, not to exceed 3.5 per cent.

Preparation of Strychnine.—Boll powdered seeds with acidulated (HCl or H_2SO_4) water. Decompose solution of alkaloidal salts by adding milk of lime, which precipitates strychnine and brucine. Wash precipitate; treat with dilute alcohol to dissolve brucine, or with alcohol or benzene to take out strychnine, thus leaving brucine in the residue. Purify with animal charcoal and reprecipitate with ammonia. Occurs in four-sided rhombic prisms; very bitter; soluble in boiling alcohol 5 parts chloroform, 110 alcohol.

ACTION AND USES.—Nux vomica is a tonic, spinal nervine, and a poison. In small doses it stimulates the appetite and digestion and the respiration. Dose: $\frac{1}{2}$ to 5 gr. (0.0324 to 0.3 Gm.). Strychnine represents its action fully. Brucine has the same physiological action as strychnine, but is only about one-twelfth as strong.

OFFICIAL PREPARATIONS.

Fluidextractum Nucis Vomicae,	Dose: $\frac{1}{2}$ to 5 drops (0.0324 to 0.3 mil).
Extractum Nucis Vomicae,	$\frac{1}{2}$ to 1 gr. (0.0324 to 0.0650 Gm.).
Tinctura Nucis Vomicae	5 to 15 drops (0.3 to 1 mil).

Druggists should never make the tincture from the fluidextract of nux vomica regardless of whether the latter is assayed or not.

STRYCHNINE AND ITS OFFICIAL PREPARATIONS.

Strychnina	Dose: $\frac{1}{60}$ to $\frac{1}{20}$ gr. (0.001 to 0.003 Gm.).
Strychninæ Sulphas	$\frac{1}{64}$ gr. (0.001 Gm.).
Strychninæ Nitras	$\frac{1}{40}$ gr. (0.0015 Gm.).

436. **IGNATIA**, N.F.—ST IGNATIUS' BEAN. The seeds of **Strych'nos igna'tia** Lindley, a tree growing in the Philippine Islands, where they are much esteemed as a medicine, and whence they were introduced to the medical world by the Jesuits, who conferred upon them the name of the founder of their order. The fruit is pear-shaped, and contains 10 to 15 of these **hard, heavy seeds** lying one upon the other and imbedded in a dry medullary mass, but the seeds come into market separate. Their shapes are various, owing to the manner in which they were situated in the fruit; but their general form is ovate, somewhat flattened, and more or less **angular**. They are about 25 mm. (1 in.) long, but considerably narrower, and have at one end a small depression indicating their point of attachment (hilum). Their testa is of a less silky nature than that of nux vomica, and of a gray-brown color. In commerce they are perfectly smooth, the testa and hairs being removed by the rubbing of the seeds against one another, and therefore the outer surface consists of **dull brown or blackish horny albumen**, translucent when fresh. The embryo is oblong, situated in the broad end of the seed, the cotyledons extending only about half the distance across the irregular cavity. Inodorous; taste excessively bitter.

CONSTITUENTS.—Same as nux vomica (435) but in different proportions, the strychnine existing to the extent of about 1.2 per cent. against $\frac{1}{3}$ to $\frac{1}{2}$ per cent. in nux vomica. Ignatia was once used for the preparation of this alkaloid, strychnine, but rarely at the present day, as nux vomica is imported in such large quantities and is a much cheaper source. Dose: $\frac{1}{2}$ to 5 gr. (0.0324 to 0.3 Gm.).

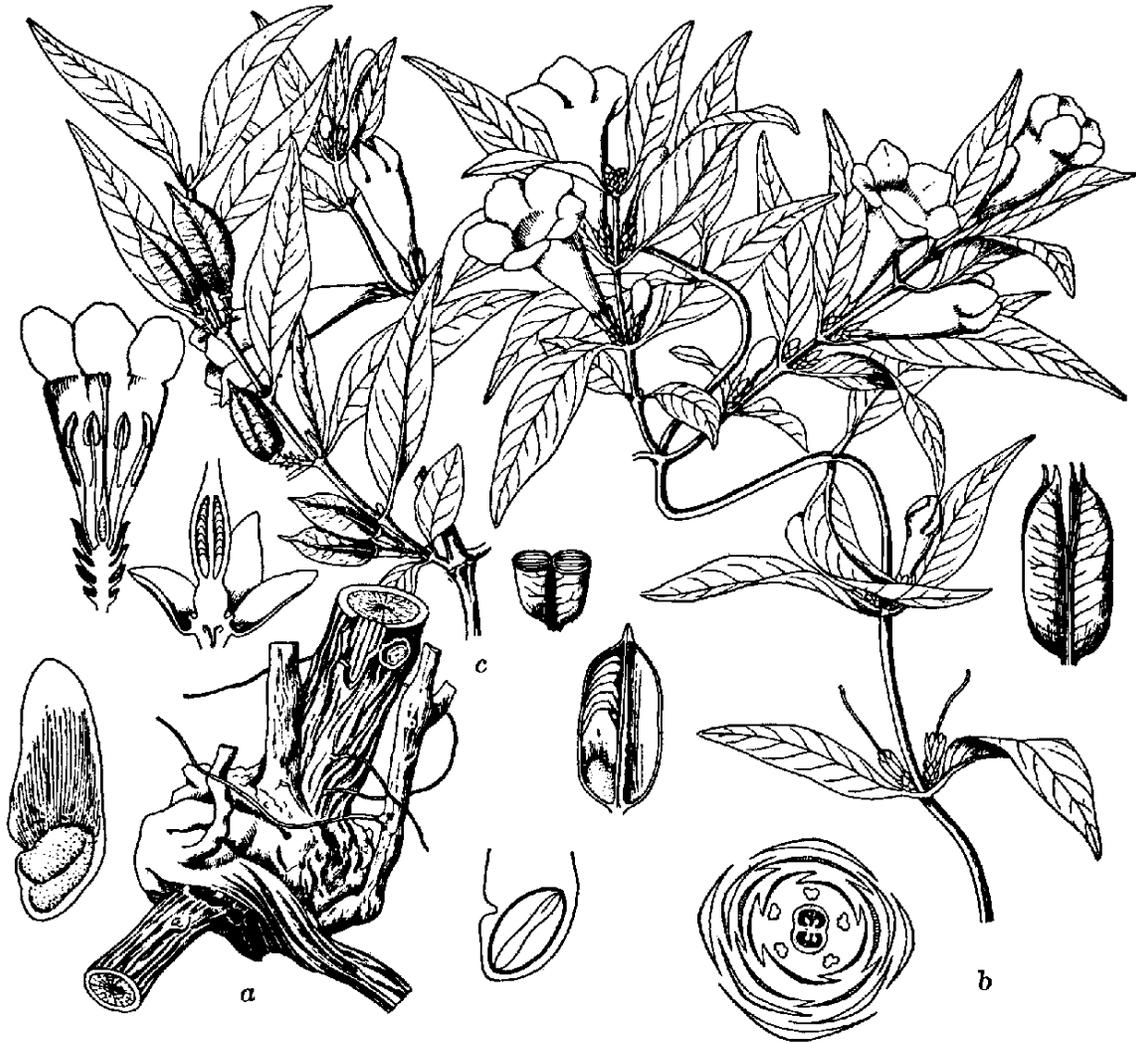
437. **HOANG-NAN or HWANG-NAO**.—TROPICAL BINDWEED. The bark of **Strych'nos malaccen'sis** Bentham, a creeping vine growing in the mountains of Tonquin. This bark is in general use among the natives of Tonquin, Cochin-China, Venezuela, etc., as a remedy in leprosy and hydrophobia, and as an antisyphilitic and alterative. First brought to the notice of the medical profession by the missionary fathers. It contains strychnine and brucine in about equal proportions, and probably has about the same range in medicine as nux vomica. Dose: $\frac{1}{2}$ to 5 gr. (0.0324 to 0.3 Gm.).

438. GELSEMIUM.—GELSEMIUM

YELLOW JASMINE

The dried rhizome and roots of **Gelse'mium sempervir'ens** Aiton.

BOTANICAL CHARACTERISTICS.—*Stem* smooth, climbing. *Leaves* short-petiolate, shining, ovate. *Flowers* in short axillary clusters, very fragrant; *corolla* bright yellow, funnel-form, 5-lobed.



Gelsemium sempervirens: a, rhizome; b, flowering branch; c, fruiting branch ($\frac{1}{4}$ natural size); also flower, ovary, fruit, seed, floral diagram, enlarged.

HABITAT.—Southern United States, notably Florida.

DESCRIPTION OF DRUG.—Generally in very light and fibrous cylindrical sections, 90 to 200 mm. long, 4 to 15 mm. in diameter; externally of a brownish-yellow color, slightly wrinkled; tough, breaking with a fibrous, splintery fracture; bark thin, with silky bast fibers, adhering to the light-yellowish, porous, broadly rayed wood; the wood-cells are more or less indurated and free of starch-grains; medullary rays contain few starch-granules; pith small; odor characteristic; taste persistently bitter.

ADULTERATION.—Mixed with the true gelsemium there are sometimes found the roots of the jessamine or jasmine; as an adulterant

this has become known as false gelsemium. The true yellow jasmine (*Jasminum fruticans* Linné) is called "*Gelsemium officinale*" in Europe. In cross-section the false root, according to Dohme, has no indurated cells in the medulla. Its medullary rays are full of starch-grains, and the sieve-ducts at the outer end of the woody cylinder are, in the case of every woody wedge, surrounded and protected by several rows of bast fibers. The true gelsemium has no such bast fibers. Accidental admixture of stems may be detected by the latter having bundles of bast fibers near the cortex. In the rhizome the fibers are not in bundles, but in a more or less interrupted ring.

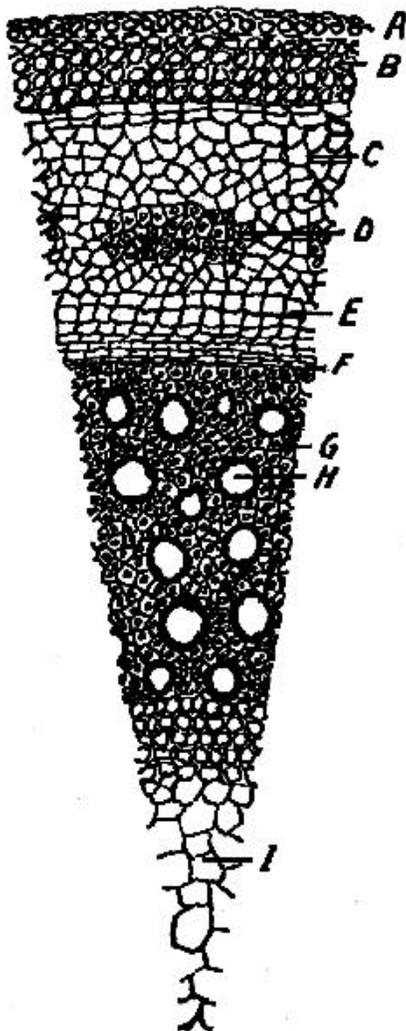


FIG. 200.—Cross-section of the stem of *Gelsemium*. A, Epidermis. B, Collenchyma. C, Parenchyma of cortex. D, Bundles of sclerenchymatous cells. E, Sieve tissue. F, Cambium. G, Wood fibers. H, Tracheal tubes. I, Pith cells.

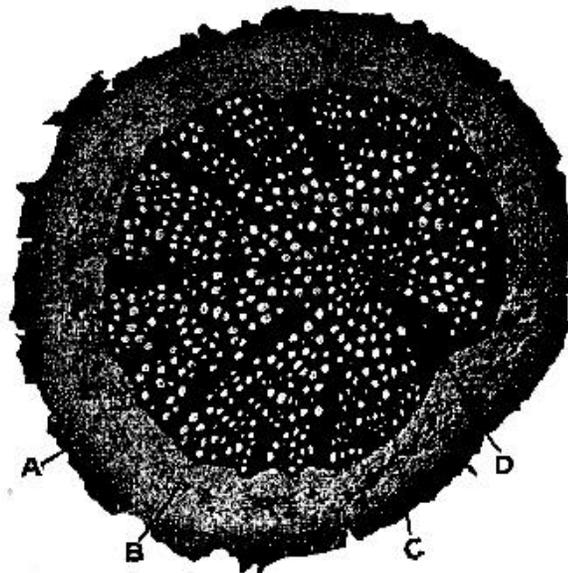


FIG. 201.—*Gelsemium*—Cross-section of root. (19 diam.). A, Cork. B, Phloem. C, Xylem. D, Medullary ray. (Photomicrograph.)

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

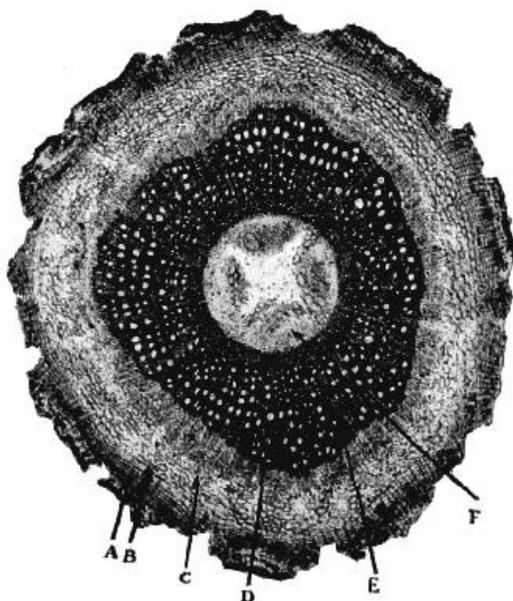


FIG. 202.—Gelsemium—Cross-section of rhizome. (25 diam.) A, Cork, B, Parenchyma of cortex. C, Bast fibers. D, Xylem. E, Medullary ray. F, Medulla. (Photomicrograph.)

CONSTITUENTS.—**Gelsemine**, $C_{54}H_{69}N_4O_{12}$, gelseminine, gelseminic acid, volatile oil, resins, gallic acid, etc. Gelsemine is a brittle, white, transparent solid, soluble in alcohol, from which it crystallizes with difficulty. Gelseminine (uncrystalline) and Sempervirine, yellowish-red crystals. The latter has been separated in minute quantities (Sayre). The root yields from 0.3 to 0.5 per cent. of alkaloids. Gelseminine is rapidly growing in favor as presenting most of the benefits occurring from the use of morphine without any of the disadvantages of the latter (Ellingwood). The activity seems to reside principally in the gelseminine.

Preparation of Gelsemine.—Add acetic acid to concentrated tincture; precipitate resin with water; concentrate the aqueous filtrate; remove gelsemic acid with chloroform or ether. The acid liquid yields impure alkaloid when precipitated by Na_2CO_3 . This is purified by solution in chloroform and slow evaporation. It is a white, amorphous, very bitter alkaline alkaloid; with HCl or HNO_3 forms crystalline salts.

ACTION AND USES.—Antispasmodic, sedative, and diaphoretic. Dose: 2 to 10 gr. (0.13 to 0.6 Gm.).

OFFICIAL PREPARATIONS.

Fluidextractum Gelsemii	Dose: 2 to 10 drops (0.13 to 0.6 mil).
Tinctura Gelsemii (10 per cent.),	2 to 15 drops (0.14 to 1 mil).
Extractum Gelsemii,	0.01 Gm. ($\frac{1}{6}$ gr.).

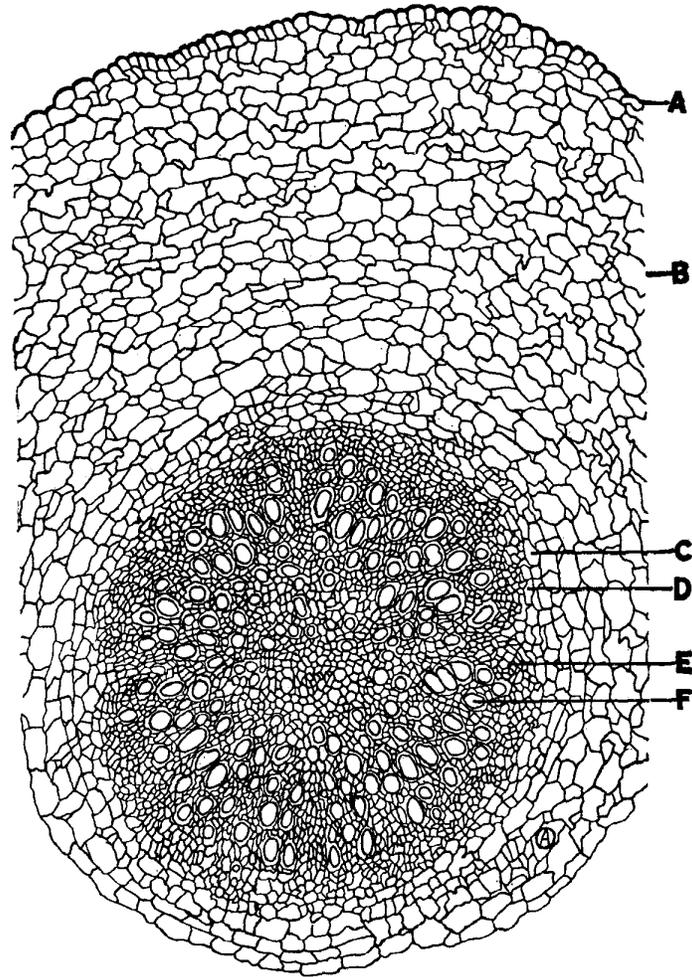


FIG. 203.—Cross-section of root of *Spigelia* (X64). A, Epidermis. B, Parenchyma of primary cortex. C, Endodermis. D, Pericycle. E, Phloem. F, Xylem.

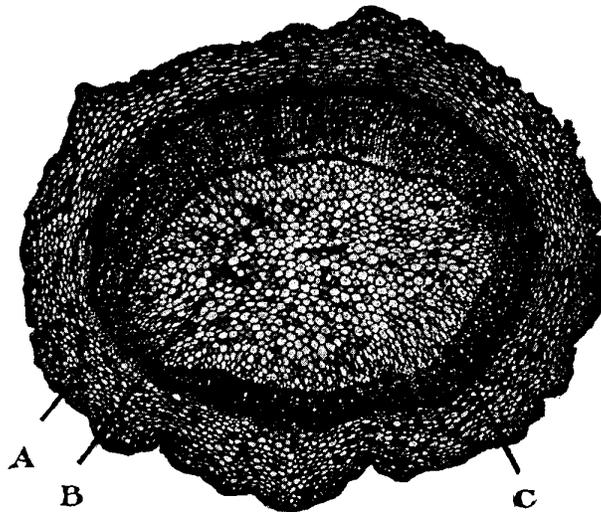
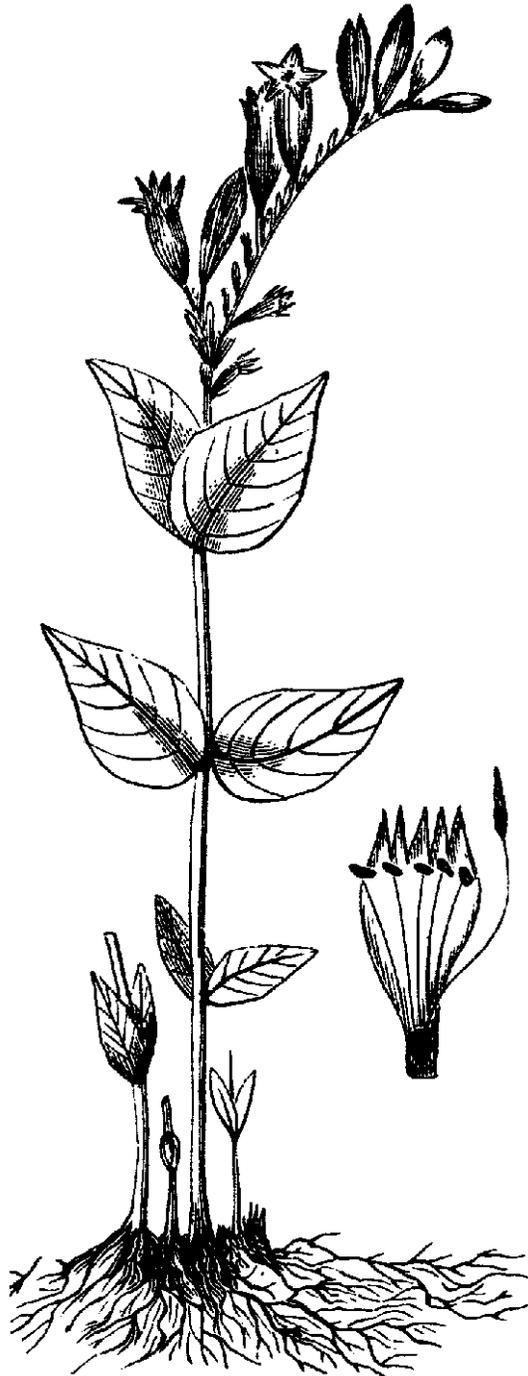


FIG. 204.—*Spigelia*—Cross-section of rhizome. (21 diam.) A, Parenchyma of cortex. B, Medulla. C, Xylem. (Photomicrograph.)

439. SPIGELIA.—SPIGELIA

PINK ROOT. CAROLINA PINK

The dried rhizome and roots of *Spigelia marilandica* Linn&



Spigelia marylandica.

BOTANICAL CHARACTERISTICS.—*Root* perennial; stem simple and erect. *Leaves* sessile, ovate-lanceolate, acute. *Flowers* in a short spike; corolla red externally, yellow within, four times the length of the calyx; *stamens* and *pistil* exserted.

HABITAT.—United States, Maryland southward and westward in rich woods.

DESCRIPTION OF DRUG.—Rhizome **thin, bent, purplish-brown**, on the upper side marked with stem scars, on the lower side beset with numerous lighter colored, slender, branching rootlets. Fracture short. Odor slight, aromatic; taste sweetish, bitter, and pungent.

RELATED SPECIES.—Another species which has attracted attention as an anthelmintic is *Spigelia anthelmia* of South America and the West Indies, which in that country is said to have greater medicinal properties than the official.

A wholesale adulteration of this drug was discovered a short time ago. To the surprise of pharmacognosists this adulterant (a species of *Ruellia*) had completely replaced the official article in commerce, A cross-section of the authentic drug (rootlets and rhizome) is given in Figs. 203 and 204.

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

CONSTITUENTS.—A volatile alkaloid, **spigeline**, is the active principle. Ash, not more than 10 per cent.

Preparation of Spigeline.—Distil the powdered drug over a paraffin bath with milk of lime; collect the distillate in HCl and evaporate to dryness; crystallize from alcoholic solution.

ACTION AND USES.—A **powerful anthelmintic**. Dose: 15 to 60 gr. (1 to 4 Gm.).

OFFICIAL PREPARATION.

Fluidextractum Spigeliæ Dose: 15 to 60 drops (1 to 4 mls).

440. **CURARA.**—CURARE. WOORARI. From **Strychnos castelnaea'na** and other species of Strychnos growing in South America, where an extract is prepared by the natives as an arrow-poison. This extract is a blackish, friable solid or of extract-like consistence, having a somewhat resinous appearance, and very hygroscopic. It contains a very bitter and poisonous alkaloid, curarine. As a remedial agent curara has probably little value, although it has been used in tetanus, hydrophobia, epilepsy, and chorea. It is a strong depressant of the motor nerves, causing a gradual loss of muscular power, deepened respiration, and death by asphyxia. Dose: $\frac{1}{10}$ to $\frac{1}{2}$ gr. (0.006 to 0.02 Gm.).

Curarine (C₁₈H₃₅N).—From the drug Roulin obtained this principle by a very intricate process. The alkaloid is extremely deliquescent and crystallizes in prisms, soluble in water, and changes litmus feebly.

GENTIANEÆ.-Gentian Family

Smooth herbs with a colorless, bitter juice, and containing little or no tannin.

Synopsis of Drugs from the Gentianeæ

A. *Roots.*

GENTIANA, 441.
Frasera, 442.

B. *Herbs.*

***Chirata**, 443.
Sabbatia, 444.
***Menyanthes**, 445.

441. GENTIANA.—GENTIAN

GENTIAN

The dry rhizome and roots of **Gentia'na lu'tea** Linné.

BOTANICAL CHARACTERISTICS.—Root perennial, large; stem 2 to 3 feet high, *Leaves* opposite, sessile, 5- to 7-nerved, ovate-acute, more or less clasping. *Flowers* in

whorls, bright yellow; *corolla* with 5 or 6 green glands at its base; *stigmas* 2.

HABITAT.—Mountainous portions of Central Europe.

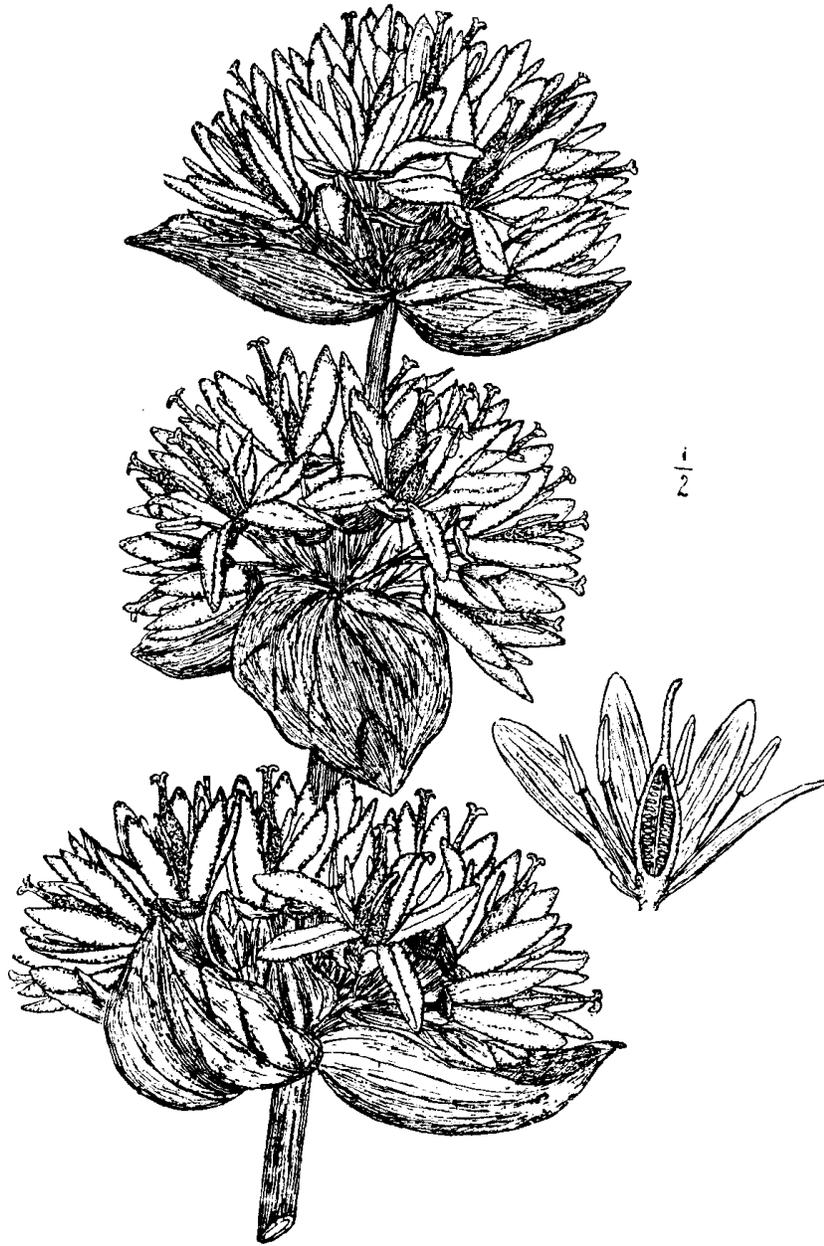


FIG. 205.—*Gentiana lutea*—Flowering head and dissected flower.

DESCRIPTION OF DRUG.—Cylindrical, fleshy, and very long, often 3 feet or more; it is generally cut longitudinally about 100 to 200 mm. ($4 \frac{1}{5}$ to $13 \frac{3}{5}$ in.) thick; in drying, these to 8 in.) long, and 5 to 40 mm. slices are depressed in the center and the bark overlaps; **yellowish-**

brown, much wrinkled longitudinally and marked transversely, especially in the upper portion, with numerous rings. Transversely the bark is rather thick, wrinkled, and contorted, separated by a black cambium line from the yellowish-brown, porous, and spongy medullium marked with indistinct medullary rays. Fracture irregular, brittle when dry, flexible and tough when damp; odor pronounced and characteristic; taste intensely bitter, sweetish, and not disagreeable.

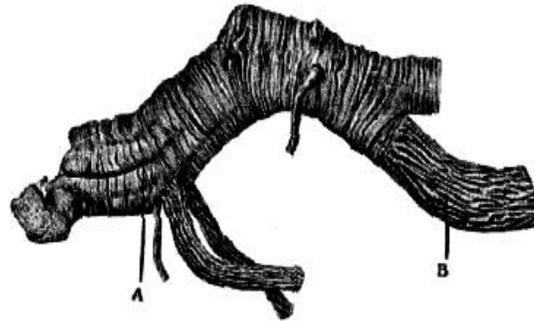


FIG. 206.—Gentian—A, Rhizome portion. B, Root portion. ($\frac{1}{4}$ natural size.)

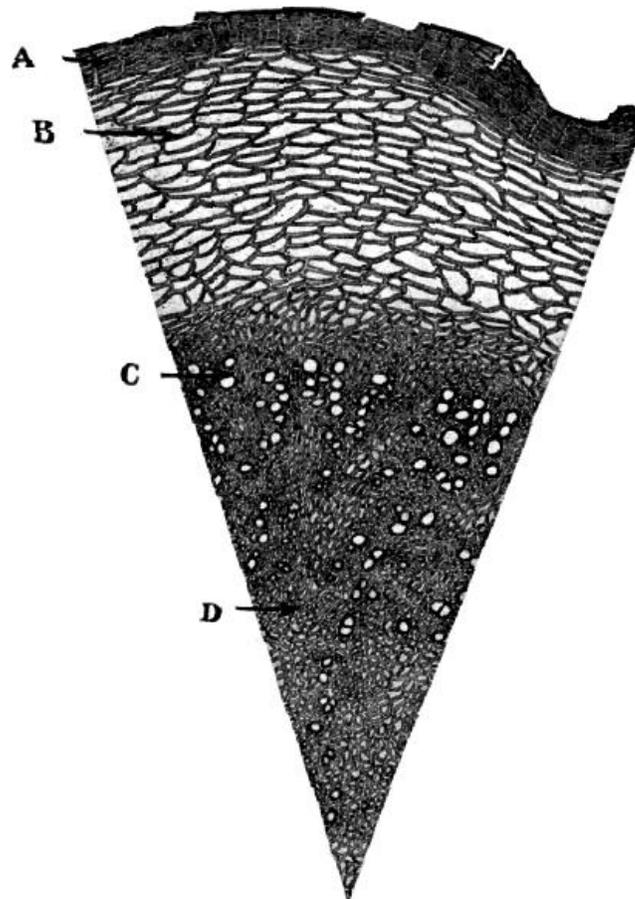


FIG. 207.—*Gentiana lutea*—Cross-section. A, Cork. B, Parenchyma of cortex. C, Water tube. D, Parenchyma of xylem.

Gentiana catesbæi, the blue gentian of the Southern States, growing in mossy swamps, is said to be little inferior to the official species. It is sometimes used to adulterate senega. Other indigenous species, as *G. purpurea* and *G. punctata*, have about the same properties as the official gentian and are used similarly. The herb *G. quinqueflora* is used in liver affections, chronic ague, jaundice, etc.

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

CONSTITUENTS.—The bitter principle is a neutral principle, **gentiopicrin**, $C_{20}H_{30}O_{12}$, the yellow color is due to **gentisin**, $C_{14}H_{10}O_5$, or **gentisic acid** (tasteless yellow prisms). The root also contains from 12 to 15 per cent. of glucose (gentianose), $C_{16}H_{66}O_{31}$, but is remarkable in that it contains **no starch, calcium oxalate, or tannin**. Ash, not to exceed 6 per cent.

Preparation of Gentisic Acid.—The alcoholic extract is washed with water, then with ether. The residue dissolved in alcohol yields the acid on evaporation. It is in yellow, tasteless crystals, partially soluble in alcohol and ether; with ferric salts gives dark brown color.

Preparation of Gentiopicrin.—Obtained by making aqueous solution of alcoholic extract. This solution is subjected to the absorptive action of charcoal. Charcoal is then boiled with alcohol, tincture evaporated, and treated with lead -oxide to remove color. Lead removed by H_2S ; solution agitated with ether. Set solution aside to crystallize. Yellowish-brown, soluble in water and dilute alcohol.

ACTION AND USES.—Simple bitter tonic, long known and very valuable. Dose: 5 to 30 gr. (0.3 to 2 Gm.).

OFFICIAL PREPARATIONS.

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

Extractum Gentianæ 5 to 10 gr. (0.3 to 0.6 Gm.).

Tinctura Gentianæ Composita (10 per cent., with orange-peel and cardamom), 1 to 2 fl. dr. (4 to 8 mils).

442. **FRASERA**.—AMERICAN COLUMBO. The root of **Fra'sera wal'teri** Michaux, a plant growing extensively in Southern and Western United States, especially in Arkansas and Missouri. Its root is long and spindle-shaped, but comes into market in transverse slices, irregularly circular, about 25 mm. (1 in.) in diameter; these disks consist of a central, medullary matter, yellowish-brown, shrunken in the middle, and a reddish-brown exterior; inodorous; taste at first sweet, then bitter., It may be distinguished from columbo by its greater uniformity of internal structure, the absence of concentric and radiating lines, and its purer yellow color without the green

tinge. It occasionally comes into the market in longitudinal slices under the name of American gentian. It contains gentiopicroin and gentisic acid, but no starch or tannin. Simple bitter tonic like columbo and gentian. Dose: 15 to 30 gr. (1 to 2 Gm.).

443. CHIRATA.—CHIRATA, N.F.

CHIRETTA

The dried plant **Swert'tia chira'yita** Hamilton.

HABITAT.—Nepal and other parts of Northern India.

DESCRIPTION OF DRUG.—Chirata of the market consists principally of short sections of the stem and branches, orange-brown or dark purple in color, generally pressed and split, showing the yellow pith, and mixed with a few leaves and flower panicles. These stems when entire are about 4 mm. ($\frac{1}{6}$ in.) in thickness, round at base and quadrangular toward the top, jointed, the internodes being from 37 to 100 mm. ($1\frac{1}{2}$ to 4 in.) in length; branches opposite. Inodorous when dry, but when moistened it has a perceptible odor; taste very bitter, persistent.

In the Indian bazaars there are a number of species of *Ophelia*, known by the name of *Chiretta*, which possess, to a greater or less degree, the bitter properties of that drug. Flückiger states: "We have frequently examined the chiretta found in the English market, but have never met with any other than the legitimate sort." Bentley noticed, in 1874, the substitution of *O. angustifolia*, which he found by far to be less bitter than the true chiretta. J. S. Ward ("Pharm. Jour.," 4th Series, 1, 1897) calls attention to a false chirata entering the eastern market. He recognized it as the product of *Andrographia paniculata*, nat. ord. Acanthraceæ, a plant distributed throughout India from Lucknow and Assam to Ceylon, and cultivated in the West — domestic remedy for fevers, debility, etc. Sold by herbalists in the fresh state.

Powder.—Grayish-brown. Characteristic elements: Parenchyma of medulla, slightly lignified with simple pores; sclerenchyma with fibers, long, narrow, and thick-walled; tracheids, numerous; ducts with spiral or scalariform markings; yellowish-brown pollen and stomata present.

CONSTITUENTS.—**Chiratin**, $C_{26}H_{48}O_{15}$ (yellow, hygroscopic powder, very bitter), **ophelic acid**, $C_{13}H_{20}O_{11}$ (a syrupy liquid, very bitter), resin, coloring matter, bitter extractive, gum, and salts. Water and alcohol extract its virtues.

ACTION AND USES.—**Bitter tonic** like the other plants of the order Gentianæ. Dose: 15 gr. (1 Gm.).

OFFICIAL PREPARATIONS.

Tinctura Chiratae (10 per cent.) (1890),	Dose: $\frac{1}{2}$ to 2 fl. dr. (2 to 8 mils).
Fluidextractum Chiratae	15 drops (1 Mil)-

444. **SABBATIA**.—CENTAURY. (Centaurium, the dried flowering plant of *Centaurium Contanrium*, N.F.) Three species of this indigenous herb are more or less used in this country as tonic and antiperiodic. These are *Sabba'tia angular'is* Pursh (American centaury), *S. paniculata* Pursh, and *S. Ellio'tti* Steudel (quinine flower); the whole plant of the two first-named species is used, the root of the last-named; they probably all contain the same principle, erythrocentaurin, $C_{27}H_{24}O_8$. Dose: about 1 dr. (4 Gm.).

445. **MENYANTHES**.—WATER SHAMROCK. BUCKBEAN (N.F.) The herb of **Menyan'thes trifolia'ta** Linné, an aquatic plant growing in bogs in the temperate zone of the Northern Hemisphere. Leaves ternate, rising out of the water on long petioles from a rhizome; leaflets obovate, about 50 mm. (2 in.) long, with entire margin, and smooth, green upper surface, paler beneath. It has no odor, but a very bitter taste, due to a bitter princi menyanthin, $C_{33}H_{54}O_{16}$ (?). Bitter tonic, in large doses cathartic. Employed ye in the preparation: **Vinum Aurantii Compositum**, N.F. (*Elix. Aurantiorum Compositum*, Germ. Pharm.). Dose: 15 to 45 gr. (1 to 3 Gm.).