

SAYRE'S MATERIA MEDICA - Part V

APOCYNACEÆ.—Dogbane Family

Herbs, shrubs, or trees. mostly tropical, with a milky juice which is often drastic or poisonous. *Leaves* mostly opposite, exstipulate. *Flowers* regular, 5-merous and 5-androus, with the pollen cohering into granular, waxy masses. *Fruit* a pair of follicles; seeds often comose.

Synopsis of Drugs from the Apocynaceæ

A. *Roots.*

* **Apocynum**, 446.

Apocynum Androsæmifolium, 446 a.

B. *Barks.*

Aspidosperma, 447.

Alstonia Constricta, 448.

Alstonia Scholaris, 449.

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C. *Seeds.*

STROPHANTHUS, 451.

D. *Leaves.*

Oleander, 452.

E. *Herb.*

Urechites, 453.

446. APOCYNUM.—APOCYNUM, N.F.

CANADIAN HEMP

The dried rhizome of **Apocynum canna'binum** Linné without the presence of more than 5 per cent, of stems and foreign matter.

BOTANICAL CHARACTERISTICS.—Stems much branched, 2 to 3 feet high. *Leaves* from oval to oblong or lanceolate, short petiolate or sessile. *Inflorescence* cymose; *corolla* greenish-white, with nearly erect lobes, the tube not longer than the calyx tube.

HABITAT.—United States.

DESCRIPTION OF DRUG.—A long, cylindrical root, **somewhat contorted**, about 8 mm. ($\frac{1}{3}$ in.) thick, with a **rather thick light brown bark, longitudinally wrinkled** and transversely fissured, and a **yellowish, porous wood divided by fine medullary rays** into very narrow wood-wedges; fracture short. The thick inner cortical layer has numerous lactiferous vessels scattered through it, which in the fresh state secrete a milky Juice which hardens into a caoutchouc-like substance, Odor slight, or none; **taste** bitter, nauseous.

Apocynum androsæmifolium Linné, dogbane, resembles the above, but has a relatively thicker bark inclosing a white, porous wood, and contains, in the outer portion, stone-cell groups. By applying the phloroglucin test to a section, the groups of stone-cells are revealed, stained red. Two species sold indiscriminately.

CONSTITUENTS.—**Apocynein**, a yellowish glucoside (acting like digitalin); **apocynin**, a bitter, resin-like extractive; tannin, resin, starch, etc.

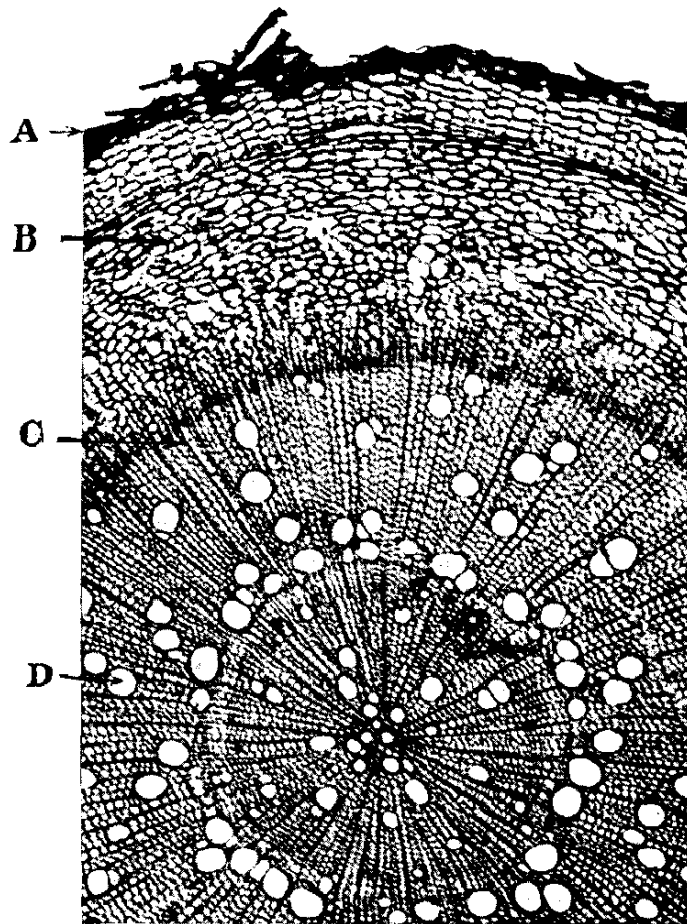


FIG. 208.—*Apocynum cannabinum*—Cross-section. (28 diam.) A, Cork. B, Parenchyma of cortex. C, Medullary ray. D, Water tube. (Photomicrograph.)

ACTION AND USES.—A **valuable diuretic** in moderate doses, in large doses emetic and cathartic, producing considerable diaphoresis and expectoration; most used and most beneficial **in dropsy**. Recently the drug has attracted some attention as a most valuable deobstruent in relieving renal congestion in the second stage of tubular nephritis, It is also a decided heart tonic. Dose as a diuretic, 4 to 5 gr. (0.3 to 0.324 Gm.); as an emetic and cathartic, is to 30 gr. (1 to 2 Gm.).

OFFICIAL PREPARATION.

Fluidextractum Apocyni . Dose: 15 drops (1 mil).

447. **ASPIDOSPERMA.**—QUEBRACHO. (U.S.P. IX.) The bark of **Aspidosper'ma quebra'cho blanco** Schlechtendal. Thick, flat pieces (from $\frac{2}{5}$ to 1 in. in thickness), with a very thick, yellowish-gray cork, which constitutes more than one-half of its entire substance, and is separated from the lower layer by a more or less sharply defined outline, deeply fissured, and traversed by parallel yellowish lines; between

these lines are whitish dots visible in a cross-section scattered through both the outer and inner layers. Internally reddish-brown to yellow; odor slight; taste aromatic and bitter. *Constituents*: *Aspidosperma* is very rich in alkaloids, six having been discovered thus far; the most important are **aspidospermine**, $C_{22}H_{30}N_2O_2$, and **quebrachine**, $C_{21}H_{26}N_2O_2$. A peculiar sugar, quebrachite, is also present, and tannin, 3 to 4 per cent. Cardiac tonic. **Its special action, however, is upon the respiration**, lessening the rate and increasing the amplitude of the respiratory movements; it is chiefly used in asthmatic dyspnoea. Dose: 5 to 30 gr. (0.3 to 2 Gm.).

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

Preparation of Aspidospermine.—Treat alcoholic extract with alkaline chloroform; dissolve chloroformic extract in acidulated (H_2SO_4) water and precipitate with NaOH; dissolve precipitate (mixed alkaloids) in boiling alcohol and cool, when alkaloids will crystallize.

To separate aspidospermine, crystallize from dilute HCl, when this alkaloid will remain in the mother liquor, from which it may be removed by neutralization and recrystallization. As found in commerce, this alkaloid is a mixture of this and the other associated principles, among which quebrachine is the most important. Crude aspidospermine sulphate is a commercial article, is deliquescent and unstable; it is much more soluble in water than the alkaloid.

Fluidextractum Aspidospermatis Dose: 5 to 30 drops (0.3 to 2 Mils).

448. **ALSTONIA CONSTRICTA** F. Mueller.—AUSTRALIAN FEVER BARK. Tonic, antiperiodic. Dose of fl'ext.: 2 to 8 drops (0.13 to 0.5 mil).

449. **ALSTONIA SCHOLARIS** R. Brown.—DITA. A tree growing in the Philippine Islands, the bark of which is used in India as a substitute for cinchona. Dose of fl'ext.: 2 to 8 drops (0.13 to 0.5 mil) .

450. **CONESSI**.—The bark of **Holar'rhenantidysenter'ica** Wallr. Has been used in Europe and is still extensively employed in India in dysentery. Its alkaloid, conessine, enters commerce.

451. STROPHANTHUS.—STROPHANTHUS

STROPHANTHUS

The ripe seed of **Strophan'thus Kombé** Oliver or of *Strophanthus hispidus* De Candolle, deprived of its long awn.

BOTANICAL CHARACTERISTICS.—A woody climber, ascending to the tops of high trees, from which it hangs in festoons. *Flowers* in terminal cymes, gamopetalous, the lobes prolonged into long, tail-like points, often 8 or 9 inches long. *Fruit* two long follicles.



FIG. 209.—*Strophanthus hispidus*—Branch and seed with comose awn.

SOURCE.—The genus *Strophanthus* contains about 20 species, native of Africa and Asia, where it is probable that more than one of them are used for the preparation of arrow-poison.

DESCRIPTION OF DRUG.—Lance-ovoid, flattened and obtusely edged; from 7 to 20 MM. in length, about 4 mm. in breadth and about 2 MM. in thickness; externally, of a light fawn color, with a distinct, greenish tinge, silky lustrous from a dense coating of closely appressed hairs, (*S. Kombe*); or light to dark brown, nearly smooth and sparingly hairy (*S. hispidus*), bearing on one side a ridge running from about the center to the summit; fracture short and somewhat soft, the fractured surface whitish and oily; odor heavy when the seeds are crushed and moistened; taste very

bitter. U.S.P. IX.

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

TEST U.S.P.—If made into the official tincture and assayed biologically the minimum lethal dose should not be greater than 0.00006 mil of tincture, or the equivalent in tincture of 0.000005 Gm. of ouabain, for each gramme of body weight of frog. Preserve *Strophanthus* in tightly closed containers, adding a few drops of chloroform or carbon tetrachloride, from time to time, to prevent attack of insects.

CONSTITUENTS.—Its medical properties depend upon an intensely bitter glucoside, **strophanthin**, $C_{32}H_{48}O_{16}$ (anhydrous), 2 to 2.5 per cent., choline, trigonelline, kombic acid, resin, mucilage, and a fixed oil are also present. Ash, not to exceed 5 per cent.

OUABAIN, CRYSTALLIZED.—Crystallized Strophanthin.—G. Strophanthin Thorns. $C_{30}H_{46}O_{12} + 9H_2O$. A glucoside, obtained from *Acoanthera ouabaio* by Arnaud, or, as now commonly prepared, from *Strophanthusgratus*, in which case it is also called crystallized strophanthin, or g-strophanthin Thorns. (The official strophanthin is methyl ouabain $C_{31}H_{48}O_{12}$.) Recent investigation shows that this alkaloid varies in proportion to water of crystallization.

Preparation of Strophanthin.—Treat powdered seeds with acidulated (HCl) alcohol; evaporate to soft extract; treat with water. The aqueous solution containing tannate is treated with lead oxide, and from the purified aqueous solution white crystals are obtained.

ACTION AND USES.—Used in all forms of cardiac disease to supplant digitalis, but is not generally regarded as its equal. It has a diuretic action similar to digitalis through its action on the circulation, and also by direct promotion of urinary secretion, and is especially indicated in cardiac dropsy as being superior to digitalis; given in the form of tincture. Dose: 1 gr. (0.065 Gm.).

OFFICIAL PREPARATION.

Tinctura Strophanthi (10 per cent.) Dose: 4 to 8 drops (0.25 to 0.50 Mil).

452. **OLEANDER.**—The leaves of **Ne'rium odor'um**, a heart stimulant belonging to the digitalis group. Oleandrin is a cardiac poison.

453. **URECHITES.**—YELLOW-FLOWERED NIGHTSHADE. A poisonous plant growing in the West India Islands. A cardiac poison not very unlike digitalis in effect. Dose of fl'ext.: 2 to 10 drops (0.13 to 0.6 mil).

ASCLEPIADEÆ.—Milkweed Family

Herbs, usually milky-juiced, with opposite or whorled entire *leaves*. *Anthers* connected to the stigma and the pollen, cohering into waxy masses which hang in pairs from the glands of the stigma. The *juice* contains caoutchouc.

454. **ASCLEPIAS TUBEROSA** (N.F.).—The root of **Ascle'pias tubero'sa** Linné. Off. in U.S.P. 1890. Enters the market in transverse or longitudinal sections about 20 mm. ($\frac{4}{5}$ in.) in thickness, and of various lengths; externally pale orange-brown or grayish, wrinkled longitudinally; internally it consists of a grayish or yellowish porous wood with broad, white medullary rays; fracture tough, uneven, showing the two distinct layers of the thin bark, the inner one white; odorless; taste bitter, somewhat acrid. Diaphoretic expectorant. Dose: 15 to 60 gr. (1 to 4 Gm.). Fl'ext., off. U.S.P. 1890. dose: 15 to 60 drops (1 to 4 mils).

455. **ASCLEPIAS CORNUTI** Decaisne.—COMMON SILK-WEED or MILK-WEED. (Rhizome.) Cylindrical sections, from 6 to 25 mm. ($\frac{1}{4}$ to 1 in.) thick, beset with a few simple rootlets; externally grayish-brown, finely wrinkled, and rough from stem-scars and undeveloped branches. It breaks with a short or splintery fracture, showing a thick bark containing lactiferous vessels, and a yellowish, porous wood in narrow wood-wedges. Odorless; taste bitter and nauseous. Diuretic, alterative, and expectorant; recommended in pectoral affections and in dropsy. Dose: 15 to 60 gr. (1 to 4 Gm.), in decoction.

456. **ASCLEPIAS INCARNATA** Linné.—SWAMP MILK-WEED. *Habitat*: North America. An oval or globular, yellowish-brown rhizome, with a tough, white wood, and a central pith; rootlets smooth, light yellowish-brown, brittle; odorless; taste sweetish, bitter, and acrid. It contains an emetic principle, **asclepiadin**; it is also alterative and cathartic. Dose: 15 to 45 gr. (1 to 3 Gm.).

457. **ASCLEPIAS CURASSAVICA** Linné.—BLOOD FLOWER. A West Indian herb used as an emetic, in smaller doses cathartic and vermifuge. Dose of fl'ext.: 1 to 2 fl. dr. (4 to 8 mils).

458. **HEMIDESMUS**.—INDIAN SARSAPARILLA. The root of a climbing East Indian plant, **Hemides'mus in'dicus** R. Brown. Long, cylindrical, slender, and tortuous; externally wrinkled and fissured, dark brown; wood yellowish, separated from the thin bark by a dark, wavy cambium line. Odor sweetish, tonka-like; taste sweetish and acrid. It is used in India as an alterative, and also in Great Britain, where it is official. Dose: 30 to 60 gr. (2 to 4 Gm.), in infusion or decoction.

459. **CONDURANGO** (N.F.).—The bark of **Gonolo'bus conduran'go** Triana, a South American vine, largely used there as an alterative. It was first introduced as a medicine here as a specific in cancer, but experience has shown it to be of no value in that trouble. It is from 2 to 6 mm. ($\frac{1}{12}$ to $\frac{1}{4}$ in.) thick, the outer surface or periderm ash-gray, with greenish or blackish lichen patches scattered over it; odor slight; taste bitter and acrid. It is given in doses of about 30 gr. (2 Gm.).

CONVOLVULACEÆ.-Convolvulus Family

Chiefly twining or trailing herbs, sometimes with milky juice, with alternate *leaves*, and regular, 5-androus *flowers*.

460. JALAPA.—JALAPA

JALAPA

The dried tuberous root of **Exogonium pur'ga** (Wenderoth) Benthham, yielding, by assay, not less than 7 per cent. of resin.

BOTANICAL CHARACTERISTICS.—*Stem* brownish, smooth. *Leaves* long-petiolate, cordate-ovate, acuminate, entire, smooth. *Peduncles* axillary, 2-flowered; *corolla* crimson or light red, four times the length of the calyx.

HABITAT.—Mexico; now successfully cultivated in India.

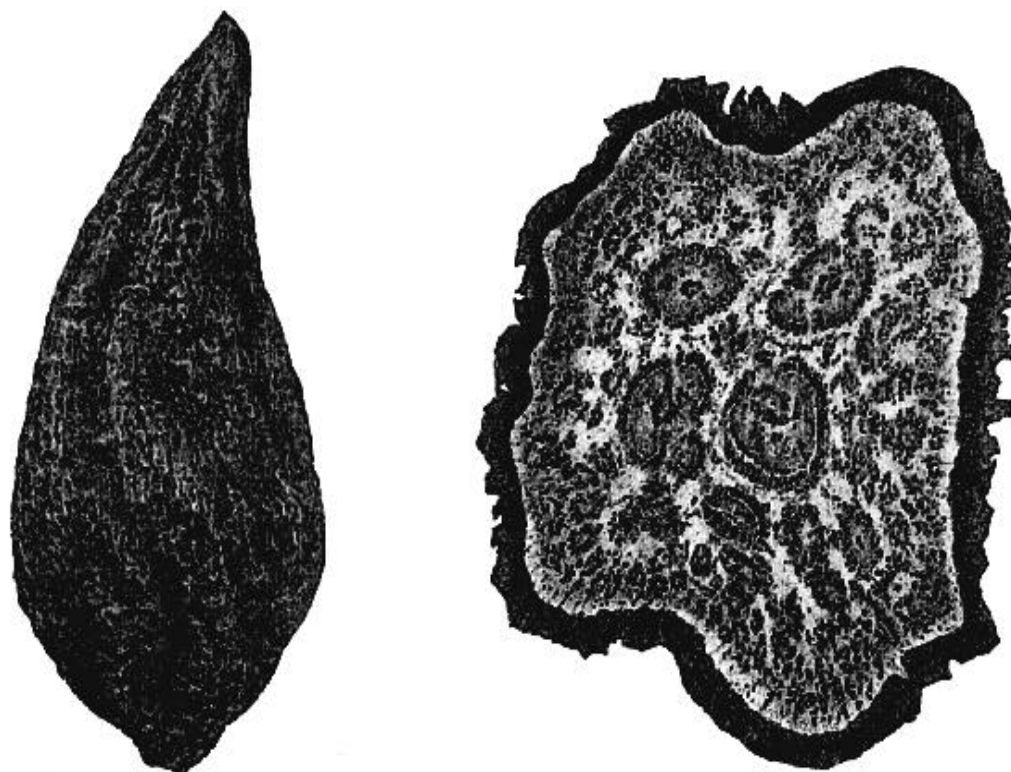
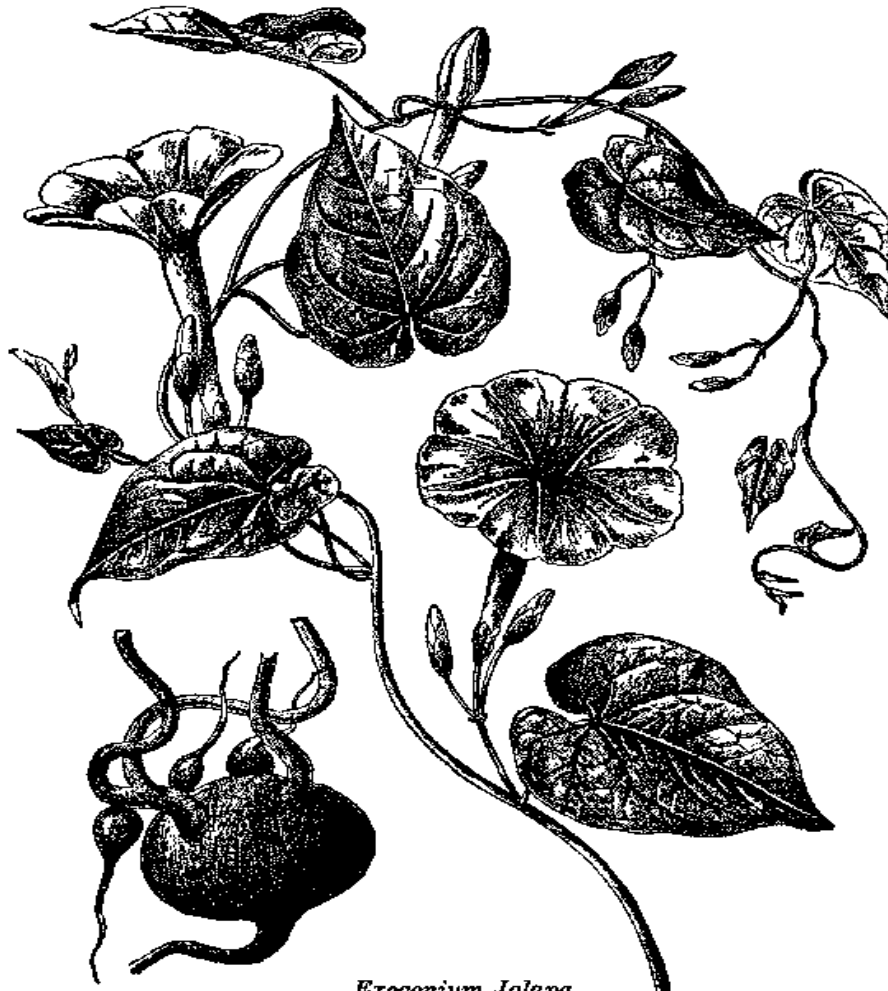


FIG. 210.—Jalap tuber. (Photograph.) FIG. 211.—Jalap—Cross-section of tuber. (2 diam.) (Photograph.)

DESCRIPTION OF DRUG.—A **compact, heavy, hard, pear-shaped tuber**, varying in size, but never larger than the fist; the larger ones are longitudinally incised to facilitate the drying, which is done over the hearths of the Indian huts, hence **externally** brown, smoky, more or less wrinkled, covered with thick, round warts of a somewhat lighter color; **internally** gray to dark brown; fracture horny and resinous; odor peculiar, smoky, partly due to the manner of drying; taste starchy, afterward slightly acrid. **Powdered jalap** is yellowish-gray, and when inhaled causes sneezing and coughing.



Exogonium Jalapa.

STRUCTURE.—Cortical layer thin, with a dense circle of resin cells near the cambium line; interior composed chiefly of parenchymatous tissue containing starch and calcium oxalate, arranged in which are concentric zones of resin cells, the broader, darker, alternate zones being formed by a closer packing of the cells; medullary rays small, but plainly visible. The false jalaps which frequently adulterate the drug in market may usually be detected by the difference in internal structure.

ADULTERATIONS.—Immature roots, roots partially deprived of resin by treatment with alcohol. These are sticky, internally darker than the genuine and other species of Ipomoea.

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

CONSTITUENTS.—Besides starch, calcium oxalate, etc., jalap contains a resinous substance which consists of two portions, a soft resin, **jalapin**, soluble in ether, and a hard resin, constituting nine-tenths of the mixture, termed **jalapurgin** or **convolvulin** (a glucoside, $C_{31}H_{50}O_{16}$); this latter is supposed to be the active principle. The U.S. Pharmacopoeia (IX) has fixed the lowest limit of resin at 7 per

cent. (which includes both resins).

The varying strength in jalap may be accounted for by the fact that the roots are dug at all seasons of the year. In the fall, when the aerial stem has decayed, it is better than in the spring, at the sprouting season. Ash, not to exceed 6-5 per cent.

ACTION AND USES.—**Hydragogue cathartic**, generally used in dropsy in the compound powder of jalap. Dose: 15 to 30 gr. (1 to 2 Gm.).

OFFICIAL PREPARATIONS.

Pulvis Jalapæ Compositus (35 per cent.

with potassium bitartrate) Dose; 15 to 60 gr. (1 to 4 Gm.).

Resina Jalapæ 2 to 5 gr. (0.13 to 0.3 Gm.).

Pilulae Catharticæ Compositæ 2 to 5 pills.

461a. **IPOMŒA PANDURATA.**—WILD JALAP. MAN-ROOT. MAN OF THE EARTH. The root of *Ipomœa pandura'ta* Meyer. Occasionally met with in commerce, in the form of longitudinal slices with an irregularly wrinkled, brownish-gray bark overlapping the white wood. The woody center is divided into narrow wood-wedges by medullary rays dotted with resin cells. Nearly inodorous; taste sweetish and bitter. Contains panaquilon (the sweet principle found in panax), mucilage, starch, resin, etc. Diuretic and cathartic. Dose: 15 to 60 gr. (1 to 4 Gm.).

461b. **FALSE JALAPS.**—*Ipomœa simulans* (Tampico jalap), a somewhat globular root yielding a resin (tampicin), very similar to jalapin, nearly soluble in ether. *I. orizabensis* (fusiform or male jalap), a spindle-shaped, large, woody root, often in sections, the resin orizabini (unfortunately named jalapin) entirely soluble in ether.

462. SCAMMONIUM.—SCAMMONY

SCAMMONY

A gum resin obtained by incising the living root of *Convol'vulus scammo'nia* Linné.

BOTANICAL CHARACTERISTICS.—*Root* perennial, tapering, 3 to 4 feet long, from 9 to 12 in. in circumference at the crown, and abounding in a milky, acrid juice. *Stem* annual, smooth. *Leaves* petiolate, sagittate, entire. *Peduncles* cymose, 3-flowered, twice the length of the leaves; *calyx-lobes* with a reflexed point; *corolla* pale yellow. *Capsule* 2-celled, 4-seeded.

HABITAT.—Western Asia. Obtained in the same manner as asafœtida.

DESCRIPTION OF DRUG.—The pure, or, as it is called, the “genuine” scammony is scarce in the market, the ordinary article being impure from flour, chalk, ashes, sand, etc., mixed with the exuded milk-juice before it has entirely hardened. It usually comes in hemispherical cakes, convex on one side, about 100 to 150 mm. (4 to 6 in.) in diameter; externally dark gray or nearly black; fracture brittle, shining, somewhat rough, exhibiting a usually porous interior, lighter colored and tinged with yellow or

green. It yields a **light-gray powder** having a peculiar **odor resembling cheese or putty**; taste slight, but leaves an acrid sensation in the throat.



FIG. 212.—*Convolvulus scammonia*—Branch.

CONSTITUENTS.—Gum, resin, starch, **scammonin**, $C_{34}H_{56}O_{16}$, etc. Not less than 75 per cent. of the drug should be soluble in ether; ash not more than 3 per cent.

ACTION AND USES.—**Hydragogue cathartic**, on account of its harshness, generally given in combination. Uncertain on account of frequent impurities. Dose: 1 to 8 gr. (0.065 to 0.5 Gm.), in emulsion.

462a. SCAMMONII RADIX.—SCAMMONY ROOT

The dried root of **Convolvulus scammonia** Linné yielding, when assayed by the official process, not less than 8 per cent. of the total resins of scammony root.

SOURCE AND DESCRIPTION.—This is the root of a morning glory-like plant, a native of Levant. The root is cylindrical or somewhat tapering from 10 to 25 cm. in length and 1 to 4.5 cm. in thickness. Externally, it is grayish to reddish-brown usually distinctly twisted, deeply longitudinally furrowed and marked by distinct root scars. Fracture tough, irregular and with projecting wood-fibers. Internally somewhat mottled showing yellowish, porous wood-wedges, separated by whitish parenchyma containing starch and resin. Bark, thin, odor, slight, resembling that of jalap; taste, slightly sweet, becoming slightly acid.

ACTION AND USES.—For its action it depends on the gum resin. Hydrogogue, cathartic, on account of its harshness it is generally given in combination. Its action is often uncertain due to adulteration.

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

OFFICIAL PREPARATIONS.

Resina Scammonii

Dose: 3 gr. (0.2 Gm.).

Extractum colocynthidis Compositum

7½ gr. (0.5 Gm.).

POLEMONIACEÆ.—Polemonium Family

463. **POLEMONIUM REPTANS** Linné.—**ABSCCESS ROOT.** The root of this American plant has been used as an alterative, astringent, diaphoretic, and expectorant. Dose: 30 to 60 gr. (2 to 4 Gm.).

HYDROPHYLLACEÆ.—Waterleaf Family

464. ERIODICTYON.—ERIODICTYON

YERBA SANTA. MOUNTAIN BALM. CONSUMPTIVE'S WEED

The dried leaves of **Eriodic'tyon Californicum** Greene.

BOTANICAL CHARACTERISTICS.—Low shrubs with alternate *leaves*. *Calyx* of narrow sepals; *corolla* violet or purple, occasionally white, with the filaments adherent to it; *ovary* 2-celled. *Fruit* a small capsule.

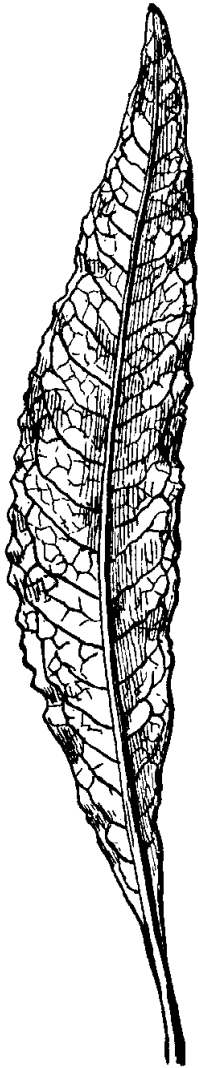


FIG. 213.—Leaf of Yerba Santa. Under side.

HABITAT.—California, and in mountains of Northern Mexico.

DESCRIPTION OF DRUG.—Oblong-lanceolate, from 50 to 100 mm. (2 to 4 in.) long, 10 to 30 mm. ($\frac{2}{5}$ to $1\frac{1}{5}$ in.) broad, with a sharp apex, and narrowed at the base into a short foot-stalk; margin sinuate or almost entire; upper surface brownish-green and **varnished with a resinous coating; under surface greenish-white, hairy**, with a prominent midrib and **distinct reticulations**; brittle, odor aromatic; taste balsamic, sweetish, free from bitterness.

RELATED SPECIES.—*Eriodictyon tomentosum*, growing with the other, is large and has a dense coat of short, villous hairs, becoming whitish or mustycolored with age.

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

CONSTITUENTS.—Volatile oil, an acrid resin, tannin, ericolin, $C_{34}H_{56}O_{21}$.

ACTION AND USES—Long used in California as a stimulant balsamic expectorant. Its preparations are principally used, however, as vehicles to disguise the taste of disagreeable medicines like quinine. Dose: 15 to 30 gr. (1 to 2 Gm.).

OFFICIAL PREPARATION.

Fluidextractum Eriodictyi Dose: 15 to 30 drops (1 to 2 Mils).

BORRAGINACEÆ.—Borage Family

465. **ALKANNA.**—ALKANET. The root of **Alkan'na tinctoria** Tausch. *Habitat:* Grecian Archipelago and Southern Europe. Fusiform, about 100 mm. (4 in.) long, from the thickness of a quill to that of the little finger, often crowned with soft, white, hairy root-stocks; the bark is of a dark-purple color, friable; and separates easily in thin, papery layers from the yellowish, twisted ligneous column; the wood is composed of distinct, slender woodfibers cohering together and cleft by purple, friable, medullary rays; in the commercial samples, however, it is generally more or less decayed, loose, and spongy. Odorless and tasteless. Alkanna is employed exclusively for coloring oils,

ointments, and plasters, which is accomplished by suspending it, tied up in a rag, into the melted fat. Its coloring principle has been termed alkannin; it is a red, resin-like substance, soluble in alcohol, ether, and fats, but insoluble in water.

Preparation of Alkannin.—Obtained by evaporation of ethereal tincture, or precipitating a weak alkaline aqueous solution of alkanet by an acid.

466. **SYMPHYTUM.**—COMFREY. The root of **Sym'phytum officina'le** Linné. *Habitat:* United States and Europe; cultivated. About 150 mm. (6 in.) or more long, and from the thickness of a quill up to an inch in diameter, often split; externally black, wrinkled; internally whitish, and horny when dry; inodorous; taste sweetish, astringent, and very mucilaginous, containing as much mucilage as, or more than, althæa, for which it may often be substituted. It is chiefly used as a demulcent in domestic cough remedies, and has been highly esteemed as a vulnerary. Dose: 2 to 4 dr. (8 to 15 Gm.).

467. **BORAGO OFFICINALIS** Linné.—BORAGE. *Habitat:* Europe. (Leaves.) They contain a large quantity of mucilage, with potassium nitrate and other salts, upon which their virtues depend. Diuretic, refrigerant, demulcent, etc. Dose of fluidextract: 1 fl. dr. (4 mils).

468. **PULMONARIA OFFICINALIS** Linné.—LUNGWORT. *Habitat:* Europe. (Leaves.) Pectoral and demulcent. Dose: 30 to 60 gr. (2 to 4 Gm.).

VERBENACEÆ.—Vervain Family

469. **LIPPIA MEXICANA.**—The leaves of **Lip'pia dul'cis** Treviranus. Demulcent and expectorant. Dose; 8 to 15 gr. (0.5 to 1 Gm.)

470. **VERBENA HASTATA** Linné.—AMERICAN BLUE VERVAIN. (Root and Herb.) (Verbena, N.F., is the dried overground portion of the plant, collected when flowering.) The hot infusion is used as a sudorific in colds, etc. Also tonic and expectorant. Dose of fl'ext.: 30 to 60 drops (2 to 4 mils).

471. **VERBENA URTICÆFOLIA** Linné.—WHITE VERVAIN. *Habitat:* Tropical America. (Root.) Febrifuge. Credited with the cure of the opium-habit. Dose of fl'ext.: 30 to 40 drops (2 to 2.6 mils).

472. **TONGA.**—A drug introduced under this name has been found to be a mixture of bark, leaves, and woody fibers, tied into bundles by means of the inner bark of the cocoanut tree. The bark comes from **Premna taitensis** (nat. ord. Verbenaceæ), a shrubby tree having a sweet and slightly astringent inner bark, containing little volatile oil, etc. The fibrous material comes from **Rhaphidophora vitiensis** (nat. ord. Araceæ), a creeper having a stem about the size of a quill, containing potassium chloride, a volatile alkaloid, tongine, etc. From this mixture a fl'ext. is prepared which has proved efficient in neuralgia. Dose of fl'ext.: 1 fl. dr. (4 mils).

LABIATÆ.—Mint Family

One of the most natural groups of plants in the vegetable kingdom. Its members being so uniform, it would seem as if all of its species could be comprehended in a single genus; hence the characteristics of its different genera are very difficult to make out.

DESCRIPTION.—*Herbs* with opposite or whorled leaves. *Flowers* in axils of leaves or bracts, solitary or clustered cymes, scattered or crowded into spikes. *Calyx* sometimes 2-lipped, upper lip bifid, lower trifold, sometimes subregular. *Corolla* monopetalous, bilabiate, the upper lip entire or emarginate, the lower 3-lobed, sometimes bell- or funnel-shaped, with 4 subequal lobes (*Mentha*). *Stamens* 4, inserted on the corolla tube, didynamous (2 long and 2 short), or 2 by the abortion of the 2 tipper (*Lycopus*, *Salvia*, *Rosmarinus*). *Ovary* 4-lobed. *Ovules* 4. *Style* simple, rising from the base of the ovarian lobes. *Fruit* separating into 4 akenes. Stem quadrangular, with volatile oil secreted in vascular glands.

GENERAL DESCRIPTION OF DRUGS OF THE ORDER

In most instances the drug consists of dry herbs composed of leaves, or leaves and tops, with portions of stem, branches, and flowers. These are usually broken and intermixed. Odor aromatic, due to the secreted volatile oil; some species hold in solution a solid hydrocarbon (stearopten) analogous to camphor. Taste aromatic, pungent, cooling, and bitterish (marrubium). The odor and taste are frequently sufficient to distinguish the different drugs, but a knowledge of the size, shape, and marginal character of the leaves and their texture, and the character of the stem and branches is sometimes quite useful in the identification of the various drugs derived from the order.

Synopsis of Drugs from the Labiatæ

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|--------------------|---------------------------|------------------------|
| A. <i>Herbs</i> . | Teucrium, 490. | OLEUM MENTHÆ |
| MENTHA PIPER- | Lamium, 491. | VIRIDIS, 474 a. |
| ITA, 473. | B. <i>Leaves</i> . | Oleum Hedeomæ |
| MENTHA VIRIDIS, | Salvia, 492. | 475 a. |
| 474. | Rosmarinus, 493. | Oleum Origani, 479 a. |
| Hedeoma, 475. | *Thymus, 494. | Oleum Monardæ, 486 a. |
| Marrubium, 476. | Orthosiphon, 495. | OLEUM ROSMARINI, |
| Melissa, 477. | Pycnanthemum, 496. | 493 a. |
| *Scutellaria, 478. | Satureia, 497. | OLEUM THYMI, 494 a. |
| Origanum, 479. | Yerba Buena, 498. | OLEUM LAVANDULÆ |
| Cunila, 480. | Ocimum, 499. | FLORUM, 501 a. |
| Glechoma, 481. | Monarda Fistulosa, 487. | E. <i>Stearopten</i> . |
| Lycopus, 482. | Betonica, 500. | MENTHOL, 473 b. |
| Majorana, 483. | C. <i>Flowers</i> . | F. <i>Rhizome</i> . |
| Serpyllum, 484. | Lavandula, 501. | Collinsonia, 502. |
| Leonurus, 485. | D. <i>Volatile Oils</i> . | |
| Monarda, 486. | OLEUM MENTHÆ | |
| Hyssopus, 488. | PIPERITÆ, 473 a. | |
| *Cataria, 489. | | |

473. MENTHA PIPERITA.—PEPPERMINT

The-dried leaves and tops of *Men'tha piperita* Linné.

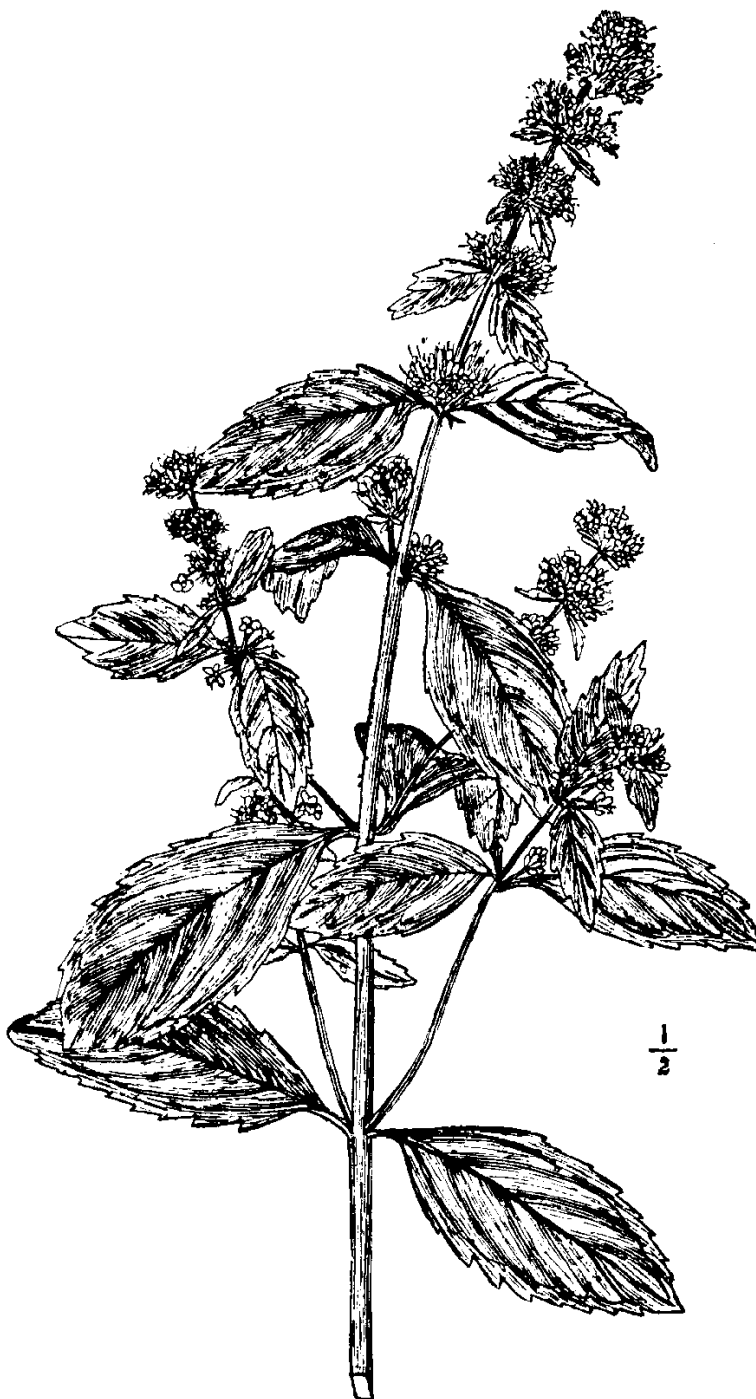


FIG. 214.—*Mentha piperita*—Flowering branch.

DESCRIPTION.—Leaves petiolate, ovate, lanceolate, about 2 inches (50 mm.) long, acute, sharply serrate, glandular, nearly smooth; light or

dark green flowers in terminal spikes, purplish; odor strong and characteristic; taste pungent and cooling. Statistics show that 300,000 pounds of peppermint are annually consumed by the world, and that more than 90 per cent. of this is grown within 25 miles of Kalamazoo, Mich. A few miles from Fenville, Mich., there are two famous mint farms, one section covers about 1400 acres, the other about 2100 acres. The former tract is known as the "Campania Farm" the other "Mentha Farm." A distilling plant is on the ground. An average yield of oil is about 20 pounds per acre. The "mint" industry is a specialty with peculiar features, combining farm and factory-agriculture in growing the plant, and the manufacture in separating the oil by distillation. There are about 80 "stills" in southwestern Michigan, and since there are 4000 acres of the plant under cultivation, one "still" is required for every 50 acres of peppermint.

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

CONSTITUENTS.—Volatile oil, consisting of a terpene of complex composition (liquid) and menthol, $C_{10}H_{20}O$

ACTION AND USES.—Carminative and diffusive stimulant. Dose: 15 to 60 gr. (1 to 4 Gm.).

OFFICIAL PREPARATION.

Spiritus Menthæ Piperitæ (1 per cent.), Dose: 15 to 30 drops (1 to 2 Mils).

473a. OLEUM MENTHÆ PIPERITÆ U.S.

A volatile oil distilled from peppermint. A colorless, or yellowish, or greenish-yellow liquid, turning darker and thicker by age and exposure to the air, having a strongly aromatic, pungent taste, followed by a sensation of cold when air is drawn into the mouth. Its composition is very complex, consisting of a number of terpenes, aldehydes, and acids: pinene, phellandrene, cineol, dipentene, limonene, menthone, and menthol, etc. In a freezing mixture the oil becomes cloudy and thick, and will separate crystals of menthol (473b). The oil yields not less than 5 per cent. of esters calculated as methyl acetate and not less than 50 per cent. of total menthol.

OFFICIAL PREPARATIONS.

Aqua Menthæ Piperitæ (0.2 per cent.),. Dose: 4 fl. dr. (15 mls)

Spiritus Menthæ Piperitæ (10 per cent.), 15 to 30 drops (1 to 2 mls).

473b. MENTHOL

A secondary alcohol from the official oil of peppermint (from *Mentha piperita* Smith), or from Japanese or Chinese oil of peppermint (from *Mentha arvensis* Linné, variety *piperascens* Holmes, and *Mentha canadensis* Linné, variety *glabrata* Holmes). Colorless, acicular or prismatic crystals, having a strong and pure odor of peppermint, and a warm, aromatic taste, followed by a sensation of cold when air is drawn into the mouth. It is slightly soluble in water, freely soluble in olive-oil, and very soluble in alcohol, ether, chloroform, and in petroleum benzin. When menthol is triturated with about an equal part by weight of camphor, thymol or hydrated chloral, the mixture becomes liquid.

Lubulinski recommends the use of a solution of menthol in liquid paraffine for acute coryza. Dose: 0.06 Gm. (1 gr.).

474. MENTHA VIRIDIS.—SPEARMINT

The dried leaves and flowering tops of **Men'tha spica'ta** Linné.

DESCRIPTION.—The leaves of the spearmint resemble those of the peppermint, but the former are rather sessile. The branches of the spearmint are mostly light green, while those of the peppermint are often purplish. The stamens of the spearmint are exserted, while those of the peppermint are short; Odor and taste mint-like, but less cooling, quite characteristic.

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

CONSTITUENTS.—Volatile oil containing carvone, C₁₀H₁₄O, limonine, etc.

ACTION AND USES.—Carminative; an antispasmodic of milder property than peppermint, often preferred in infantile cases. Dose: 15 to 60 gr. (1 to 4 Gm.), in infusion, employed in Spiritus Menthæ Viridis.

OFFICIAL PREPARATION.—**Spiritus Menthæ Piperitæ.**



FIG. 215.—*Mentha viridis*—Flowering branch.

474a. OLEUM MENTHÆ VIRIDIS

A volatile oil distilled from the flowering plant of *Mentha Spicata* Linné (*Mentha Viridis* Linné) and yielding when assayed by the U.S.P. process not less than 40 per cent. by volume of carvone. It is a colorless, yellow or greenish-yellow liquid having characteristic odor and taste of spearmint.

Michigan is the chief producer of this oil in U.S.

OFFICIAL PREPARATIONS.

Aqua Menthæ Viridis (0.2 per cent.).

Spiritus Menthæ Viridis (10 per cent.), Dose: 30 drops (2.0 Mils).



FIG. 216.—*Hedeoma pulegioides*—Flowering branch.

475. HEDEOMA.—AMERICAN PENNYROYAL U.S.P. VIII

The dried leaves and tops of **Hedeo'ma pulegioi'des** Persoon.

DESCRIPTION.—*Stem* hairy; *leaves* $\frac{1}{2}$ inch (12 mm.) long, short-petioled, oblongovate, slightly serrate; *flowers* in small axillary cymes, with small, pale blue, spotted, pubescent stamens; odor mint-like. Taste aromatic and pungent.

CONSTITUENTS.—Volatile oil containing hedeomol, $C_{10}H_{18}O$, and pulegone, $C_{10}H_{16}O$. The oil obtained from *Menthapulegium* Linné has about the same specific gravity and optical rotation, and contains pulegone.

475 a. OLEUM HEDEOMÆ U.S. VIII—OIL OF PENNYROYAL

A volatile oil distilled from the flowering plant of **Hedeoma pulegioides** Persoon.

SOURCE AND DESCRIPTION.—Most of the oil of pennyroyal is reported as being distilled in North Carolina and in the southern and eastern parts of Ohio.

It is a pale yellow liquid, having the characteristic odor and taste of Hedeoma. Its specific gravity is 0.920 to 0.935 at 25°C, It is soluble in 2 volumes of 70 per cent. alcohol forming a solution showing not more than a slightly acid reaction with litmus.

The principal and only constituent known definitely to exist in the oil is “pulegone,” a ketone which can be identified by its hydrated oxime.

ACTION AND USES.—Oil of pennyroyal possesses stimulant, carminative, and emmenagogue properties.

The dose is from 2 to 10 minims (0.10 to 0.60 mil).

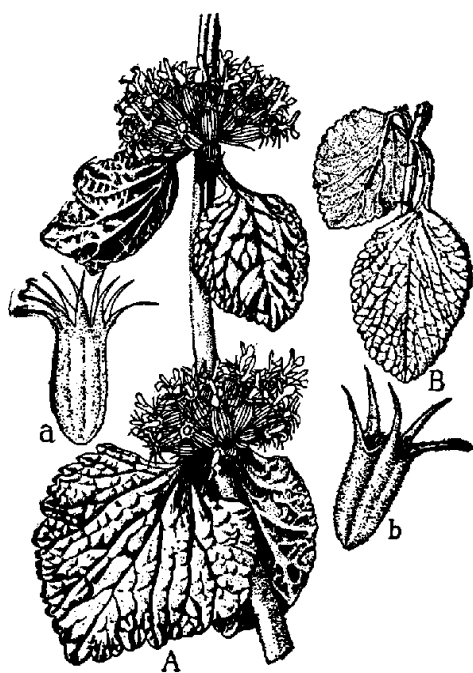
476. MARRUBIUM.—HOREHOUND U.S.P. VIII

The dried leaves and flowering tops of **Marrubium vulgare** Linné.

DESCRIPTION.—*Stem* white, tomentose; *leaves* roundish-ovate, about 1 inch (25 mm.) long, obtuse, crenate, downy; *flowers* whitish, aromatic, and bitter; *odor* distinct and agreeable; *taste* aromatic and bitter.

CONSTITUENTS.—Volatile oil in minute quantity, marrubiin, crystalline prisms soluble in hot water and ethereal solvents, insoluble in benzene.

Preparation of Marrubiin.—Treat the infusion with charcoal; exhaust latter with Alcohol, which dissolves marrubiin and tannin; precipitate tannin with lead oxide; exhaust precipitate with alcohol. This leaves behind insoluble tannate of lead and dissolves the bitter principle.



A, *Marrubium vulgare* (Nat.); a, calyx ($\times 3$).
B, spurious *marrubium* (Nat.); b, calyx ($\times 3$).

ACTION AND USES.—A bitter tonic, laxative when given in large doses; employed in catarrh and chronic affections of the lungs attended by copious expectoration. Dose: 15 to 30 gr. (1 to 2 Gm.), in infusion or decoction.

477. **MELISSA.**—BALM. The leaves and tops of **Melis'sa officina'lis** Linné. Official U.S.P. 1890. Margin of leaves crenate, serrate, base rounded or rather heart-shaped, somewhat hairy; flowers in about four-flowered cymules, whitish or purplish; aromatic, astringent, and bitterish. *Constituents:* Volatile oil about 0.1 per cent., containing citral and citronellal. Carminative, stimulant, diaphoretic. Dose: 15 to 60 gr. (1 to 4 Gm.), in infusion or decoction.

478. SCUTELLARIA, N.F.—SKULLCAP

The dried plant of **Scutella'ria lateriflo'ra** Linné.

DESCRIPTION.—*Leaves* 2 inches (50 mm.) long, somewhat ovate, serrate; *stem* smooth and branched; corolla pale blue; odor slight, taste bitterish. The other species of *Scutellaria* are sometimes collected as *S. integrifolia*, *S. pilosa*, and *S. galericulata*.

CONSTITUENTS.—A bitter crystalline glucoside, trace of volatile oil, tannin.

ACTION AND USES.—Tonic and antispasmodic. Dose: 30 to 60 gr. (2 to 4 Gm.), in infusion or fl'ext.

Fluidextractum Scutellariæ Dose: 30 to 60 drops (2 to 4 mils) .

479. **ORIGANUM.**—WILD MARJORAM. The herb of **Ori'ganum vulgare** Linné, formerly used in making the Vinum Aromaticum, U.S.P. 1880.

479a. **OLEUM ORIGANI.**—OIL OF ORIGANUM is a favorite among some practitioners as an ingredient in various liniments.

480. **CUNILA.**—DITTANY. The herb of **Cunil'amarian'a** Linné. Carminative and sudorific. Dose: 15 to 60 gr. (1 to 4 Gm.)..

481. **GLECHOMA.**—GROUND IVY. The herb of **Glecho'ma hедера'cea** Linné. Pectoral, tonic, and diuretic. Dose: 30 to 60 gr. (2 to 4 Gm.).

482. **LYCOPUS.**—BUGLE. The herb of **Ly'copus virgin'icus** Linné, and of **L. sinuatus** Elliott. Astringent, sedative. Dose: 8 to 30 gr. (0.5 to 2 Gm.).

483. **MAJORANA.**—SWEET MARJORAM. The herb of **Ori'ganum majora'na**. Carminative, stimulant, and emmenagogue. Dose: 15 to 60 gr. (1 to 4 Gm.).

484. **SERPILLUM.**—WILD THYME. The herb of **Thy'mus serpyll'um**. Carminative, stimulant, tonic, and emmenagogue. Dose: 15 to 60 gr. (1 to 4 G m.).

485. **LEONURUS**.—MOTHERWORT. The herb of **Leonu'rus cardia'ca**. Tonic and expectorant. Dose: 30 to 60 gr. (2 to 4 Gm.).

486. **MONARDA**.—HORSEMINT. The herb of **Monar'da puncta'ta** Linné. Carminative, emmenagogue, and nervine. Dose: 15 to 60 gr. (1 to 4 Gm.).

486a. **OLEUM MONARDÆ**.—OIL OF HORSEMINT. Used as an embrocation and as an addition to stimulating liniments.

487. **MONARDA FISTULOSA** Linné.—WILD BERGAMOT. Indigenous. (Leaves.) Introduced as a substitute for quinine; in large doses diaphoretic. Dose: 15 to 60 gr. (1 to 4 Gm.).

488. **HYSSOPUS**.—Hyssop. The herb of **Hyssop'us officina'lis** Linné. Carminative, sudorific, and stimulant. Dose: 15 to 60 gr. (1 to 4 Gm.).

489. **CATARIA**, N.F.—CATNIP. The herb of **Nep'eta cata'ria** Linné. Carminative, stimulant, tonic, and diaphoretic. Dose: 15 to 60 gr. (1 to 4 Gm.).

490. **TEUCRIUM**.—GERMANDER. The leaves and tops of **Teu'crium chamse'drys**. Aromatic stimulant; noted as an ingredient in the famous gout remedy known as Portland Powder.

491. **LAMIUM ALBUM** Linné.—DEAD NETTLE. (Herb.) An active hemostatic.

492. **SALVIA**.—SAGE, U.S.P. VIII

The dried leaves of **Sal'via officin'alis** Linné.



Salvia officinalis.

DESCRIPTION.—About 2 inches (50 mm.) long, ovate, obtuse, base narrow to the long petiole, thickish, wrinkled, grayish-green, soft, hairy, and reticulated and glandular beneath; odor aromatic, taste bitterish and astringent. Salvia is said to be adulterated with other species, closely resembling the official in late summer.

CONSTITUENTS.—Volatile oil (0.5 to 0.75 per cent.), resin, tannin, etc. The volatile oil contains pinene, cineol, and salviol, $C_{10}H_{18}O$.

ACTION AND USES.—Stimulant, tonic, astringent, vulnerary, in infusion or decoction. Dose: 15 to 60 gr. (1 to 4 Gm.).



Rosmarinus officinalis:
branch and flowers.

493. **ROSMARINUS**.—ROSEMARY. The leaves of **Rosmari'nus officina'lis** Linné. Rigid, linear, obtuse at summit, margin entire; odor strong, balsamic, and camphoraceous.

ACTION AND USES.—Carminative, stimulant, diaphoretic, emmenagogue. Dose: 3 to 15 gr. (0.2 to 1 Gm.) .

493a. **OLEUM ROSMARINI**, U.S.—OIL OF ROSEMARY. A volatile oil distilled from the fresh flowering tops of **Rosmarinus officinalis** Linné, yielding, when assay by official process, not less than 2.5 per cent. of ester, calculated as bornyl acetate ($C_{10}H_{17}C_2H_3O_2$) and not less than 10 per cent. of total borneol ($C_{10}H_{17}OH$).

DESCRIPTION.—It is a colorless or pale yellow liquid, having the characteristic odor of rosemary and a camphoraceous taste.

ACTION AND USES.—In moderate amounts acts as stimulant, aromatic and carminative. In local application, it is said to do good in the treatment of chronic rheumatism, sprains, etc.

OFFICIAL PREPARATIONS.

Tinctura Lavandulæ Composita (0.2 per cent.)

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

Linimentum Saponis (1 per cent.).

494. **THYMUS**, N.F.—GARDEN THYME. The leaves of **Thy'mus vulga'ris** Linné. Carminative, tonic, antispasmodic. Dose: 30 to 60 gr. (2 to 4 Gm.).

494a. **OLEUM THYMI**, U.S.—OIL OF THYME. Used as an antiseptic, etc. A volatile oil distilled from the flowering plant of **Thymus vulgaris** Linné, containing about 20 per cent. by volume of phenols. It is a colorless red liquid having a characteristic odor and taste. Specific gravity is from 0.894 to 0.929. It is soluble in 2 volumes of 80 per cent. alcohol.

PROPERTIES.—Commercially “red” and “white” oil are distinguished. The latter, however, is not obtained by simple rectification of the ordinary kind. “White” thyme oil, offered at a lower price than the “red,” is apt to contain much turpentine oil.

THYMOL.—(See Ajowan, 389.)

495. **ORTHOSIPHON STAMINEUS** Bentham.—JAVA TEA. (Leaves.) Used as a diuretic and in gravel. Dose of fl'ext.: 20 to 30 drops (1.3 to 2 Mils).

496. **PYCNANTHEMUM MONTANUM** Michaux.—MOUNTAIN MINT. (Leaves.) Stimulant, tonic, and carminative. Dose: 15 to 60 gr. (1 to 4 Gm.).

497. **SATUREIA HORTENSIS** Linné.—SUMMER SAVORY. Habitat: Southern Europe; cultivated in our gardens. (Leaves.) Stimulant, carminative, and emmenagogue. Dose: 1 to 4 dr. (4 to 15 Gm.).

498. **YERBA BUENA**.—The leaves of a California plant, **Microme'ria dougla'sii** Benth. A grateful aromatic stimulant, tonic, and emmenagogue. Dose of fl'ext.: 1/2 to 2 fl. dr. (2 to 8 mils).

499. **OCIMUM BASILICUM** Linné.—SWEET BASIL. (Leaves.) Aromatic, stimulant, and tonic.

500. **BETONICA**.—The leaves of **Sta'chys beto'nica** Benth. Used in atonic dyspepsia, rheumatism, hepatic diseases, etc. Dose: 15 to 60 gr. (1 to 4 Gm.).

501. **LAVANDULA**.—GARDEN LAVENDER. The flowers of **Lavan'dula ve'ra** De Candolle. Calyx tubular, blue-gray, hairy, 5-toothed; corolla violet-blue, hairy, and glandular on the outside, tubular and 2-lipped; odor characteristic, somewhat camphoraceous. Stimulant and carminative. Dose: 15 to 30 gr. (1 to 2 Gm.).

501a. **OLEUM LAVANDULÆ FLORUM**, U.S.—OIL OF LAVENDER FLOWERS. A volatile oil distilled from the fresh flowers of **Lavan'dulaofficina'lis** Chaix. French oil contains linalool, geraniol, partly free and partly as ester, principally as acetate, but in small part. Also as propionate, butyrate and valerianate. English oil contains linaloyl acetate and free linalool, also limonene and sesquiterpene, and cineol.

U. S. P. IX gives quantitative test for esters.

ACTION AND USES.—Used as perfumery and as flavoring agent in certain pharmaceuticals.

OFFICIAL PREPARATIONS.

Spiritus Lavandulæ (5 per cent. of the oil).

Tinctura Lavandulæ Composita (0.8 per cent. of the oil, with oil of rosemary, Saigon cinnamon, cloves, nutmeg, and red saunders).

Dose, 30 drops (2.0 Mils).

OIL OF SPIKE, used as an embrocation in rheumatic affections, is obtained by distillation of the leaves, tops, etc., of *Lavandula spica*.

502. **COLLINSONIA**.—STONE ROOT. The rhizome of **Collinso'nia canaden'sis** Linné. Long, with short, knotty branches and numerous stem-scars; hard; internal whitish; nearly inodorous; taste bitter and nauseous. Contains resinous matter. Diaphoretic, diuretic, and irritant.

SOLANACEÆ.-Nightshade Family

Herbs or, rarely, shrubs, with rank-scented, often poisonous, foliage, and colorless juice. *Leaves* alternate. *Stamens* five, equal, inserted on the corolla. *Fruit* a capsule or berry. This order owes its poisonous qualities to the presence of alkaloids such as atropine.

Synopsis of Drugs from the Solanaceæ

A. <i>Roots.</i>	HYOSCYAMUS , 509.	*Dulcamara, 514.
BELLADONNÆ	Tabacum, 511.	F. <i>Fruits.</i>
RADIX , 503.	Duboisia, 512.	CAPSICUM , 516.
Manaca, 505.	C. <i>Stems and Branches.</i>	Lycopersicum, 517.
B. <i>Leaves.</i>	Pichi, 513.	G. <i>Herb.</i>
BELLADONNÆ	D. <i>Seeds.</i>	*Solanum Carolinense,
FOLIA , 504.	Stramonii Semen, 508.	515.
STRAMONII FOLIA ,	Hyoscyami Semen, 510.	H. <i>Rhizome.</i>
507.	E. <i>Branches.</i>	Scopola, 506.

BELLADONNA.—DEADLY NIGHTSHADE

The dried root and the dried leaves official.

BOTANICAL CHARACTERISTICS.—*At'ropa Belladon'na* Linné. *Root* perennial, fleshy, white within; stem 3 to 5 feet high, with a tinge of red. *Leaves* short-petiolate, ovate, acute, entire, more or less hirsute. *Flowers* solitary, drooping; *calyx* campanulate; *corolla* campanulate, twice the length of the calyx, greenish at the base, varying to dark purple at the border. *Berry* 9-lobed, violet-black; seeds uniform.

503. BELLADONNÆ RADIX

The dried root of *Atropa Belladonna* Linné, yielding, when assayed by U.S.P. process, not less than 0.45 per cent. of its alkaloids.

DESCRIPTION OF DRUG.—Rough, irregular, longitudinally wrinkled, somewhat tapering pieces, from 12 to 25 mm. (1/2 to 1 in.) thick, of a **dirty-gray color externally, internally whitish**; fracture short, mealy when dry, tough when damp; odor narcotic; **taste** slightly sweetish, afterward bitter and acrid. Tough, woody roots, breaking with a splintery fracture, should be rejected, also the hollow stem-bases sometimes present.

STRUCTURE.—The bark is rather thick, free from bast fibers, composed almost entirely of parenchymatous tissue containing starch-grains and calcium oxalate raphides; directly underneath the periderm is a darker line composed of six to eight tabular cells. In the center of the root is a small pith, surrounded in the younger root by distant wood-fibers

scattered throughout the parenchymatous tissue; in older roots the wood-bundles are more numerous, and traversed by broad medullary rays.



FIG. 217.—*Atropa belladonna*—Branch.

Belladonna is sometimes mistaken for, or adulterated with, althæa, from which it may be distinguished by the smoothness of its outer layer (althæa has projecting fibers), by its fracture, which does not show protruding fiber-ends, and by the wood-bundles, which are readily discernible in the former, but not in the latter.

ADULTERATIONS.—Certain species of *Mandragora* yield very nearly allied roots both in external appearance and structure, but they are not likely to be confounded with belladonna roots.

The rhizomes of *Scopola carniolica* are very similar to the root of belladonna; the bark, however, of the former, is less thick, starch-grains smaller, and shape less distinct. *Scopola Japonica* (Japanese belladonna) is found to be similar to *S. carniolica*.

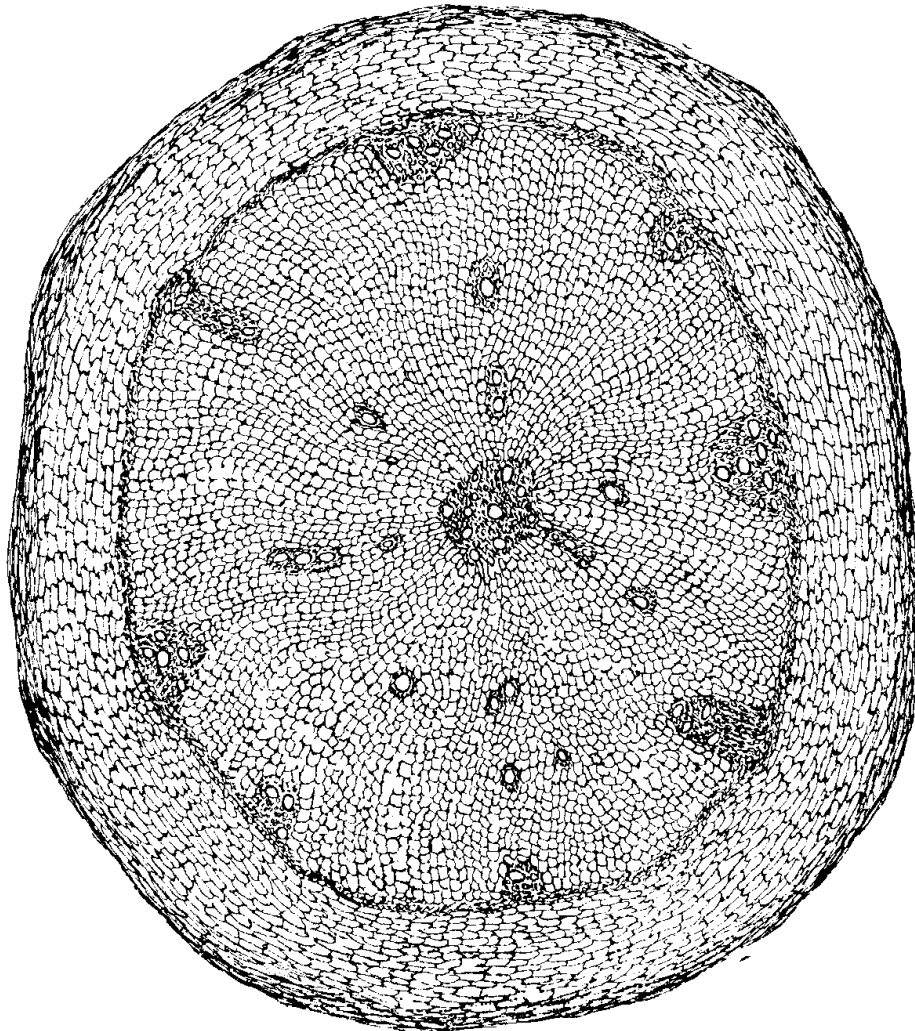


FIG. 218.—Cross-section of Belladonna root.

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

CONSTITUENTS.—The active principles are alkaloids, the chief of which are atropine, hyoscyamine and hyoscine. Atropine is a compound of equal amounts of the isomers, dextro- and levo-hyoscyamine into which it separates and is readily changed to dextro-hyoscyamine. In the growing belladonna the hyoscyamine is said to form in

the young leaves, to be later changed to atropine.

According to the predominance of one or other of these alkaloids, and to the amounts present, the drugs of this group fall into a regular pharmacologic series, as follows:

1. Belladonna (root and leaves), the leaves containing 0.35 per cent., and the root, 0.5 per cent., of alkaloid, which is nearly all atropine. It has, therefore, a typical atropine action.

2. Scopola (root) contains 0.5 per cent. of alkaloid, about equally hyoscyamine and atropine. It acts like belladonna, but with somewhat less strength.

3. Stramonium (leaves) contains 0.35 per cent. of alkaloid, mostly hyoscyamine but with small amounts of atropine and hyoscyine. It is less stimulating to the cerebrum and may be narcotic.

4. Hyoscyamus (leaves) contain 0.08 per cent. of alkaloid, mostly hyoscyamine, with a fair amount of hyoscyine, and only traces of atropine. It is rather narcotic but is weaker than the other drugs of the group (Bastido),

Ash, root, not more than 7 per cent.; leaves, not more than 20 per cent.

ACTION AND USES.—Applied externally belladonna is anodyne and anesthetic. Internally the activity of the peripheral terminations of all the secretory nerves in the body is depressed. Dropped into the eye, solutions of belladonna or atropine quickly dilate the pupil and accommodation is paralyzed. Upon the heart it has a stimulating action— toxic doses abolish the function of the cardiac muscles and the heart stops in diastole. When a 1 per cent. solution of atropine sulphate is dropped into the eye, the pupil dilates in about fifteen or twenty minutes, but takes two hours to reach the maximum dilation. The pupil gradually regains its power but is not fully restored to normal for one or two weeks.

An antagonist of atropine is physostigmine, which stimulates the ends of the third nerve. It is not powerful enough to remove the effects of atropine at once, but greatly lessens the time which the eye takes to return to normal.

Dilated pupils, dry throat, and wild cerebral symptoms are the regular warnings of overdosage. In full poisoning there is a stage of central stimulation followed by collapse. Dose: 1 to 3 gr. (0.065 to 0.2 Gm.); of atropine, $\frac{1}{64}$ to $\frac{1}{100}$ gr. According to Cushney, hyoscyamine is twice as active as atropine in checking secretions and in pupil dilatation.

OFFICIAL PREPARATIONS.

Fluidextractum Belladonnæ Radicis, Dose: 1 to 3 drops (0.065 to 0.2 Mil).
Linimentum Belladonnæ (95 per cent., with camphor 5 per cent.).

504. BELLADONNÆ FOLIA

The dried leaves of **Atropa Belladonna**, yielding not less than 0.3 per cent. of total alkaloids.

DESCRIPTION OF DRUG.—As they come into market, these leaves are crumpled and broken, of a dull brownish-green tint, the under surface paler than the upper, and with a prominent woody midrib prolonged below into a petiole, margin entire; one of the characteristics is the small, circular holes puncturing the leaves by the dropping off of corky excrescences. This, however, applies, but in a less degree, to the other narcotic leaves. It should be observed that the margins of the three narcotic leaves, belladonna, stramonium, and hyoscyamus, are quite different.

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

CONSTITUENTS.—The alkaloids hyoscyamine and atropine (0.3 to 0.7 per cent.) are present. Belladonnine (oxyatropine) and other alkaloids of less importance exist, with chrysotropic acid. Ash, not exceeding 20 per cent.

ACTION AND USES.—Same as the root. Dose: 1 gr. (0.065 Gm.). The extract is employed in: Pil. Laxative Co. and Pil. Podophyl., Bellad. et Capsici, and in the following:

OFFICIAL PREPARATIONS.

Tinctura Belladonnæ Foliorum (10
per cent.) Dose: 5 to 15 drops (0.3 to 1 mil).

Extractum Belladonnæ Foliorum
(1-4 per cent, alkaloid) $\frac{1}{8}$ to $\frac{3}{4}$ gr. (0.008 to 0.048 Gm.).

Unguentum Belladonnæ (1 0 percent.).

505. **MANACA**.—Portions of the root and stem of **Brunfel'siahopia'na** Bentham, a Brazilian plant. Strongly recommended in chronic subacute rheumatism as a powerful alterative. Dose: 15 to 60 gr. (1 to 4 Gm.).



a
Scopola carniolica: *a*, flowering and fruiting branch ($\frac{1}{2}$ nat. size); also flower, stamen, anther, pistil, fruit, seed, enlarged.

506. SCOPOLA.—SCOPOLA, U.S.P. VIII

The dried rhizome of **ScopolaCarniolica** Jacquin, yielding by former U.S.P. process not less than 0.5 per cent. of its alkaloids.

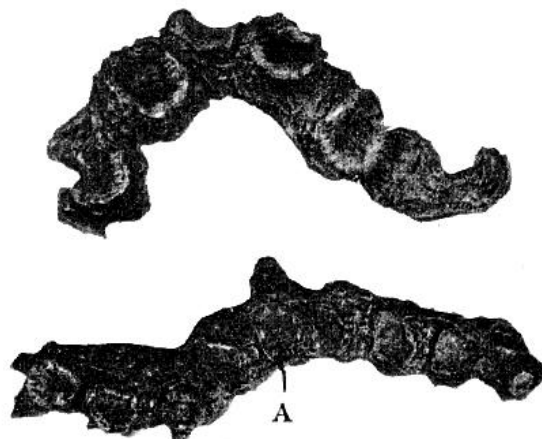


FIG. 219.—Scopola rhizome. A, Leaf scar. ($\frac{1}{2}$ natural size.) (Photograph.)

DESCRIPTION OF DRUG.—From 25 to 100 mm. (1 to 4 in.) long and from 10 to 20 mm. ($\frac{2}{5}$ to $\frac{4}{5}$ in.) thick, frequently sliced. The upper surface is beset with cup-shaped stem scars; externally, yellowish-brown to dark brown; wrinkled longitudinally, obscurely annulate, rough and nodular; fracture short, showing a yellowish-white bark, its corky layer dark-brown or pale brown, indistinctly radiate wood; pith rather hard, but becoming soft and spongy when macerated in water. As compared to belladonna root, Coblenz concludes that scopolia rhizome is more constant in alkaloidal content; that it is to be preferred to belladonna root in securing preparations of uniform standard.

CONSTITUENTS.—(See Belladonna.)

ACTION AND USE.—The action of scopolia is about the same as that of belladonna, but preparations of the rhizome have not been professionally recognized until recently. The extract has been used as a substitute for the extract of belladonna in making of plasters. It has been stated that scopolia costs about forty dollars per ton, while belladonna costs three hundred dollars per ton.

STRAMONIUM.—THORNAPPLE, JIMSON WEED

The leaves and the seed are medicinal.

BOTANICAL CHARACTERISTICS.—**Datu'ra stramo'nium** Linné. Rank, narcotic, poisonous annuals. Leaves ovate, sinuate-toothed. Corolla white, funnellform, the border 5-toothed. Fruit a 4-valved, 2-celled capsule, the outer side covered with prickles, longer toward the apex.

HABITAT.—Europe, Asia, and North America; almost universally distributed.

507. STRAMONIUM.—LEAVES

The dried leaves of **Datu'ra Stramo'nium** or of *D. tatula* Linné.

DESCRIPTION OF DRUG.—These leaves, in the dried and broken state resemble somewhat those of belladonna, but are lighter in color; odor distinct, heavy, and narcotic; taste nauseous. Admixture of more than 10 per cent. of stems or other foreign matter not permitted. **The drug should yield not less than 0.25 per cent. of total alkaloids.**

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

CONSTITUENTS.—**Daturine** 0.2 per cent., which, according to Ladenburg, is a mixture of atropine and hyoscyamine, with the latter usually

predominating; it is said to be stronger than atropine. Ash, not to exceed 20 per cent.



FIG. 220.—*Datura stramonium*—Branch showing flower and fruit.

ACTION AND USES.—Stramonium acts similarly to belladonna in every particular, but more strongly, and chiefly on the sympathetic system, without affecting the motor or sensory nerves. **Its chief use is in asthma**, the powdered leaves being sprinkled with a solution of potassium nitrate, dried, and smoked in a pipe, or ignited and the smoke inhaled. Dose: 1 to 5 gr. (0.065 to 0.3 Gm.).

OFFICIAL PREPARATIONS.

Tinctura Stramonii	Dose: drops 8 (0.5 mil).
Extractum Stramonii —Pilular Extract	0.01 Gm. ($\frac{1}{6}$ gr.).
Extractum Stramonii —Powder, Extracted	0.01 Gm. ($\frac{1}{6}$ gr.).
Unguentum Stramonii.	

508.—**STRAMONII SEMEN.**—Off. in U.S.P. 1890. Small, somewhat reniform, flattened seeds, with a blackish testa covered with small indentations; the embryo, curved parallel with the convex edge of the seed, is imbedded in a whitish, oily albumen. Inodorous in the whole state, but with a peculiar disagreeable odor when crushed; taste oily, slightly acrid, bitter, and nauseous. *Constituents:* Daturine 0.3 per cent., combined with malic (daturic) acid, scopolamine, fixed oil, etc. Dose: I to 3 gr. (0.065 to 0.2 Gm.). A tincture, extract, and fluidextract were official in the U.S.P. I 890.

509. **HYOSCYAMUS.**—HENBANE

The dried leaves and flowering tops of **Hyoscy'amus ni'ger** Linné, collected from plants of second year's growth, yielding by official assay not less than 0.65 per cent. of the alkaloids of Hyoscyamus.

BOTANICAL CHARACTERISTICS.—Clammy, pubescent, foetid, narcotic annuals or biennials. Leaves clasping, sinuate-toothed, and angled. Flowers sessile, in one-sided, sessile spikes in the axils of the leaves; calyx urn-shaped; corolla dull yellow, reticulated with purple veins. Fruit a 2-celled capsule.

SOURCE.—Europe and Asia; from biennial plants growing wild or cultivated in Britain, when about two-thirds of the flowers are expanded. The plant is found in the northeastern section of the United States in wet grounds, growing in great abundance about Detroit and in other parts of Michigan.

DESCRPTION OF DRUG.—The fresh leaf is from 2 to 10 inches long, 1 to 4 inches broad, ovate to ovate-oblong in shape. On each side 3 to 5 coarse, sinuate teeth or lobes, which are rather acute and oblong or triangular. On drying, the leaves shrivel and crumple up around the very large, light-colored midribs, and generally have the large petiole still attached; they are grayish-green, and of a coriaceous texture; leaves, in the market, are very much broken; odor heavy, narcotic; taste bitter and nauseous.

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

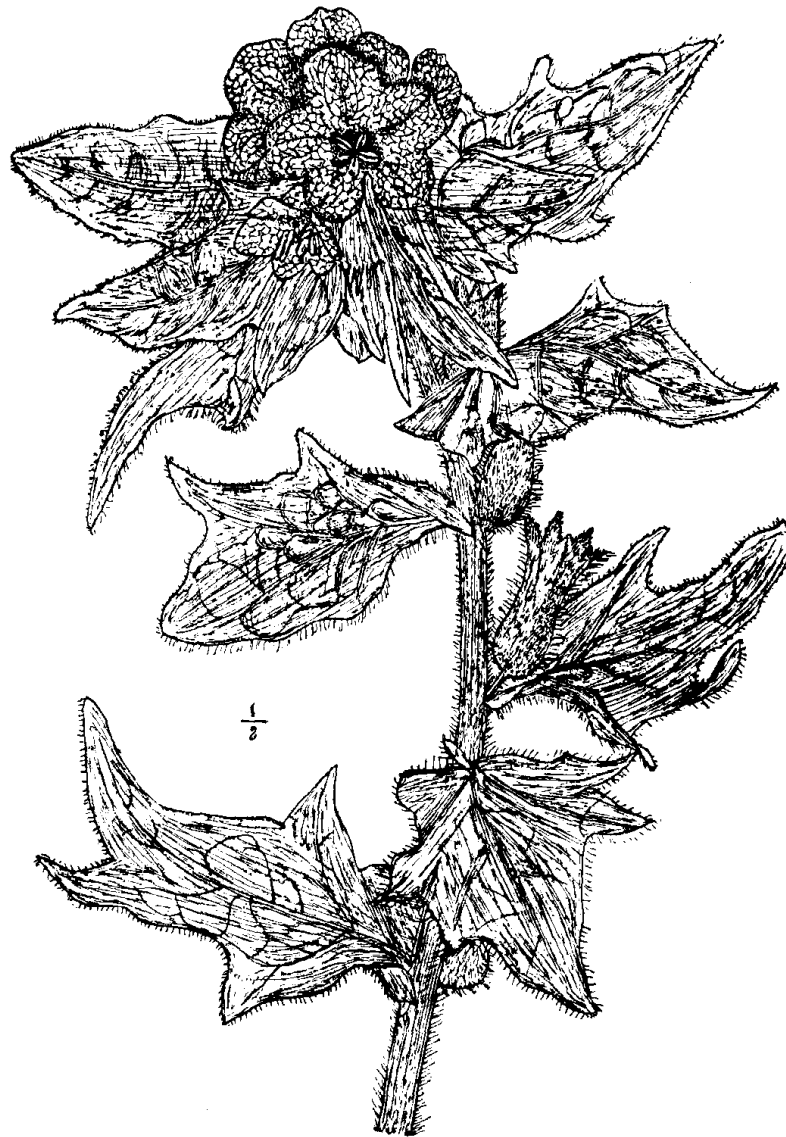


FIG. 221.—*Hyoscyamus niger*—Flowering branch.

CONSTITUENTS.—By distillation the leaves yield a very poisonous volatile oil, but the active principles are **hyoscyamine**, $C_{17}H_{23}NO_3$ (crystalline), and **hyoscine**, $C_{17}H_{21}NO_4$ (amorphous). They also contain about 2 per cent. of potassium nitrate, which causes them to crackle when thrown in the fire. Ash, not exceeding 30 per cent.

Preparation of Hyoscyamine from Seed.—First extract fatty matter; acidulate with HCl; evaporate; wash acid solution with benzene. Neutralize solution with NH_4OH , shake out with chloroform, and evaporate latter solvent.

ACTION AND USES.—Anodyne, hypnotic, narcotic. The action of hyoscyamus is that of its alkaloid, hyoscyamine, which acts like atropine but is less irritant and more calmative and hypnotic. Hyoscine is a decided anodyne and hypnotic. The extract in the form of a suppository is frequently employed to relieve the pain of hemorrhoids, and a poultice made from the leaves may be employed to allay the pain of cancerous and other ulcers. Dose of leaves: 5 to 15 gr. (0.3 to 1 Gm.); Hyoscyamine salts, $\frac{1}{100}$ gr. (0.0006 Gm.); Hyoscine hydrobromate (Scopolamine hydrobromate), $\frac{1}{100}$ gr. (0.0006 Gm.).

RELATED SPECIES.—*Hyoscyamus pallidus* (flowers pale yellow), *H. agrestis* (flowers few, leaves smaller), and *H. albus* (flowers white). The latter is used indiscriminately in France with the niger, with which it appears to be identical in medicinal properties.

VARIETIES.—There are two varieties of henbane, the annual and biennial. The former when properly grown are not devoid of active properties. The official plant is susceptible of considerable diversity of character, causing varieties which have been considered by some as distinct species, and by cultivation differing somewhat in medical properties.

OFFICIAL PREPARATIONS.

Tinctura Hyoscyami (10 per cent.),	Dose: 10 to 60 drops (0.6 to 4 mils).
Fluidextractum Hyoscyami	1 to 3 gr. (0.065 to 0.2 Gm.).
Extractum Hyoscyami	5 to 15 drops (0.3 to 1 mil).

510. **HYOSCYAMI SEMEN** (unofficial).—Used for the same purposes as the leaves and contain the same alkaloids, but in larger proportion, together with a large quantity of fixed oil and a bitter glucoside, hyoscyopicrin. They are small, reniform, and have a peculiar gray-brown surface, much wrinkled and finely pitted; near the raised portion of the testa they are rather sharp (distinction from stramonium seed). The embryo is curved so as to form a figure 9, the lower part of which is the radicle, and is surrounded by a whitish, oily albumen. Odorless in entire state, but when rubbed, of a distinctly narcotic odor; taste oily and bitter.

511. **TABACUM.**—TOBACCO. The leaves of *Nicotia'na taba'cum* Linné. Off. U.S.P. 1890. Large, oval, or oval-lanceolate leaves, often 500 mm. (20 in.) long when entire, but they are more generally somewhat broken; brown; thin; friable; the glandular hairs, so thick on the leaves when fresh, are scarcely discernible; short-petiolate; odor peculiar, heavy, narcotic; taste strong, bitter, and acrid. *Constituents:* Nicotine, $C_{10}H_{14}N_2$, nicotianine (a camphor), bitter extractive, salts, resin, etc. Nicotine is a volatile liquid alkaloid and a virulent poison; there is hardly any of it contained in Turkish tobacco; by heat it is decomposed, yielding various pyridine



Nicotiana Tabacum.

compounds, hydrocyanic and acetic acids, etc.; these pass off in the smoke; the chief of these compounds are pyridine (in smoke from pipes), collidine (from cigars), lobeline, coniine, piperidine, sparteine, trimethylamine, etc.

Preparation of Nicotine.—Concentrated infusion made with acidulated water is treated with KOH and shaken with ether. The ethereal solution is precipitated with oxalic acid; the oxalate of the alkaloid thus precipitated is dissolved in boiling alcohol; evaporate to a syrup, agitate with ether, and make alkaline with KOH. On fractional distillation the colorless, oily alkaloid remains. It is very unstable.

Narcotic, sedative, diuretic, and emetic. It is rarely used in medicine. Dose: $\frac{1}{2}$ to 2 gr. (0.0324 to 0.13 Gm.). Oil of tobacco is a pharmaceutical product, official in the U.S.P. in 1870, obtained by destructive distillation of coarsely powdered tobacco; it is a tarry liquid of offensive odor. Considerable oil is obtained by distilling the leaves with water. It contains nicotine (a dark, oily liquid).

512. **DUBOISIA.**—DUBOISIA. The leaves of **Dubois'siamyoporoides** R. Brown, a tall Australian shrub or small tree. The medicinal qualities of the leaves make the plant related to hyoscyamus and other narcotic plants of this order Lanceolate, 75 to 100 mm. (3 to 4 in.) long and 12 to 25 mm. ($\frac{1}{2}$ to 1 in.) broad, tapering below into a short petiole; midrib prominent; margin entire; they are generally seen, however, in broken fragments of a brownish-green color; inodorous; taste bitter. They contain **duboisine** (a mixture of hyoscyamine and atropine), and their action is, therefore, nearly identical with that of belladonna, except that they are less of a cerebral excitant and more calmative and hypnotic.

513. **PICHL.**—The stems and leafy branches of a Chilean shrub, **Fabia'na imbrica'ta** Ruiz et Pavon. A terebinthinate diuretic, used in gravel, cystitis, and diseases of the genito-urinary tract when the kidneys are not inflamed. Dose of fluidextract: 30 drops (2 Mils).

514. **DULCAMARA, N.F.**—BITTERSWEET. WOODY NIGHTSHADE. The young branches of **Sola'num dulcama'ra** Linné. Off. U.S.P. 1890. Very small cylindrical pieces (branches cut in sections) about the thickness of a quill; externally longitudinally striate and marked with alternate leaf-scars; periderm light greenish-brown or greenish-gray, thin, overlaying a uniformly green, rather thick, inner bark. Wood whitish or yellow, with greenish spots, surrounding a central pith, or, as is generally the case, a hollow; it is in one or two circles, with large ducts and numerous one-rowed medullary rays. The bark consists principally of parenchymatous tissue.



Solanum Dulcamara.

Inodorous; taste at first bitter, afterward sweet. *Constituents:* **Solanine**, the active alkaloid, and a glucoside termed **dulcamarin**, $C_{22}H_{34}O_{10}$, to which the taste of the drug is due; also resin, wax, gum, starch, and calcium lactate. Commercial Solanin is a mixture of Solanin and Solanidin. Solanidin is soluble in alcohol. Solanin is practically insoluble, excepting in boiling alcohol.

Preparation of Dulcamarin.—Digest aqueous infusion of the drug with animal charcoal; treat charcoal with alcohol. Precipitate aqueous solution of alcoholic extract with lead subacetate, wash, digest with alcohol, and decompose with H_2S . Evaporate resulting solution. Purify product by resolution, filtration and evaporation.

Dulcamara is feebly narcotic and anodyne, but is chiefly employed as an

alterative and resolvent in skin diseases, particularly those of a scaly character. Dose: 1 to 2 dr. (4 to 8 Gm.).

Extractum Dulcamaræ Fluidum, U.S.

P. 1890

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

515. **SOLA'NUM Carolinensis**, N.F. Linné.—HORSE NETTLE. A 20 per cent. tincture of this herb has been recommended in epilepsy in doses of 30 to 60 drops (2 to 4 mils)

516. **CAPSICUM.**—CAPSICUM

CAYENNE PEPPER. RED PEPPER

The dried ripe fruit of **Cap'sicum frutescens** Blume, deprived of its calyx.

BOTANICAL CHARACTERISTICS.—A small, rough, branched shrub, 1 to 2 feet high. Leaves ovate or lanceolate, entire, hairy. Flowers small, white, solitary, axillary, drooping. Capsule deep red, very pungent.

SOURCE.—Tropical America and Asia; cultivated.



FIG. 222.—*Capsicum fastigiatum*—Branch.

DESCRIPTION OF DRUG.—The fruits vary in shape and size, but those most generally used are oblong, wrinkled, pendulous, pod-like berries, the largest (American), about the thickness of a finger, with a long, recurved apex; pericarp bright red, sometimes yellow, thin, translucent; it incloses two or three cells and contains numerous flat, reniform, whitish seeds, which are surrounded by a dry, loose parenchyma, and fastened to a slender placenta; odor peculiar, very irritating, especially in powder or in the fresh state; taste fiery.

Powdered capsicum of the market consists of several species of capsicum ground up together. It is of a reddish color. This is especially true of the American capsicum, which is grown to a limited extent in

Texas and Mexico, where it is ground and called "paprika." The African (Zanzibar) pod yields a powder of a greenish- or brownish-yellow color. The commercial variety known as Bombay yields a powder of a more yellowish color than the African, but is not at all like the reddish-orange powder resulting from the American pod. This color fades and disappears on long exposure to the light. It is often adulterated with sawdust and red lead; the former may be detected with the microscope, the latter by digesting the powder in dilute nitric acid, filtering, and adding a solution of sodium sulphate, which will throw down a white precipitate if any lead oxide is present.

STRUCTURE.—A microscopical examination for the distinction of the above varieties has been suggested. This test is based upon the size and character of the cells of the outer layer of the epidermis, the American having, in dimension, the largest and the African the smallest cell in the outer layer of the pericarp. The value of capsicum can be estimated only by assay.

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

CONSTITUENTS.—**Capsaicin**, $C_9H_{14}O_2$, an exceedingly active pungent principle existing principally in the pericarp; a volatile alkaloid having an odor like coniine, supposed to be the result of a decomposition process during ripening of the fruit, as it does not exist in the unripe fruit- fixed oil, fat acids (oleic, palmitic, and stearic), and a red coloring matter (a cholesterin ester of the fat acids). Ash, not exceeding 7 per cent.; insoluble in HCl 1 per cent.

Capsicum should yield not less than 15 per cent. of non-volatile ether extract, soluble in ether, U.S.P. IX.

Preparation of Capsaicin.—Treat petroleum ether extract with alkali; pass CO_2 through the solution; collect crystals after standing. Soluble in ether, alcohol, benzene, and fixed oils.

ACTION AND USES.—Externally **rubefacient**. Internally a powerful **stimulant**. Its chief value medicinally is in the treatment of malignant sore throat and scarlet fever, used internally and as a gargle. Dose: 1 to 5 gr. (0.06 to 0.3 Gm.).

OFFICIAL PREPARATIONS.

Tinctura Capsici (10 per cent.), Dose: 15 to 30 drops (1 to 2 mils).

Oleoresina Capsici $\frac{1}{4}$ to 1 drops (0.016:2 to 0.065 mil).

517. **LYCOPERSICUM ESCULENTUM** Miller.—TOMATO. The ripe fruit is said to exert a curative action on ulcerated mucous membranes, given internally and applied locally. Dose of fluidextract: 30 to 60 drops (2 to 4 mls).

SCROPHULARIACEÆ.-Figwort Family

Herbs or rarely trees with didynamous stamens, and an irregular, usually 2 lipped, *corolla*; *fruit* a capsule. A large order of plants, containing a bitter glucoside.

Synopsis of Drugs from the Scrophulariaceæ

A. *Leaves.*

DIGITALIS, 518.

Euphrasia, 519.

*Verbascum, 520.

B. *Rhizome.*

* **Leptandra**, 521.

C. *Herbs.*

Veronica Officinalis, 522.

Scrophularia, 523.

Chelone, 524.

518. DIGITALIS.—DIGITALIS

FOXGLOVE

The carefully dried leaves of **Digitalis purpurea** Linné, without admixture of more than 2 per cent. of stems, flowers, or other foreign matter.

BOTANICAL CHARACTERISTICS.—Biennial, hoary-pubescent. *Leaves* alternate, ovate-lanceolate, crenate, rugose. *Racemes* terminal, loose; *flowers* purple, Sometimes white, hairy, and spotted within.

SOURCE.—The plant is indigenous to Southern and Central Europe, particularly in the western section, and grows wild as far north as Norway, also in Madeira and the Azores, and is cultivated in the United States. It is found on the edges of woody land and prefers sandy soil.

It is claimed by some investigators that Digitalis leaves of the first and second year's growth have proved identical in their activity, and the cultivated leaves are at least as active as those wild grown.

DESCRIPTION OF DRUG.—The margin of this leaf is rather irregularly double crenate. In the market it comes in **wrinkled, velvety fragments**, the lower surface paler green than the upper, **softly pubescent**, especially along the midrib and veins; the midrib is prominent, but not so much so as in hyoscyamus; the venation forms **prominent meshes on the under surface** of the leaf, the principal veins joining the midrib at a very acute angle; odor slight and

characteristic; taste strongly bitter.

ADULTERATIONS.—Other dried leaves are sometimes mixed with digitalis', the commonest of these are: *Inula conyza* (*Conyza squarrosa*), spikenard, and *Inula helenium*, both having entire, instead of crenate or serrate, margins, and the latter having its veins branching off at about right angles to the midrib, accidental impurities, such as Comfrey leaves, *Symphytum officinale*, have been found. These are lanceolate and bear isolated stiff hairs.

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

CONSTITUENTS.—The exact chemical composition of digitalis is a vexed question, but the latest analysis shows it to be composed of at least five principles: **digitalin**, $C_5H_8O_2$ (soluble in alcohol, insoluble in water), **digitalein** (soluble in water and alcohol), **digitonin**, $C_{27}H_{44}O_{13}$ (readily soluble in water, insoluble in alcohol, the diuretic principle), **digitin** (inert), and **digitoxin**, $C_{31}H_{50}O_{10}$, the most active ingredient, crystalline (insoluble in water, and sparingly soluble in alcohol, deposited as a sediment from the alcoholic preparations of the leaf). Digitoxin, by recent experimentation, is found to yield with hydrochloric acid digitoxigenin, $C_{22}H_{32}O_4$, and a glucose, digitoxose, $C_9H_{18}O_6$, the former in colorless crystals.

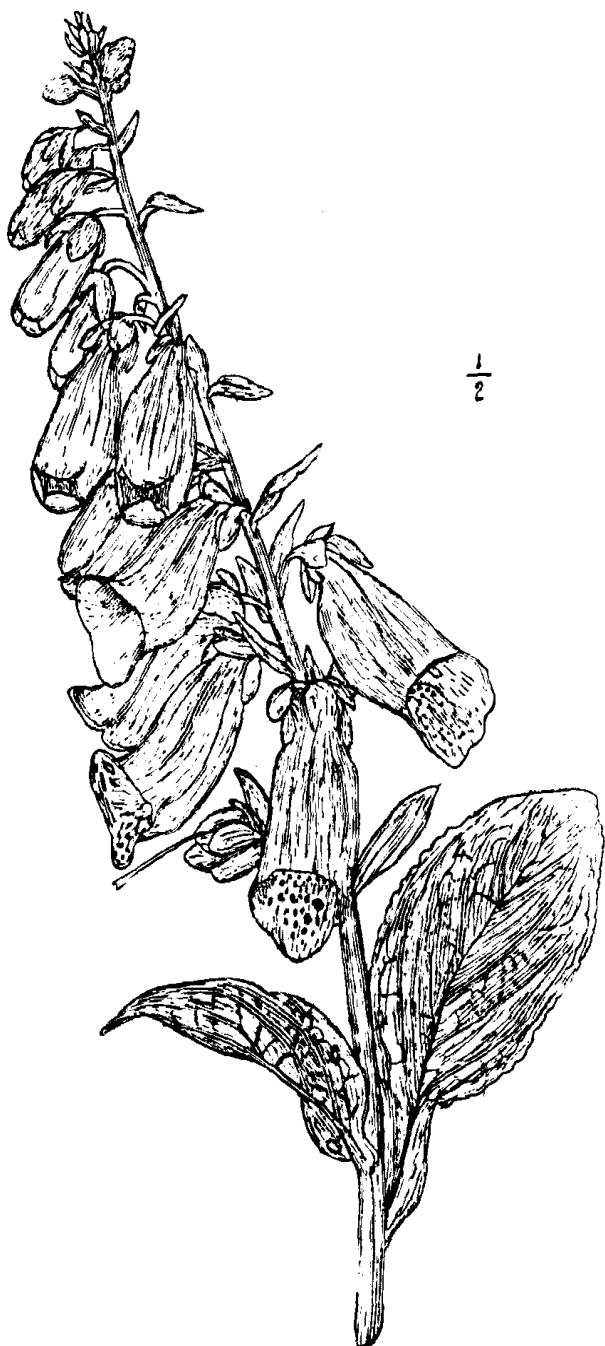


FIG. 223.—*Digitalis purpurea*—Flowering branch.

DIGITALIS PRINCIPLES.—The search for pure principles representing the complete action of the drug seems to be hopeless, but many proprietary preparations have been countenanced, in a measure, by the Council of the A.M.A. These are: Digitalein, Crude; Digitalin, True; Digitalin, “French;” Digitalin, “German;” Digitoxin; Digitoxin-Merck. These principles are all described in “New and Non-official Remedies.” Ash not to exceed 15 per cent.

TEST.—If made into a fluidextract and assayed biologically the minimum lethal dose should not be greater than 0.0006 mil of fluidextract, or the equivalent in fluidextract of 0.0000005 Gm. of ouabain, for each gramme of body weight of the frog.

Preparation of Digitalin.—A concentrated fluidextract is first treated with water acidulated with acetic acid and charcoal. The filtrate is neutralized with ammonia, then precipitated with tannin. The washed precipitate is then rubbed with lead oxide, boiled with alcohol, decolorized, and filtered. Evaporate to solid and wash with ether. In this way a digitalin of indefinite composition is obtained, consisting of such glucosides as digitin, digitonin, etc.

ACTION AND USES.—**Cardiac tonic and stimulant and diuretic.** It slows the heart's action and increases its force, and by stimulating the vascular nervous system causes contraction of the arterioles and therefore greatly increases arterial tension. Its efficient diuretic action in cardiac diseases is due to its peculiar effects upon the general and renal circulations. Dose: 1 to 2 gr. (0.065 to 0.03 Gm.). Dose of digitalin: $\frac{1}{10}$ gr. (0.006 Gm.), much depends on the quality. Digitalin, “French.” Homolle's Digitalin, for example: Dose: $\frac{1}{250}$ to $\frac{1}{35}$ gr. (0.00025 to 0.002 Gm.), Digitoxin $\frac{1}{120}$ gr. (0.0005 Gm.), Digitalein, crude $\frac{1}{60}$ gr. (0.001 Gm.).

OFFICIAL PREPARATIONS.

Infusum Digitalis (1.5 per cent.)	Dose: 1 to 4 fl. dr. (4 to 15 mils).
Tinctura Digitalis (10 per cent.),	5 to 30 drops (0.3 to 2 Mils).
Fluidextractum Digitalis	1 to 2 drops (0.065 to 0.13 mil).

519. **EUPHRASIA OFFICINALIS** Linné.—**EYEBRIGHT.** The leaves of this common plant have been stated to be almost a specific in acute nasal catarrh, given in the form of infusion.

520. **VERBASCUM THAPSUS** Linné.—**MULLEIN.** Both the flowers and leaves of this field weed are used. (V. Flores and V. Folia, N.F.). Mullein contains a large proportion of mucilage, which makes it a good demulcent and emollient. Anodyne

properties are also ascribed to it. Popularly used in pectoral complaints, especially consumption, in which it is said to relieve the cough and also to improve the nutrition. Dose: 2 to 3 dr. (8 to 12 Gm.), in infusion. The dried leaves are sometimes smoked for nasal catarrh.

521. LEPTANDRA, N.F.—LEPTANDRA

CULVER'S ROOT. CULVER'S PHYSIC

The dried rhizome and roots of *Veronica virginica* Linné.

BOTANICAL CHARACTERISTICS.—*Stem* erect, 2 to 6 feet high. *Leaves* whorled in 4's or 7's, very smooth, or sometimes slightly downy, lanceolate, serrulate. *Spikes* paniced; *corolla* small, pinkish, or nearly white; *stamens* much exerted.

HABITAT.—United States, east of the Mississippi.

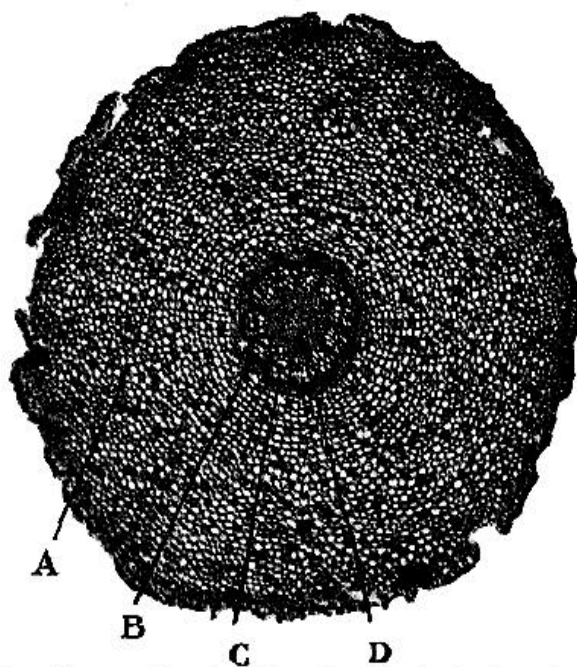


FIG. 224.—*Leptandra*—Cross-section of rootlet. (25 diam.) A, Parenchyma of cortex. B, Phloem. C, Xylem. D, Medulla. (Photomicrograph.)

DESCRIPTION OF DRUG.—Horizontal rhizome, 4 to 6 inches long, somewhat flattened, about the thickness of a quill, branched, generally broken into pieces an inch or more long; very hard and firm; from a light to a dark brown color; upper side marked with broad stem-scars, under side beset with the remnants of the thin, fragile, wrinkled rootlets. **Fracture** woody—bark thin, blackish, wood-circles one or two, yellowish, pith 6-rayed; tissue surrounding pith irregular and angular; inodorous; taste bitter and acrid.

Powder.—Brown. Characteristic elements: Parenchyma of cortex, isodiametrical or

elongated with spherical starch grains (2 to 4 μ in diam.) and brown resin; sclerenchyma with bast fibers and narrow, thick-walled stone cells; ducts with scalariform, spiral, simple pores; tracheids, numerous; outer wall of epidermal rootlets very thick; considerable cork from rhizome.

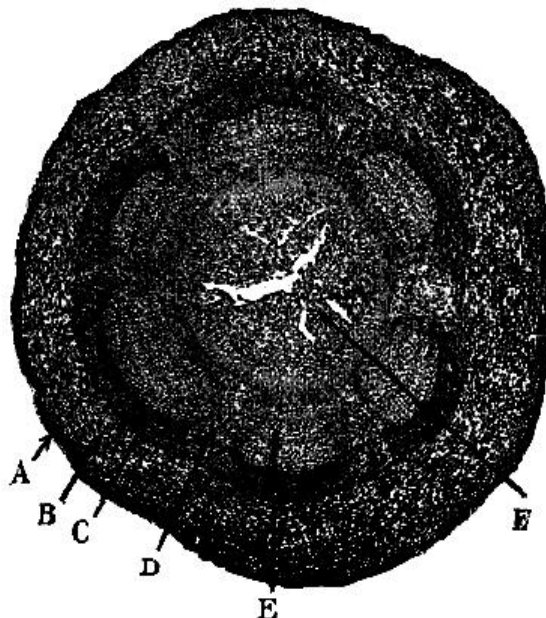


FIG. 225.—Leptandra—Cross-section of rhizome. (13 diam.) A, Cork. B, Parenchyma of cortex. C, Phloem. D, Medullary ray. E, Xylem. F, Medulla. (Photomicrograph.)

CONSTITUENTS.—Besides tannin, gum, and a small quantity of volatile oil, it contains a crystalline glucoside, the active principle, which should be termed leptandrin instead of the resin or resinoid called by that name; this resinoid is obtained by precipitating a concentrated alcoholic tincture with water; its action is probably due to a small amount of the crystalline glucoside mixed with it.

Preparation of Leptandrin.—Remove coloring matter from infusion by basic acetate of lead, excess of lead removed by Na_2CO_3 . Treat resulting liquid with animal charcoal. Extract washed charcoal with boiling alcohol; evaporate; dissolve in ether to purify. Upon evaporation needle-shaped crystals are obtained which are bitter; soluble in water, alcohol, and ether. The eclectic leptandrin is made by precipitating concentrated alcoholic tincture with water, and is a mixture of inert matter with pure leptandrin.

ACTION AND USES.—**Cholagoguecathartic.** Dose: 15 to 60 gr. (1 to 4Gm.). The fluidextract, extract and vegetable cathartic pills formerly represented the drug (U.S.P. VIII).

522. **VERONICA OFFICINALIS** Linné.—SPEEDWELL. Indigenous. (Herb.) Alterative, diuretic, and expectorant, in infusion.

523. **SCROPHULARIA NODOSA** Linné.—FIGWORT. This indigenous herb is peculiar from the rank, foetid odor of the leaves, especially when fresh. It has

alterative, diuretic, and anodyne properties, and is used in hepatic diseases, scrofula, cutaneous diseases, dropsy, and as a depurative. Dose of fluidextract: 30 to 60 drops (2 to 4 mils).

524. **CHELONE**.—BALMONY. SNAKE-HEAD. The herb of **Chelo'ne gla'bra** Linné. *Habitat*: United States. Tonic, anthelmintic, and laxative, with a supposed peculiar action on the liver. It has been largely employed in domestic practice as an external application in diseases of the skin. Dose: 30 to 60, gr. (2 to 4 Gm.).

OROBANCHACEÆ.—Broom -rape Family

525. **EPIPHEGUS**.—BEECH-DROP. CANCER-ROOT. The herb of **Epiphe'gus virginia'na** Barton, growing in all parts of North America as a parasite on the roots of the beech tree. It is a fleshy plant with a scaly, tuberous root, and smooth, yellowish or purplish stem, about 400 mm. (16 in.) tall, covered with small scales instead of leaves; taste bitter, astringent, and nauseous. It receives its name, cancer-root, from the popular belief that the powder was beneficial in the treatment of cancerous ulcers. It is often given as an astringent. Dose: 30 to 60 gr. (2 to 4 Gm.).

BIGNONIACEÆ.-Bignonia Family

526. **NEWBOULDIA**.—The root-bark of **Newboul'dia læ'vis** Seeman, introduced from tropical Africa as an astringent in diarrhea and dysentery. Dose of fl'ext.: 15 to 60 drops (1 to 4 mils).

527. **CAROBA**.—The leaves of **jacaran'da proce'ra** Sprengel. *Habitat*: South America. A valuable alterative and antisiphilitic. Dose of fl'ext.: 1.5 to 60 drops (1 to 4 mils)

PEDALINEÆ

528. **SESAMUM**.—BENNÉ. From **Se'samum in'dicum** Linné, a plant growing to the height of 4 or 5 feet, native to the East Indies, but long cultivated in Asia and Africa; from the latter country it was introduced by the negroes into Southern United States. Both the leaves and the seeds are used, and a fixed oil expressed from the latter.

528a. **THE LEAVES** are oblong -lanceolate, from 75 to 125 mm. (3 to 5 in.) long, heart-shaped at base; pubescent, prominently veined beneath. They abound in a gummy matter to such an extent that two leaves stirred in a cup of water will make a sufficiently thick mucilage for use as a demulcent.

528b. **THE SEEDS** are used chiefly as a source of the fixed oil, of which they contain from 50 to 60 per cent. They are used by the southern negroes as food. Ovate, flattened, about 3 to 4 mm. ($\frac{1}{8}$ to $\frac{1}{6}$ in.) long; externally yellowishwhite to pale brown (in one species, *S. orientale*, purplish-brown), with four longitudinal ridges, and, on the



Sesamum indicum:
a, flowering branch;
b, section of seed enlarged.

pointed end, a somewhat prominent hilum; internally whitish, oily; taste bland.

528c. **Oleum Sesami.**—TEEL OIL. BENNÉ OIL. A yellowish, limpid, transparent fixed oil, thinner at ordinary temperatures than most of the fixed oils; odor slight; taste bland, nut-like. It has a specific gravity of 0.919 to 0.923, and congeals to a yellowish-white mass at -5°C . (-23°F). It is often used to adulterate olive and almond oils, in which it may be detected by shaking a portion of the suspected oil with an equal weight of concentrated hydrochloric acid; a bright emerald-green color will usually be produced, changing to blue, then violet, and finally to deep crimson on the addition of about one-tenth its weight of cane-sugar and agitating.

CONSTITUENTS.—Contains, olein (76 per cent.), myristin, palmitin, stearin-resinoid compound, higher alcohol, $\text{C}_{25}\text{H}_{44}\text{O}$, sesamin, $\text{C}_{11}\text{H}_{12}\text{O}_3$, crystalline.

PLANTAGINEÆ

529. **PLANTAGO.**—PLANTAIN. The herb of **Planta'go ma'jor** and other species. Used principally in domestic practice, the leaves being externally applied as a stimulant application to sores, frequently in the form of a poultice, not infrequently applied whole.

RUBIACEÆ.—Madder Family

Herbs, shrubs, or trees, with opposite, simple, and entire leaves, connected with interposed stipules, or in whorls without stipules. A very large family in tropical regions, represented by the coffee plant (Arabia and Africa) and by the cinchonas (South America).

Synopsis of Drugs from the Rubiaceæ

- | | |
|--------------------------------|---------------------------------|
| A. <i>Root.</i> | D. <i>Herb.</i> |
| IPECACUANHA , 530. | Mitchella, 535. |
| B. <i>Rhizome.</i> | Galium, 536. |
| Rubia, 531. | E. <i>Seed.</i> |
| C. <i>Bark.</i> | *Coffea, 537. |
| CINCHONA , 532. | F. <i>Extractive.</i> |
| CINCHONA RUBRA , 532 a. | Catechu Pallidum (Gambir), 538. |
| Remijia, 533. | |
| Cephalanthus, 534. | |

530. IPECACUANHA.—IPECAC

IPECAC



FIG. 226.—*Cephalis ipecacuanha*—Plant and dried root.

The dried root, of **Cephæ'lis Ipecacuan'ha** (Brotero) A. Richard (Fam. *Rubiaceæ*), known commercially as *Rio Ipecac*, **C. acuminata** Karsten, known commercially as . The value is dependent upon the percentage of alkaloidal constituents, should yield not less than 1.75 per cent. of ether soluble alkaloids of Ipecac, U.S.P.

Two important alkaloids (**emetine** and **cephaëline**) are present in ipecac; the proportion in which these exist seems to vary, and this variation seems to depend upon the accidents of growth and the surroundings of the individual plant.—See Constituents.

BOTANICAL CHARACTERISTICS.—The root perennial, knotty, with transverse rings; stems suffruticose, ascending, somewhat pubescent toward the apex. *Leaves* opposite, oblong, roughish above, finely pubescent beneath. *Inflorescence* capitate, inclosed by a large one-leafed involucre; *flowers* bracteate; *corolla* white, funnel-form, the limb with reflexed segments; *stamens* 5, slightly exserted. *Fruit* a dark violet berry, crowned by the limb of the calyx, 2-celled, 2-seeded.

SOURCE AND VARIETIES.—Grows in the damp woods of the Brazilian valleys, notably in the provinces of Para, Rio Janeiro, Pernambuco, etc. This variety is known in commerce as Rio ipecac, while that from Colombia is called Carthagena ipecac. The former is usually preferred, but the latter is now more common. The plant *Psychotrin medica* is sometimes termed and sold as Carthagena, ipecac, but it is devoid of alkaloid. The Brazilian plant is quite hardy, appearing as a creeping vine or bush. The roots usually grow thicker as they penetrate the ground and then taper off again to a point or thin rootlet. Collectors usually leave a part of every other plant in the ground, so that in about three years another crop may be harvested. “Wiry root,” consisting of about 75 per cent. of woody portion and 25 per cent. cortex, is, according to Dohme, richest in alkaloids. It has a rather rough, uneven appearance, and is popularly less esteemed than the so-called “fancy” root consisting of 75 per cent. cortex. This prejudice, according to Dohme, is difficult to overcome.

DESCRIPTION OF DRUG.—**Rio Ipecac.**—In pieces of irregular length, rarely exceeding 25 cm.; stem portion 2 to 3 mm. thick, light graybrown, cylindrical and smoothish; root portion usually red-brown, occasionally blackish-brown, rarely gray-brown, 3 to 6 mm. thick, curved and sharply tortuous, nearly free from rootlets, occasionally branched, closely annulated with thickened, incomplete rings, and usually exhibiting transverse fissures with vertical sides, through the bark; fracture short, the very thick, easily separable bark whitish, usually resinous, the thin, tough wood yellowish-white, without vessels; odor very slight, peculiar, the dust sternutatory; taste bitter and

nauseous, somewhat acrid. It is stated by Rusby that the Rio variety has almost ceased to arrive in the market, the Carthagena variety being supplied. This is now mostly what is known as Panama Ipecac.

Carthagena ipecac is of a dull gray color, thicker, less frequently and sharply crooked, and lacks the constrictions characteristic of Rio ipecac, although it bears the annular thickenings, or merging annulæ. The thick bark, on cross-section, has rather a grayish color, the medullary rays are more prominent and more numerous.

STRUCTURE.—The thin outer layer of cork cells contains a brownish-red deposit, thought by some to be emetine in combination with ipecacuanhic acid. The thick inner cortical layer consists of starchy parenchyma, free from medullary rays, but containing a circle of stone cells filled with calcium oxalate crystals. Transverse sections show rather a small layer of cork cells, a thick cortical portion consisting of parenchyma, loaded with starch and rich in alkaloid. The woody portion, radiate, contains little or no alkaloid.

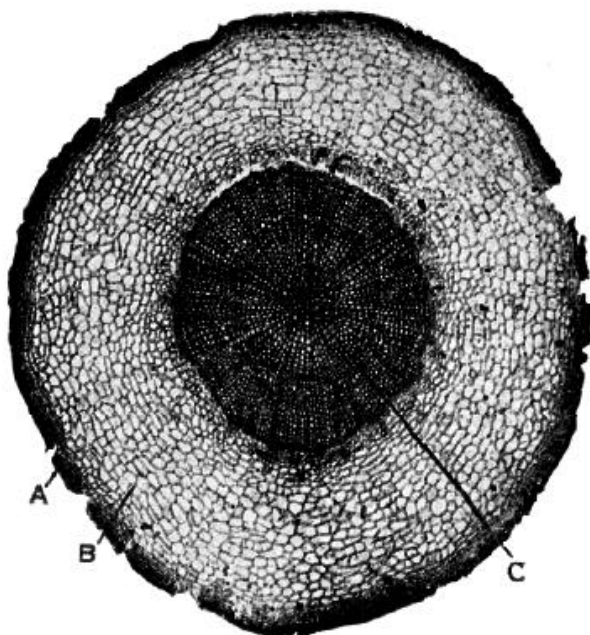


FIG. 227.—Ipecac—Cross-section of root. (25 diam.) A, Cork. B, Parenchyma of cortex. C, Xylem. (Photomicrograph.)

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

CONSTITUENTS.—**Emetine** (1 to 2 per cent.), cephaëline, psychotrine, and a peculiar tannic acid called ipecacuanhic or cephaëlic acid, starch,

resin, etc. The active principles exist only in the bark of the root, and probably in the thin, outer layer of cork cells. Recently considerable light has been thrown on emetine, $C_{15}H_{22}N_2O_5$, and cephaëline, $C_{14}H_{20}NO_2$, which were formerly supposed to be one body. According to Paul and Cownley ("Pharm. Jour.," 1896) cephaëline is the emetic principle and emetine the expectorant principle of the drug. This naming is unfortunate, and should be reversed. Emetine is amorphous; cephaëline crystalline. Ash, not less than 1.8 per cent. nor more than 4.5 per cent.

KRYPTONINE.—This is the name of a new alkaloid of ipecac, discovered by J. U. Lloyd. The principle itself, as well as its acid compounds, are colloidal in character. It belongs apparently to a new group of principles awaiting further investigation. Filter paper shows a marked adsorptive property to this alkaloid. It is black in mass but of varying color in different solvents. See Proc. Amer. Ph. Asso., 1916. Condensed description Amer. Druggist, Oct., 1916, P. 28.

Preparation of Emetine.—A very simple process is to exhaust the drug with boiling chloroform made slightly alkaline with solution of ammonia. Upon distilling off the chloroform the emetine is left in a very pure condition, and, when dried at $100^{\circ}C.$, gives a residue which, when weighed, gives one a rough estimate of the value of the drug. Cephaëline is extracted usually with emetine in most of the processes for assay. It is less soluble in ether than emetine.

Preparation of Ipecacuanhic Acid (Cephaëlic Acid).—Precipitate decoction with lead acetate, dissolve precipitate with acetic acid, and precipitate solution with lead subacetate; wash and dry. Resembles caffeotannic acid.

ACTION AND USES.—When locally applied, acts as counter-irritant. Small doses are diaphoretic and expectorant. In large doses a **systemic emetic**, in minute doses stomachic, aiding digestion. Ipecac has been used, since its introduction into medicine, as a remedy in dysentery, when there is said to be a peculiar tolerance of the drug, but the fact is the stomach almost invariably rejects large doses. Recent experiments prove that ipecac, when deprived of its emetine, possesses its full antidysenteric properties, without the drawbacks of depression, nausea, etc. Accordingly there appears in the market to meet this peculiar demand a preparation made from **de-emetinized bark**. **Emetine** has recently been highly praised in the treatment of pyorrhea, Riggs' disease. Hypodermic tablets of the hydrochloride, containing from 0.016 to 0.032 Gm. are prepared. Used in the form of injections in diseases due to pathogenic amebas. Also administered internally, "Alcresta Ipecac" when thus administered is decomposed in the alkaline fluid of the

intestines with liberation of alkaloids and produce amebacidal action. Tablets of same, representing 10 gr. of ipecac are dispensed. Dose 2 or 3 tablets three times a day at first period of few days, then discontinued for a day or two, if laxative effect is produced. Dose of ipecac as expectorant, 1 gr. (0.06 Gm.); emetic, 10 to 15 gr. (0.6 to 1 Gm.).

OFFICIAL PREPARATIONS.

Fluidextractum Ipecacuanhae Dose: 3 to 8 drops (0.2 to 0.5 mil);
15 to 60 drops (1 to 4 mil) .

Syrupus Ipecacuanhae (7 per cent.),
Adult exp. 30 drops (2 mils),
Emetic 6 fl. dr. (24 mils).

Pulvis Ipecacuanhae et Opii (10 per cent. of each) 5 to 15 gr. (0.3 to 1 Gm.).

531.—**RUBIA**.—MADDER, The rhizome of **Rubia tinctorum** Linné. *Habitat*: Levant and Southern Europe, chiefly supplied from Holland, where it is cultivated. Usually comes into market in a coarse, red powder. Its most important constituent is **alizarin**, a red coloring-matter soluble in water and alcohol. Chiefly used as a dye.

532. CINCHONA.—CINCHONA

PERUVIAN BARK

The dried bark of **Cincho'na Ledgeriana** Moens, **Cincho'na calisa'ya** Weddell, **Cinchona officinalis** Linné, and of hybrids of these with other species of Cinchona, yielding, when assayed, not less than 6 per cent. of cinchona alkaloids.

SOURCE VARIETIES, HISTORY, ETC.—The genus Cinchona is composed of over three dozen species, but few furnish the commercial barks. It is well known that the original source of the drug is South America (10° N. lat. to 19° S. lat., from about 3000 to 12,000 feet above sealevel), the area of the growth of the various species being confined exclusively to the Andes, chiefly on the eastern face of the Cordilleras—occasionally on the western face, which is covered by forests. The best known varieties from South America were the dark brown Loxa bark and the pale yellow-gray Huanuco. The cinchonas seldom form an entire forest, but rather groups interspersed among treeferns, gigantic climbers, bamboos, etc., sometimes growing separately in exposed situations, but under peculiar climatic conditions, such as a great humidity of atmosphere and a mean temperature of about 62°. Shade seems to favor the development of alkaloids. Dymock calls attention to the fact that “the north or shaded side of a tree has a richer bark than that on the south side,” a fact which explains the

success of the “mossing system.”¹



Outline map of South America, showing the native distribution of cinchona bark and certain other prominent drugs of that country. See also Geographical Classification of Drugs.

¹ There are four methods of collecting or harvesting the bark: (1) By taking it in longitudinal strips from the standing tree and leaving the bark to renew over the exposed wood; (2) by scraping and shaving off the bark; (3) by coppicing; and (4) by uprooting. The first is most in use . . . The trees are barked preferably in the rainy season, when the bark “lifts” or is more easily removed from the wood. The coolie inserts the point of a knife in the tree as far as he can reach and draws it down, making an incision in the bark straight to the ground; he then makes another cut parallel to the first, about an inch and a half distant and, loosening the bark with the back of the knife, the strip or ribbon is taken off. If the operation is performed carefully and the cambium cells are not broken, a new layer of bark will be formed in place of that which is taken away. The tree is then covered with moss, grass, or leaves, bound on by strings of fiber. All this is done to foster the growth of the new bark (renewed bark) from the cambium and to thicken the untouched layers of natural bark, which is now termed **mossed bark**.—*Pharmacographia Indica*.



FIG. 228.—*Cinchona officinalis*—Branch.

Cultivated trees in recent years have been the chief source of the commercial barks. To some extent the cultivation has been carried on in South America, but great success has attended the persevering efforts of the Dutch Government and the Government of British India. Extensive plantations of cinchona are now flourishing, to the extent of several million trees of the more important species, on the Neilgherry Hills and in the valleys of the Himalaya in British Sikkin. The tree is also cultivated in Ceylon, Java, Jamaica (Blue Mountains), and other countries.

VARIETIES.—There are about twenty varieties of cinchona barks, and it is a very difficult matter to distinguish them, since they have been and are now changed so much by grafting and crossing. The varieties generally used and best known are: *C. succirubra* Pavon, *C. calisaya* Weddell, *C. ledgeriana* Moens, *C. lancifolia* Mutis, and *C. officinalis* Hooker.

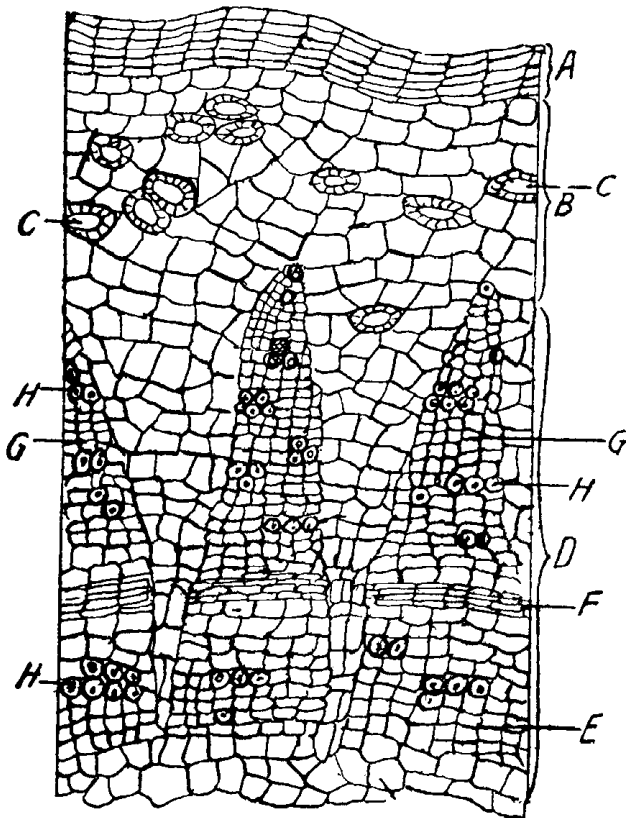


FIG. 229.—*Cinchona calisaya*—Cross-section of bark. A, Cork cells. B, Cortical parenchyma. C, Stone cells. D, Phloem portion. E, Soft bast. F, Phellogen forming bark. G, Medullary rays. (The black line from G should be extended to the parenchyma cells between the phloem portions.) H, Bast fibers.

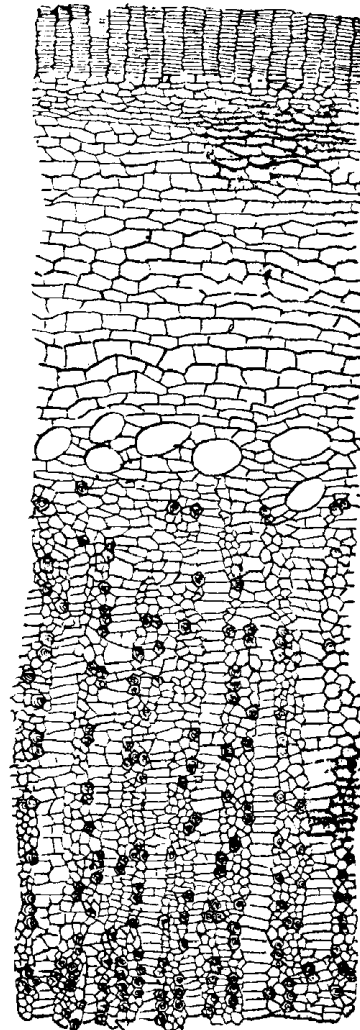


FIG. 230.—Cross-section of *Cinchona calisaya* bark (var. *Micrantha*).

The success of the Dutch planters of Java has been so pronounced that the greater portion of cinchona bark comes from this place, leading varieties being ledgeriana and succirubra bark. In Java great care is exercised in the cultivation. The trees are allowed to reach the age of

twelve years before the bark is collected. The cultivation is largely confined to the variety *Ledgeriana*. Over 500,000 pounds are collected annually from Java plantations.

DESCRIPTION.—In quills or curved pieces of variable size, usually 2 or 3, sometimes 5 mm. thick; externally gray, rarely brownish-gray, with numerous intersecting transverse and longitudinal fissures, having nearly vertical sides; the outer bark may be wanting, the color externally being then cinnamon brown; the inner surface light cinnamon brown, finely striate; fracture of the outer bark short and granular, of the inner finely splintery; powder light brown or yellowish-brown; odor slight, aromatic; taste bitter and somewhat astringent.

MICROSCOPICAL.—The *calisaya* (variety *Micrantha*) transversely shows milk-vessels in the cortical parenchyma and absence of stone cells, which are present in *Lancifolia*. The rays of the woody portion are more elongated and the medullary rays larger in size. Bast fibers comparatively small and less numerous, but are spindle-shaped, as they are in all true cinchona barks showing longitudinal section. In *C. rubra* the stone cells and milk-ducts are both wanting, while the bast fibers are more numerous and stouter. The bark is richer in coloring matter. In *cuprea* bark the cork cells are thicker and the cortical parenchyma cells smaller, stone cells present, milk-ducts absent, few bast fibers, but the woody portion contains indurated cells, which simulate them. The ligneous cells are very numerous and extend even down into the medulla. They are smaller than the bast fibers of true cinchona barks, but much more numerous.

These barks are thoroughly saturated with pigments, principally cinchona red, the phlobaphen of all cinchona barks. Before microscopical examination these pigments must be removed by a weak alcoholic solution of ammonia. This requires considerable practice (Dohme). Compared with other barks, the fibers of the liber of cinchona are shorter and more loosely arranged, being for the most part separated into simple fibers imbedded in the bast parenchyma, or united into very short bundles.

Grahe's test for the distinction of cinchona bark is as follows: On heating about 0.1 Gm. (1½ gr.) of the powdered bark in a dry testtube a tarry distillate of a red color is obtained.

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

OFFICIAL PREPARATIONS.

Fl. Ext. Cinchonæ

Dose: 15 drops (1 mil).

Tr. Cinchonæ

1 fl. dr. (4 mils).



FIG. 231.—*Cinchona succirubra*—Branch.

532a. **CINCHONA RUBRA.**—The dried bark of *Cinchona Succirubra* Pavon or its hybrids, yielding not less than 6 per cent. of the total

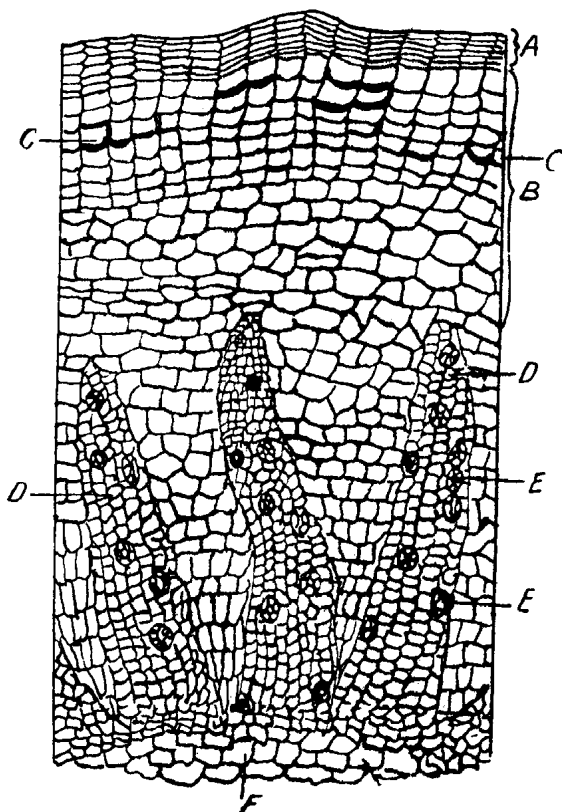


FIG. 232.—*Cinchona rubra*—Cross-section of bark. A. Cork cells. B. Cortical parenchyma. C. Coloring matter, deposits between and within the cells. D. Medullary ray. (Black line from D should not extend beyond the first two rows of cells of the figure.) E. Bast fibers.

alkaloids of *Cinchona*. "In quills or incurved pieces, varying in length, and from 2 to 4 or 5 mm ($\frac{1}{12}$ to $\frac{1}{6}$ or $\frac{1}{5}$ in.) thick; the outer surface covered with a grayish-brown cork, more or less rough from warts and longitudinal, warty ridges, and from few, mostly short and not frequently intersected transverse fissures, having their sides sloping; inner surface more or less **deep reddish-brown** and distinctly striate; fracture short, fibrous in the inner layer; outer layer, granular. For years practically all of the red cinchona bark, so called, was only a hybrid, but recently, and especially for a year past, fine quill bark of pure *succirubra* has frequently been received.

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

CONSTITUENTS.—Upon **quinine**, $C_{20}H_{24}N_2O_2 \cdot 3H_2O$, the bark almost

exclusively depends for its value. This alkaloid is colorless, amorphous, or in acicular crystals; inodorous, very bitter; soluble in 1670 parts water, 6 parts alcohol, 26 parts ether. Aqueous solutions of the salts have a blue fluorescence, and when treated with chlorine water and ammonia a beautiful green color is produced—"Thalleoquin test." The solutions deviate the plane of polarization to the left. The tartrate is soluble in water. A cold aqueous solution of the sulphate remains unaffected by potassium iodide T. S. (difference from quinidine). The other prominent principles are:

CINCHONIDINE, $C_{19}H_{22}N_2O$ —isomeric with cinchonine, non-fluorescent; forms colorless, anhydrous crystals, soluble in 20 parts alcohol (80 per cent.), 1680 of water, and 188 of ether. The sulphate is more soluble in water than quinine, and the tartrate very insoluble. The Thalleoquin test (see above) gives a white precipitate. Represented in

Cinchonidinæ Sulphas.

CINCHONINE, $C_{20}H_{24}N_2O$ —white lustrous prisms, soluble in 3760 parts water, 116 parts alcohol, and 526 parts ether; has exactly the opposite action to cinchonidine and quinine upon polarized light.

QUINIDINE, $C_{20}H_{24}N_2O_2$ —isomeric with quinine; crystallizes in prisms soluble in 2000 parts water, 0.8 part alcohol, about 30 parts ether; turns the plane of polarization to the right. A cold aqueous solution of the sulphate yields a white precipitate with potassium iodide T. S. (difference from sulphate of quinine). Represented in Quinidinæ Sulphas.

Among the **unofficial alkaloids and principles** found in the bark are the following: Isomeric with quinine and quinidine is **quinicine**; with cinchonine and cinchonidine, are **cinchonine**, **homocinchonine**, **homocinchonidine**, **homocinchonine**, and **apoquinamine**; a brown amorphous alkaloid is obtainable from the mother-liquor known as **chinoidine** (quinoidine), a mixture of various not well-defined alkaloidal substances; kinic acid, $C_7H_{12}O_6$, and kinovic acid, kinovin; bitter cinchonic acid (derived from preceding)- volatile oil, a minute quantity.

Separation of Total Alkaloids.—Moisten powdered cinchona with ammonia water and allow it to stand for an hour, then hot water is added. To the mixture, after cooling, milk of lime is added and the whole evaporated to dryness. This is placed in an extraction apparatus and exhausted with ether. Water acidulated with HCl is added to neutralize the alkaloids and the ether distilled off. The cooled liquid is filtered and decinormal solution of soda is added. Finally, sodium hydrate is added to complete the precipitation of the alkaloids. There are numerous other processes, but this seems a simple and satisfactory one to use for assay purposes.

YIELD OF ALKALOID.—The richest government bark brought to the market until recently has not exceeded $9\frac{1}{2}$ per cent. of sulphate of quinine; 7 to 8 per cent. is a good average in government plantations. Barks taken from the trees in the government gardens at Pioeng Goenog, Java, have recently been analyzed and found to equal respectively 12.66 and 16.04 per cent. of quinine sulphate.

ACTION AND USES.—The action of cinchona bark is due almost entirely to the alkaloids therein contained. Quinine is a powerful

antiseptic, destructive, in weak solution, to infusorial and vegetable life. Internally it stimulates the muscular fibers of the stomach, acting as a bitter tonic, invigorating the vital functions and aiding digestion. In large doses the brain is affected, giving rise to symptoms such as fullness, frontal headache, deafness, ringing in the ears, and mental dullness. This effect is called "cinchonism" attributed to partial anæmia of the brain, contraction of blood-vessels, etc. Heart action is depressed. Reflex excitability of the spinal cord is lowered. In the blood, quinine arrests the migration of the white corpuscle and checks its amœboid movement; the oxygen-carrying function of the red corpuscle is impaired; infectious micro-organisms in the blood and tissues are

probably rendered inactive or destroyed. The toxic symptoms produced by quinine and allied salts are spoken of collectively as cinchonism, which ordinarily is not allowed to go further than tinnitus aurium.

Dose of cinchona: 15 to 60 gr. (1 to 4 Gm.), in powder, fluidextract, or its equivalent in the salts of the alkaloids.

OFFICIAL PREPARATION.

Tinctura Cinchonæ Composita (10 per cent., with bitter orange-peel 8 per cent., and serpentaria 2 per cent.) 1 to 4 fl. dr. (4 to 1.5 mls).

533. **REMIJIA**.—CUPREA BARK. The bark of **Remijia pedunculata** Triana and of **Remijia purdieana** Weddell, resembling cinchona in physical properties and constitution. A copper-red bark from the United States of Colombia, grown at an altitude of from 3000 to 6000 feet, usually in flat or curved pieces; odor slight; taste bitter. Quinine is contained in this bark to the amount of 0.5 to 2.5 per cent., but no cinchonidine is found; homoquinine—a compound of quinine and cupreine—is also a constituent. Remijia bark is largely imported by

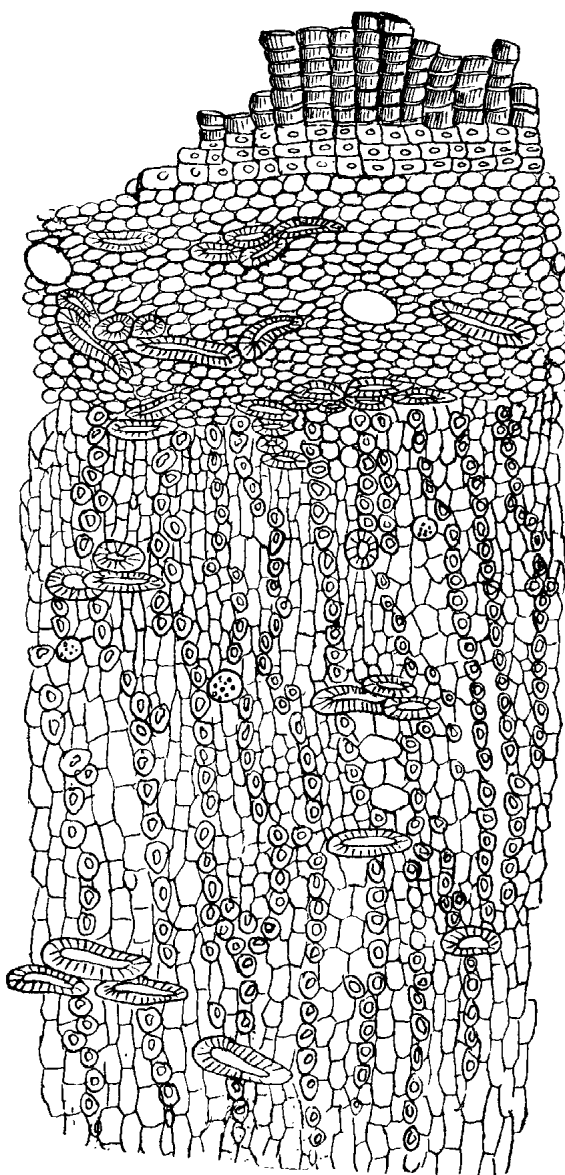


FIG. 233.—Cross-section of Cuprea bark.

manufacturers; it was said that the importations of this bark at one time exceeded in amount the entire importations of all the cinchona barks, by reason of its cheapness for the manufacture of quinine. Cinchonamine, $C_{19}H_{24}N_2O$, is one of the principal products of *R. purdieana*, the bark from which does not respond to Grahe's test.

534. **CEPHALANTHUS OCCIDENTALIS** Linné.—BUTTON BUSH. POND DOGWOOD. *Habitat*: United States. (Bark.) Tonic, febrifuge, laxative, and diuretic. It has an indirect action on the lungs, and is much used in consumption, coughs and colds generally. Dose: 30 to 60 gr. (2 to 4 Gm.).

535. **MITCHELLA**.—SQUAW VINE. PARTRIDGE BERRY. The herb of **Mitchell'a re'pens** Linné, a creeping evergreen growing in the woods of this country east of the Mississippi. Stem branching, bearing roundish-ovate, entire, evergreen leaves, about 12 mm. ($1/2$ in.) long, sometimes marked with white lines; flowers pale purplish, the ovary ripening into a small, scarlet-red berry. Tonic, astringent and diuretic, resembling pipsissewa in action and often substituted for it. It is frequently combined with black haw. Dose: 30 to 60 gr. (2 to 4 Gm.).

536. **GALIUM**.—CLEAVERS. LADY'S BEDSTRAW. The herb of **Ga'lium apar'ine** Linné. *Habitat*: Northern Hemisphere. Stem weak, quadrangular, prominently winged, and covered with retrorse prickles; leaves linear-lanceolate, borne in whorls. Flowers small, white, axillary, the single ovary ripening into a two-seeded, bristly fruit. Aperient, diuretic, and alterative; also used in psoriasis and other skin diseases. Dose: 30 to 60 gr. (2 to 4 Gm.), in infusion.

G. ve'rum (Yellow Lady's Bedstraw) has a smooth stem, bearing yellow flowers. *G. triflo'rum* contains coumarin, and has a fragrant odor when dry.

537. **COFFEA**.—COFFEE. The seeds of **Coffea arab'ica** Linné. *Habitat*: Southern Arabia and Abyssinia; cultivated in South America, Java, and various tropical countries. The fruit is a roundish berry, about the size of a large cherry, becoming dark purple, and containing two seeds, which are inclosed within a membranous covering, and a purplish pulp. These seeds, when freed from the pericarp, form the coffee of the market. They are brownish-green or bluish-gray, planoconvex, the flat surface being elliptical, with a longitudinal groove curving deeply into the horny albumen; odor peculiar, faint, growing stronger by age; taste sweetish, somewhat astringent. Good berries are hard and sink readily in water. Soft, light, dark-colored berries should be rejected.

CONSTITUENTS.—Its properties depend upon the alkaloid caffeine (2 to 8 per cent.), the constituent common to most of the stimulating beverages. It also contains sugar, tannic acid, caproic acid, fat, etc. When roasted, the sugar is converted into caramel, the caffeic acid partially into methylamine, and several volatile and empyreumatic substances (caffeine) are formed. Pyridine has been separated from these mixed products due to roasting, giving to coffee its peculiar aroma. It loses from 15 to 18 per cent. of moisture in drying.

Preparation of Caffeine (Theine).—Precipitate infusion of tea or coffee with lead

acetate; remove lead from filtrate with H₂S; concentrate second filtrate, neutralize with NH₄OH, and allow it to cool, when caffeine will crystallize out. An aqueous solution of caffeine does not form a precipitate with Mayer's reagent.

ACTION AND USES.—Cerebrospinal stimulant, tonic; aids digestion and allays hunger and fatigue by lessening tissue waste.

537a. **COFFEA TOSTA**, N.F.—Yielding not less than 1 per cent. of caffeine.

538. **CATECHU PALLIDUM**.—TERRA JAPONICA. GAMBIR. An extract obtained from a climbing plant of the East Indies, **Ourouparia Gambir** (Hunter) Baillon, by boiling the leaves, twigs, etc., in water. It is in about one-inch cubes, or in irregular pieces, reddish-brown or yellowish, breaking with a dull, earthy, pale yellowish fracture, showing under the microscope numerous crystals; inodorous; taste astringent and bitter, leaving finally a sweet taste in the mouth. It is mostly used in this country in tanning, dyeing, etc.; in its native country it is chewed with betel-nuts.

CAPRIFOLIACEÆ.—Honeysuckle Family

Shrubs, as viburnum, or twining plants, as the honeysuckle, with opposite, exstipulate *leaves*, a gamopetalous *corolla*, and the *fruit* a berry, pod, or drupe. The *calyx-tube* is adherent to the 2- to 5-celled ovary.

Synopsis of Drugs from the Caprifoliaceæ

A. *Flowers.*

* *Sambucus*, 539.

B. *Bark.*

* *Viburnum Opulus*, 540.

VIBURNUM PRUNIFOLIUM, 541.

C. *Root.*

Triosteum, 542.

539. **SAMBUCUS**, N.F.—ELDER. The dry flowers of **Sambu'cus canadensis** Linné. Collected when in full bloom and rapidly dried, the commercial drug being composed of the small, yellowish, somewhat wheel-shaped and shriveled flowers, mixed with a few expanded ones; usually detached from their peduncles, which are mixed with them. They have a sweetish, somewhat bitter taste, and a slight, peculiar, agreeable odor, due to a very small quantity of volatile oil. The European elder (*S. nigra*) resembles *S. canadensis*. *Constituents*: Besides volatile oil, they contain sugar, mucilage, fat, wax, resin, pectin, albuminoids, and probably a little tannin. Stimulant, carminative, and diaphoretic. Dose: 30 to 60 gr. (2 to 4 Gm.).

540. VIBURNUM OPULUS, N.F.—CRAMP BARK

HIGH BUSH CRANBERRY

The dried bark of **Vibur'num op'ulus** Linné



FIG. 234.—*Viburnum opulus*—Flowering branch and fruit.

HABITAT.—North America.

DESCRIPTION OF DRUG.—Very thin pieces or occasionally quills, outer surface, light gray, with purplish-brown stripes and very small brown lenticels; thicker pieces purplish-red, or occasionally blackish; odor strong and characteristic; taste bitter; the inner surface is yellowish or brownish; fracture short. The bark of the mountain maple (*Acer Spicatum*) was an adulterant formerly described by *mised* authorities, as *Viburnum opulus*.

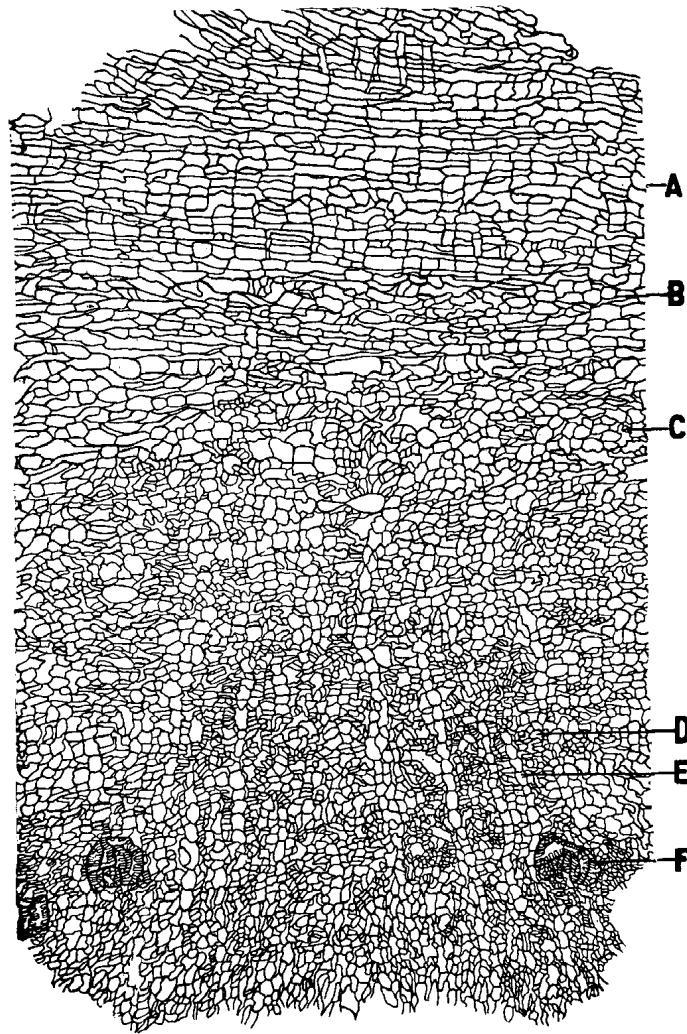


FIG. 235.—Cross-section of bark of *Viburnum Opulus* ($\times 43$). A, Cork. B, Cork cambium. C, Parenchyma of cortex. D, Phloem. E, Medullary ray. F, Group of stone cells.

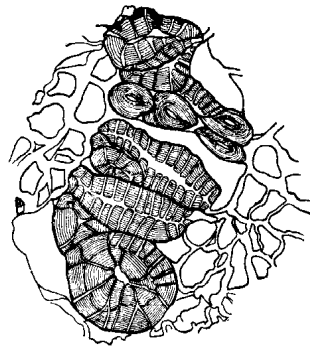


FIG. 235 a.—*Viburnum Opulus* ($\times 137$). Group of stone cells taken from F in Fig. 235.

Powder.—Light brown. Characteristic elements: Parenchyma of inner cortex, with rosettes of calcium oxalate; middle bark bearing reddish-brown coloring matter, starch (5 to 12 μ in diam.); tracheal fragments with lignified wood fibers; few stone

cells; crystals of calcium oxalate, few aggregate (15 to 30 μ in diam.); polygonal cork cells, thin-walled.

ACTION AND USES.—Claimed to be **antispasmodic**, hence the name cramp bark.
Dose: 30 gr. to 2 dr. (2 to 8 Gm.).

541. VIBURNUM PRUNIFOLIUM

BLACK HAW



FIG. 236.—*Viburnum prunifolium*—Branch with flowers.

The dried bark of the root of **Vibur'num prunifo'lium** Linné or of **V. lentago** Linné, without admixture of more than 5 per cent. of wood or other foreign matter.

BOTANICAL CHARACTERISTICS.—A tall shrub or small tree. *Leaves* oval, obtuse, or slightly pointed, finely serrate. *Cymes* compound, sessile. *Fruit* an oval, black, sweet drupe.

HABITAT.—Middle and Southern United States, east of the Mississippi.

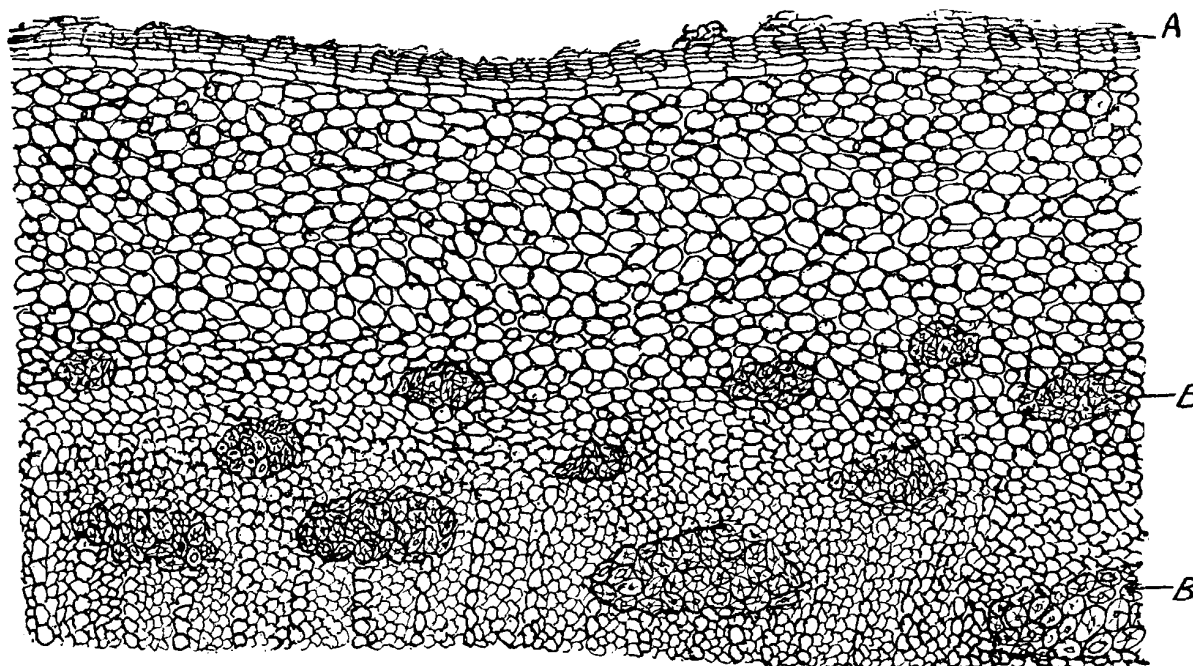


FIG. 237.—*Viburnum prunifolium*—Bark of root, cross-section. A. Cork. B. Group of stone cells in cortical parenchyma.

DESCRIPTION OF DRUG.—In irregular, transversely curved or quilled pieces from 1.5 to 6 cm. in length, and from 0.5 to 1.5 mm. in thickness; outer surface, grayish-brown, or, where the outer cork has scaled off, brownish-red, longitudinally wrinkled; inner surface reddishbrown, longitudinally striated; fracture short but uneven, showing in bark which is young or of medium thickness, a dark brown cork, a brownish-red outer cortex, and a whitish inner cortex in which are numerous light yellow groups of sclerenchyma tous tissues; odor slight; taste distinctly bitter and somewhat astringent. U.S.P. IX.

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

CONSTITUENTS.—A brown resin, a bitter principle (viburnin), valerianic acid, tannic acid, oxalic, malic, and citric acids, sulphates, and chlorides.

ACTION AND USES.—Diuretic, and a **tonic and sedative to the uterine and ovarian nerve centers**; used in threatened abortion. Dose: 30 to 60 gr. (2 to 4 Gm.).

OFFICIAL PREPARATIONS.

Extractum Viburni Prunifolii

Dose: 0.5 Gm. (8 gr.).

Fluidextractum Viburni Prunifolii

30 to 60 drops (2 to 4 mils)

542. **TRIOSTEUM**.—FEVER ROOT. BASTARD IPECAC. The root of **Triosteum perfoliatum** Linné, common in most parts of the United States. (See Conspectus.) Cathartic and emetic in large doses. Dose: 15 to 30 gr. (1 to 2 Gm.).

VALERIANEÆ

Herbs with opposite, exstipulate *leaves*. *Flowers* in paniced or head-like cymes. Many of the species possess antispasmodic properties, due to the presence of a volatile oil, from which is developed valerianic acid.

543. VALERIANA.—VALERIAN

VALERIAN

The rhizome and roots of **Valeriana officinalis** Linné.

BOTANICAL CHARACTERISTICS.—*Root* perennial, tuberous. *Leaves* pinnate or pinnately cut. *Corolla* roseate, funnel-form, 5-lobed; *stamens* 3. *Fruit* a feathery akene.

SOURCE.—Europe, especially in Holland, Belgium, England, and Germany as well as Japan. The Japanese root is said to be richer in volatile oil than the Belgian. The fresh rhizomes and roots are preferred for distilling the oil, as there is a loss of nearly 50 per cent. of the oil in drying the rhizome and root for medicinal use.

DESCRIPTION OF DRUG.—Obconical, from 6 to 75 mm. ($\frac{1}{4}$ to 3 in.) in length, with stem-remnants above, and beset with numerous rootlets; those rhizomes grown in dry localities are smaller, nearly globular, with lighter colored, thinner, and less shriveled rootlets, and contain a greater proportion of volatile oil than those grown in moist ground; the latter are generally sliced longitudinally. Externally brown, internally pale brownish; **odor** strong, disagreeable, increasing with age, taste camphoraceous and bitter. A **cross-section** shows a rather thin bark, and a wood-circle, narrow, white, inclosing a large pith. Nucleus sheath mostly indistinct; branches have a similar structure but a thicker bark. The rootlets have a thick bark and a slender, woody column, distinctly radiate, and contain a small pith inclosed in a nucleus sheath.

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



FIG. 238.—*Valeriana officinalis*—Plant and rhizome.

CONSTITUENTS.—Besides the common vegetable principles, it contains a terpene, isovaleric acid, $C_5H_{10}O_2$ (distilling at $300^{\circ}C.$), and a **volatile** oil of complex constitution, consisting mainly of an alcohol, borneol; its ether, and its formic, acetic, and valerianic acid esters, which

are gradually decomposed on exposure, liberating the acids. This oil (Oleum Valerianæ, U.S.P. VI) is of a pale greenish color, becoming yellow and viscid on exposure, and has the peculiar odor of the root. Ash, not exceeding 20 per cent.

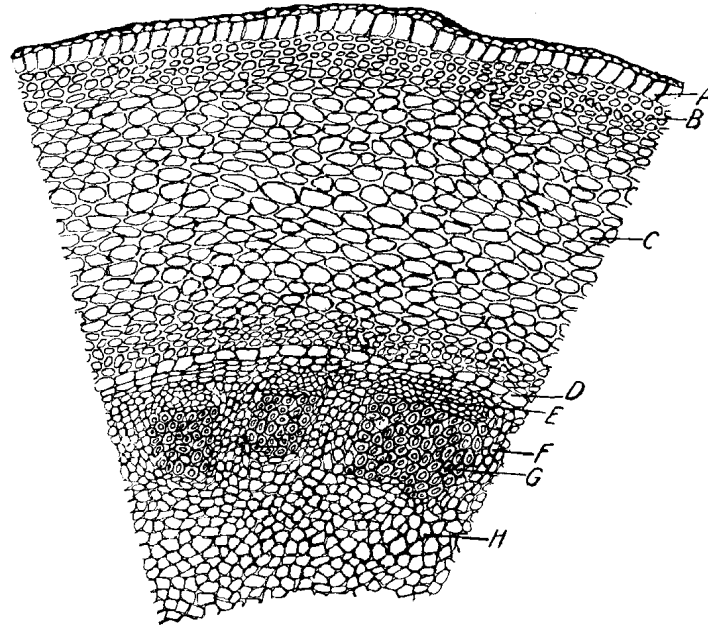


FIG. 239.—Valerian—Cross-section of rhizome. A, Cork cells. B, Collenchyma. C, Cortical parenchyma. D, Endodermis. E, Small irregular liver-cells. F, Medullary rays. G, Punctuated vessels of wood-rays. H, Pith-cells.

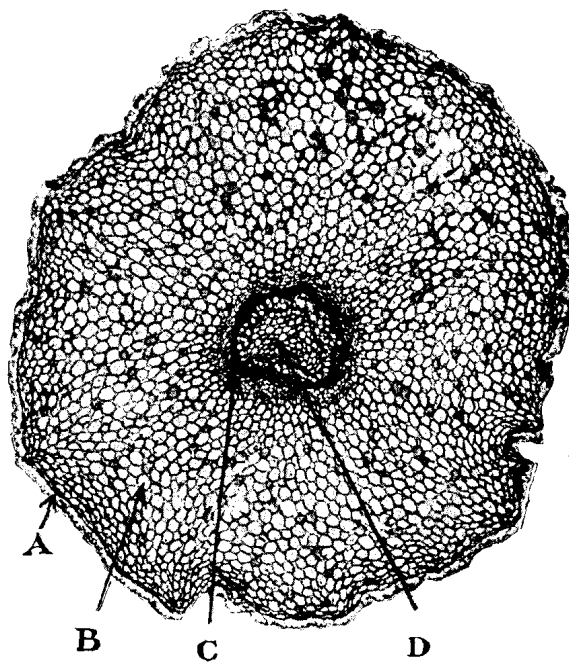


FIG. 240.—Valerian—Cross-section of rootlet. (17 diam.) A, Epidermis. B, Parenchyma of cortex. C, Phloem. D, Xylem. (Photomicrograph.)

ACTION AND USES.—Gentle nerve stimulant and **antispasmodic, employed in hysterical disorders.** Dose: 15 to 60 gr. (1 to 4 Gm.).

OFFICIAL PREPARATIONS.

Tinctura Valerianæ (20 per cent.) Dose: 1 to 2 fl. dr. (4 to 8 mils).
Tinctura Valerianæ Ammoniata (20 per cent.) 30 to 60 drops (2 to 4 mils).

CUCURBITACEÆ.—Gourd Family

Succulent herbs, creeping or climbing by tendrils. *Leaves* alternate. *Flowers* monoecious and polygamous; *stamens* with long and wavy or twisted anthers. Fruit a pepo.

Synopsis of Drugs from the Cucurbitaceæ

- | | |
|---------------------------|--------------------|
| A. <i>Root.</i> | C. <i>Seeds.</i> |
| * Bryonia, 545. | PEPO , 548. |
| B. <i>Fruits.</i> | Citrullus, 549. |
| COLOCYNTHIS , 544. | Cucumis, 550. |
| Luffa, 546. | D. <i>Resin.</i> |
| Momordica, 547. | Elaterium, 551. |

544. COLOCYNTHIDIS PULPA.—COLOCYNTH

BITTER APPLE. Ger. KOLOQUINTEN

The dried pulp of the fruit, **Citru'l'us colocy'n'this** Schrader, containing not more than 5 per cent. of seeds nor more than 2 per cent. of epicarp. U.S.P. IX.

BOTANICAL CHARACTERISTICS.—Stem procumbent, angular, hispid; *leaves* cordate-ovate, lobate; tendrils short. *Flowers* axillary, *female flowers* solitary, *petals* yellow with greenish veins. *Fruit* globose, smooth, 6-celled, with very bitter pulp; seeds whitish, sometimes brownish.

HABITAT.—Asia, Europe, and Africa.

DESCRIPTION OF DRUG.—The fresh fruit has a marbled green surface, not very unlike the watermelon. It has a thick rind inclosing a white, spongy pulp, imbedded in which are numerous light-colored seeds. The fruit on drying loses about 50 per cent. of water, leaving a **very light, spongy, white or yellowish-white pulp, which, deprived of the seed,** constitutes the official drug. Colocynth “apples,” as they appear in the market, contain the seeds, but are deprived of the rind; 50 to 100 mm. (2 to 4 in.) in diameter. A cross-section of the spherical pulp (“apples”) makes apparent three distinct wedges, each of

which has two branches; this structure is due to the parietal placentæ, which project to the center of the fruit, then divide and turn back, making convoluting branches directed one toward the other. In odorless; so **intensely bitter** that the bitterness is imparted to any object brought in contact with it.



FIG. 241.—Colocynth—Portion of vine and whole fruit.

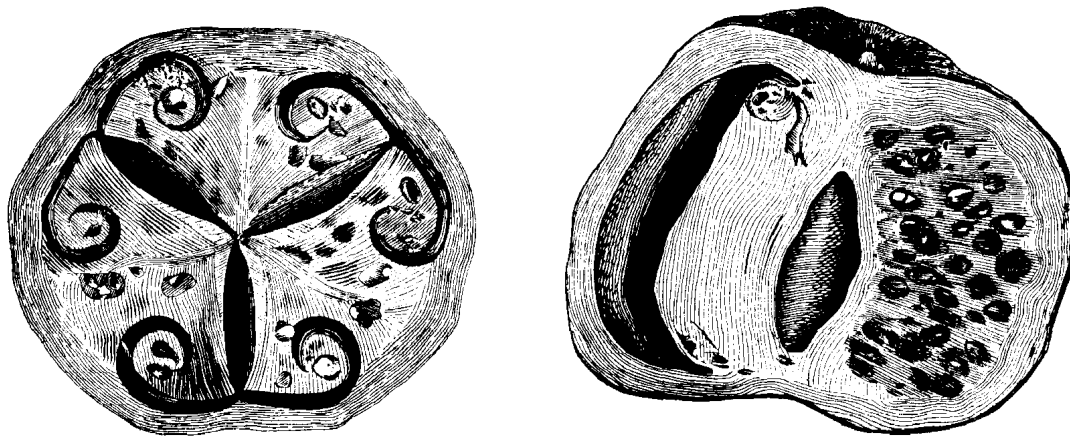


FIG. 242.—Transverse section of colocynth fruit. FIG. 243.—Longitudinal section of colocynth fruit.

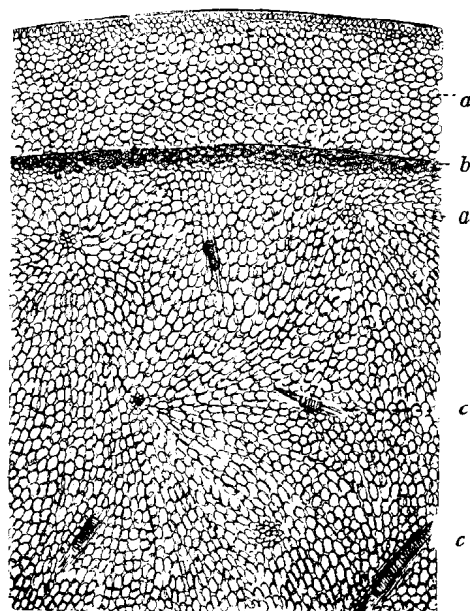


FIG. 244.—*Citrullus colocynthis*—Cross-section through outer portion of the fruit. *a, a*, Parenchyma. *b*, Stone cells. *c, c*, Fibro-vascular bundles.

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

CONSTITUENTS.—Resin, gum, and amyloid principles. **Colocynthin**, $C_{56}H_{84}O_{23}$, a yellowish, somewhat translucent, bitter, and friable glucoside, is, perhaps, the most important constituent; it is contained in the pulp to the extent of about 2 per cent. Colocynthin is a taste less crystalline principle left after treating the alcoholic extract with cold water in preparing colocynthin. Ash, not to exceed 15 per cent.

The powder should not yield more than 2 per cent. of fixed oil when treated with petroleum benzin—a check test on the 5 per cent. limit of seeds. U.S.P. IX.

Preparation of Colocynthin.—Exhaust alcoholic extract with water, precipitate with lead acetate and subacetate, remove lead from liquid by treating with H_2S , filter, then precipitate with tannin; suspend the tannate in alcohol, decompose with lead hydroxide, remove excess of lead by H_2S , filter and evaporate, and wash the residue with ether.

ACTION AND USES.—A **powerful hydragogue cathartic**, given in combination with weaker purgatives. Dose: 3 to 10 gr. (0.2 to 0.6 Gm.).

OFFICIAL PREPARATIONS.

Extractum Colocynthis Dose: 1/2 to 2 gr. (0.0324 to 0.13 Gm.).

Extractum Colocynthis Compositum (Extract Colocynth 16 per cent., with aloes, scammony, cardamon and soap),

5 to 25 gr. (0.3 to 1.6 Gm.).

(**Pilulæ Catharticæ Compositæ**
8 per cent. of compound extract)

2 to 5 pills.



Bryonia dioica.

545. **BRYONIA**, N.F.—BRYONY. The root of *Bryo'nia al'ba* and of *Bryonia' dioi'ca* Linné. Off. in U.S.P. 1890. A dull reddish-brown, longitudinally wrinkled root, usually appearing in the market in transverse disks about 50 to 100 mm. (2 to 4 in.) in diameter, of a white or yellowish-white color; bark thin, with a thin, friable cork; the bark is separated by a brown cambium line from the medullium, in which the wood-bundles are arranged radially and concentrically; the wood-wedges and zones are separated by rather broad rays and concentric circles of parenchymatous tissue; fracture short. Inodorous; taste disagreeably bitter. The active principle is **bryonin**, $C_{48}H_{80}O_{19}$, an intensely bitter glucoside, soluble in water, but best extracted with strong alcohol. Obtained by precipitating the hydro-alcoholic percolate with tannin. The moist tannin

compound is mixed with lead oxide and then digested with alcohol. The alcoholic solution yields bryonin on evaporation. Drastic hydragogue cathartic, formerly much used in the treatment of dropsy, but now superseded by jalap. Dose: 10 to 30 gr. (0.6 to 2 Gm.).

Tinctura Bryoniae (10 per cent.)

(U.S.P. 1890)

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

546. **LUFFA**.—VEGETABLE SPONGE. WASH-RAG SPONGE. GOURD TOWEL. The gourd-like fruit of *Luffa ægyp'tiaca*, a vine growing in Arabia and Egypt. The layer of tissue next the epidermis is composed of interwoven woody fibers, and, when deprived of the epidermis, makes a good substitute for sponge. The fruit of *Luffa echinata*, growing in India, contains a principle related to, if not identical with, colocynthin.

547. **MOMORDICA BALSAMINA** Linné.—BALSAM APPLE. This is a climbing East Indian plant, cultivated in our gardens for the sake of its cucumber-like fruit, which is often used in domestic practice as a vulnerary.

548. PEPO.—PUMPKIN SEED

PUMPKIN SEED

The ripe seed of **Cucur'bita pe'po** Linné.

BOTANICAL CHARACTERISTICS.—Stem hispid, procumbent; tendrils branched. *Leaves* very large, cordate, palmately 5-lobed. *Fruit* yellow, very large (sometimes two feet in diameter), roundish or oblong, smooth, and furrowed.

HABITAT.—Tropical Asia and America.

DESCRIPTION OF DRUG.—Flat, broadly ovate seeds, about 20 mm. ($\frac{4}{5}$ in.) long, and 2 mm. ($\frac{1}{12}$ in.) thick, with a **flat ridge and shallow groove around the edge**; testa **dull white**, inclosing two flat, white, oily cotyledons and a short radicle; inodorous; taste bland and oily.

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

CONSTITUENTS.—From 30 to 40 per cent. of a thick, red fixed oil, **an acrid resin**, considered to be the tæniafuge principle, starch, sugar, fatty acids, and the proteids, myosin and vitellin, the myosin precipitating from an infusion saturated with NaCl, and the addition of CO₂ separating out the vitellin, apparently identical with that of egg yolk.

ACTION AND USES.—Tæniafuge. Dose: 1 to 2 oz. (30 to 60 Gm.), in emulsion.

549. **CITRULLUS.**—WATERMELON SEED. The seed of **Cucu'mis citrul'lus** Seringe. Indigenous to Southern Asia, but cultivated extensively in the United States. Differs from the pumpkin seed in being blackish-marbled or brownish in color, somewhat smaller, and with a blunt, ungrooved edge. They are used like pumpkin seeds as a tæniafuge, and also have diuretic and demulcent properties. Dose: 2 dr. to 2 oz. (8 to 60 Gm.).

550. **CUCUMIS SATIVUS** Linné.—CUCUMBER SEED. Flat and thin, lanceoblong, from 8 to 12 mm. ($\frac{1}{3}$ to $\frac{1}{2}$ in.) long, acutely edged, ungrooved, dull white in color. Resembles above in properties.

551. **ELATERIUM**.—A peculiar resinous substance obtained from the fruit of **Ecbal'lium elate'rium** A. Richards (squirting cucumber), a vine growing in the Mediterranean regions of Europe, Africa, and Asia. The fruit, when ripe, separates suddenly from its stalk, and the internal pressure forces the juice out of the aperture thus made in a stream; in collecting, therefore, the fruits are gathered green, sliced, and the juice expressed by slight pressure; on standing it deposits a sediment, which, when dried, forms the commercial Elaterium.

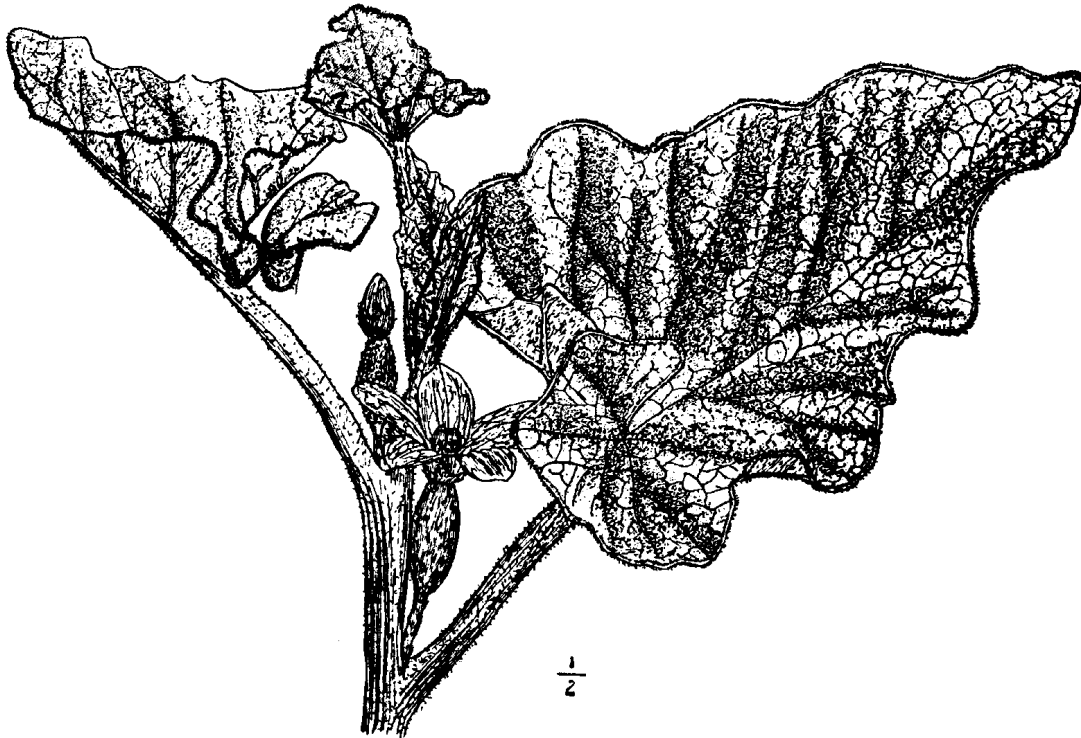


FIG. 245.—*Ecballium elaterium*—Branch with flowers.

Elaterium is in flat pieces of varying sizes, **light and friable**, pale green when fresh, but taking on a **gray or light buff color** as it becomes older; the surface is covered with small crystals of elaterin; odor somewhat tea-like; taste acrid and intensely bitter, due to the active ingredient, elaterin, which constitutes from 25 to 30 per cent. of the drug. This principle is insoluble in water, readily soluble in chloroform and hot alcohol; it is a violent irritant poison; its alcoholic solution is colored red by warm sulphuric acid; its carbolic acid solution, crimson, rapidly changing to scarlet. There is also present ecballin (soft, yellow, acrid), hydroelaterin, and elaterid.

ELATERINUM (U.S.P. IX).—*Elaterin*.—Exhaust elaterium with chloroform; add ether; white crystals deposit immediately. Wash with ether and recrystallize from chloroform. This principle is odorless and crystalline, is bitter and acrid in taste. No weighable ash remains on incinerating 0.1 Gm. of Elaterin.

ACTION AND USES.—Elaterin is a **powerful hydragogue cathartic**, used in the treatment of dropsy. Dose: $\frac{1}{20}$ to $\frac{1}{12}$ gr. (0.003 to 0.005 Gm.). Preparation: Trituratio Elaterini (10 per cent.). Dose: $\frac{1}{2}$ gr. (0.030 Gm.).

CAMPANULACEÆ.—Campanula Family

Herbs or shrubby plants, with acrid, milky juice, alternate *leaves*, and scattered flowers, *corolla* 5-lobed. *Fruit* a one- to several-celled capsule. Many species of the tribe *Lobeliæ* are acrid-narcotic poisons.



FIG. 246.—*Lobelia inflata*—Portion of plant and flower.

552. LOBELIA.—LOBELIA

INDIAN TOBACCO

The dried leaves and tops of **Lobe'lia infla'ta** Linné (fam. Lobeliaceæ U.S.P. IX), without the presence or admixture of more than 10 per cent. of stems or other foreign matter.

BOTANICAL CHARACTERISTICS.—*Stems* much branched from an annual root, pubescent; *leaves* ovate or oblong, gradually diminishing into leaf-like bracts. *Capsule* inferior.

RELATED SPECIES.—*Lobelia syphilitica* (great lobelia), *Lobelia cardinalis* (cardinal plant).

HABITAT.—United States.

DESCRIPTION OF DRUG.—In the market the herb is broken up, but the fragments of green leaves, small pieces of the longitudinally ridged stem, the rather elongated, dried flowers, and the inflated, membranous capsules serve to identify it; odor irritating when inhaled; taste very pungent, persistently acrid, and tobacco-like.

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

CONSTITUENTS.—**Lobeline** (a poisonous, acrid, yellowish, aromatic liquid alkaloid), **lobelic acid**, **lobelacrin** (an active principle, probably lobelate of lobeline), inflatin (a tasteless, colorless, and odorless, probably inert, neutral principle), resin, fixed oil, gum, probably volatile oil, salts, etc.

Preparation of Lobeline.—Evaporate the acetic alcoholic tincture to syrup; triturate this with MgO in excess; agitate filtrate with ether. Evaporate ether and concentrate over sulphuric acid. It is quite volatile.

Preparation of Lobelacrin.—Obtain by concentrating tincture of lobelia in persence of animal charcoal; exhaust charcoal with boiling alcohol. It is the acrid principle, lobelate of lobeline. Ash, not more than 8 per cent.

ACTION AND USES.—Poisonous²; diaphoretic and expectorant; used in **asthma**, whooping-cough, and other spasmodic pulmonary affections. In large doses it is a cathartic and emetic, but, being a violent

² — I, of course, disagree with Sayre here...there are probably 30 botanicals in this text more toxic than Lobelia, yet non of them are called "poisonous". This was a remnant of a then 70 year-old conflict between "regular school" medicine and the "irregulars" and is pure dialectic—Michael Moore

gastroirritant, **it should not be used for these purposes on account of its danger.** Dose: 1 to 15 gr. (0.065 to 1 Gm.). The latter dose as an emetic. The two species, *syphilitica* and *cardinalis*, are used medicinally, the former antisyphilitic and diaphoretic and the latter anthelmintic. Both were used by the Indians.

OFFICIAL PREPARATIONS.

Fluidextractum Lobeliæ
Tinctura Lobeliæ (I 0 per cent.)

Dose: 1 to 5 drops (0.065 to 0.3 mil).
 Expectorant 15 drops (1 mil).
 Emetic 1 fl. dr. (4 mils).

COMPOSITÆ.—Composite Family

Herbaceous or woody plants, rarely shrubs, with the *flowers* in close heads on a common receptacle, and surrounded by a common imbricated involucre. *Stamens* 5, their anthers united into a tube surrounding the pistil. *Flowers* of two sorts, strap-shaped or ligulate, and tubular, and hence the family is divided into three tribes: Tubulifloræ (flowers tubular in all the perfect flowers, and ligulate in the marginal or ray-flowers), Ligulifloræ (all the flowers of the head being strap-shaped, ligulate), and Labiatifloræ (with tubular flowers more or less labiate). *Fruit* an akene.

Synopsis of Drugs from the Compositæ

- | | | |
|---|--|---|
| <p>A. <i>Roots.</i>
 TARAXACUM, 553.
 Cichorium, 554.
 PYRETHRUM, 555.
 Pyrethrum Germanicum, 555 a.
 *Inula, 557.
 *Lappa, 558
 Polymnia, 560.
 Laciniaria, 561.
 Helianthella, 562.
 * Echinacea, 563.</p> <p>B. <i>Rhizomes.</i>
 Arnicæ Radix, 564.
 Cnicus Arvensis, 566.</p> <p>C. <i>Leaves.</i>
 Erechthites, 567.
 Trilisa, 568.
 Pertocaulon, 569.
 Guaco, 570.
 Ambrosia, 571.
 Strumarium, 572.
 Spinosum, 573.
 Eupatorium Purpureum, 575.</p> | <p>D. <i>Herbs.</i>
 *Eupatorium, 574.
 GRINDELIA, 576.
 Tanacetum, 577.
 *Absinthium, 578.
 Artemisia, 579.
 A. Frigida (a).
 A. Vulgaris (b).
 A. Abrotanum (c).
 Erigeron, 580.
 Erigeron Canadense, 581.
 Gnaphalium, 582.
 Helenium, 583.
 Achillea, 584.
 Tussilago, 585.
 Carduus Benedictus, 586.
 Silphium, 587.
 Mutisia, 588.
 Elephantopus, 589.
 Rudbeckia, 590.
 Bidens, 591.
 *Senecio, 592.
 Solidago, 593.</p> | <p>Lactuca Sativa, 595.
 Lactuca Canadensis, 596.
 Parthenium, 597.
 Cotula, 598.</p> <p>E. <i>Flowers.</i>
 MATRICARIA, 599.
 Anthemis, 600.
 Santonica, 601.
 ARNICA, 565.
 *Calendula, 602.
 Carthamus, 603.
 Pyrethri Flores, 556.</p> <p>F. <i>Concrete Juice.</i>
 LACTUCARIUM, 594.</p> <p>G. <i>Volatile Oil.</i>
 Oleum Erigerontis, 581 a.
 Oleum Anthemidis, 600 a.</p> <p>H. <i>Seeds.</i>
 Helianthus, 604.</p> <p>I. <i>Fruit.</i>
 Lappæ Fructus, 559.</p> |
|---|--|---|

553. TARAXACUM.—TARAXACUM

DANDELION

The dried rhizome and roots of **Tarax'acum officina'le** Weber. Preserve the thoroughly dried drug in tightly closed containers, adding a few drops of chloroform or carbon tetrachloride from time to time, to prevent attack by insects.



Taraxacum.

BOTANICAL CHARACTERISTICS.
—Root perennial; *leaves* radical, runcinate, pinnatifid or lyrate; scape hollow. *Flower-head* solitary, many flowered, yellow. After blossoming, and while the fruit is forming, a pappus raises which soon exposes to the wind the naked fruit, which is blown about.

SOURCE.—A plant of very extensive geographical distribution, native to Europe, but very abundant in the United States, where, in some parts, it is a troublesome weed.

Dandelion root may be dug from July to September, during which time the juice it contains becomes thicker and more bitter. The roots should be washed and carefully dried, and care should be taken to avoid maggots, which attack the well-dried roots.

DESCRIPTION OF DRUG.—The dry root is fleshy, long, and tapering, seldom branching; 5 to 25 mm. to 1 in.) thick at the top, surmounted by several heads. Externally brownish, soon darkening by exposure. In the fall, about November, the root acquires a deep orange color throughout. **Internally** white, abounding in a bitter, inodorous, milky juice. A **cross-section** displays a **thick, white bark** with numerous concentric circles of laticiferous vessels surrounding a **yellow woody center**. The central column is easily separated from the thick bark, when the former is found to have along its exterior at intervals minute knotty projections; a cross-section of the root at this point shows woody fibers branching from the ligneous cord, penetrating, and passing through, the bark.

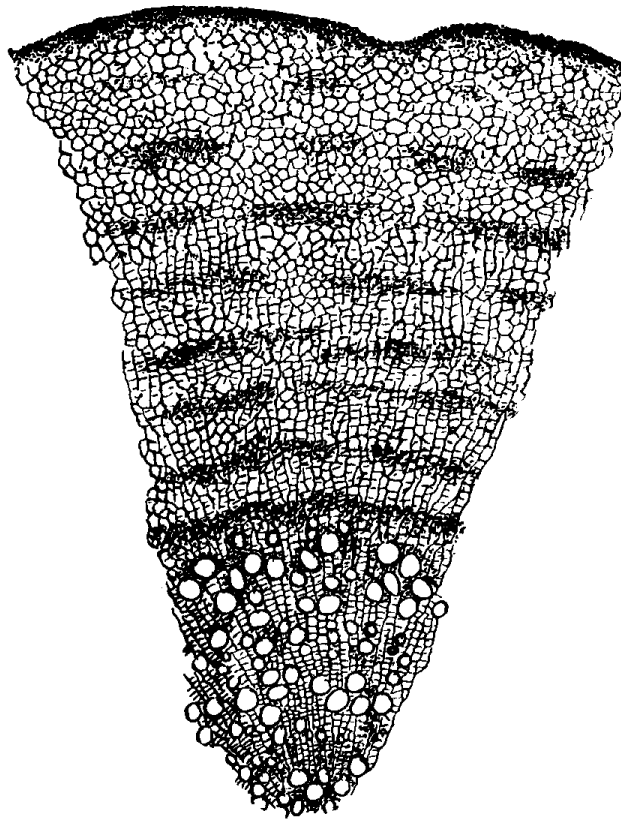


FIG. 247.—Cross-section of *Taraxacum* root.

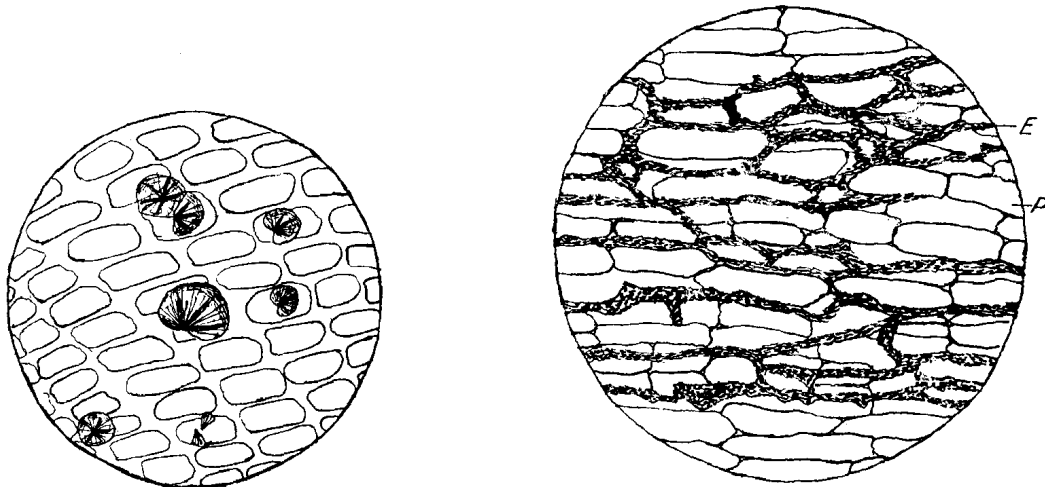


FIG. 248.—Inulin spherules in *Taraxacum*.

FIG. 249.—Laticiferous tissue in *Taraxacum* root.
E, Laticiferous tissue. P, Parenchyma.

Inulin spherules are plainly discernible under the microscope if, before sectioning, the fresh root be macerated in alcohol. The root loses in drying from 78 to 88 per cent. of moisture. The dried root is

longitudinally and spirally wrinkled; when quite dry, has a brittle fracture, showing a dark brown exterior and a thick, white bark.

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

CONSTITUENTS.—**Taraxacin** (a bitter principle), **taraxacerin**, $C_9H_{15}O$, resin, **inulin**, sugar, and mucilaginous substances. The percentage of sugar varies with different seasons and with condition of soil; it is said to diminish in the summer. Recent investigations have shown the existence of an alkaloid. But this has been found to be exceedingly minute—a mere trace. Ash, not more than 10 per cent.

Preparation of Taraxacin.—Treat decoction with animal charcoal, wash the latter with water, and dissolve out bitter principle with boiling alcohol; evaporate. It has not been proven that this is crystalline. Composition uncertain.

ACTION AND USES.—Deobstruent, tonic. As a remedial agent dandelion root has not been properly appreciated, possibly because it is such a common weed. It is worthy of more study on the part of pharmaceutical chemists and clinicians. The fluidextract and extract are used in **hepatic disorders**. Dose: 1 to 4 dr. (4 to 15 Gm.)

OFFICIAL PREPARATIONS.

Fluidextractum Taraxaci	Dose: 1 to 4 fl. dr. (4 to 15 mils)
Extractum Taraxaci	5 to 60 gr. (0.3 to 4 Gm.).

554. **CICHORIUM.**—CHICORY. The root of **Cichor'ium in'tybus** Linné. *Habitat:* Europe; naturalized in the United States. Nearly cylindrical, resembling dandelion, but lighter in color, more woody, with a thinner bark, and with the laticiferous vessels of the woody column and the bark arranged radially; very bitter. It contains inulin and a bitter principle. Bitter tonic in doses of 15 to 60. gr. (1 to 4 Gm.), in decoction. Its greatest demand is as an adulterant of coffee. It should be stated, however, that roasted chicory has become a favorite in many parts as a coffee substitute. The cultivation of the plant for this purpose and as a forage plant has grown to be a permanent agricultural industry in nearly every country of Europe and in many parts of the United States.

555. **PYRETHRUM.**—PYRETHRUM

PELLITORY. ROMAN PELLITORY

The root of **Anacy'clus pyre'thrum** (Linné) De Candolle. Preserve in tightly closed containers, adding a few drops of chloroform or carbon tetrachloride, to prevent attack by insects.

BOTANICAL CHARACTERISTICS.—*Root* long, fusiform. *Stems* numerous, branched, pubescent. *Radical leaves* pinnatifid, *stem-leaves* sessile. *Florets* of the ray pistillate, white above and purplish beneath; of the disk, yellow, tubular, 5-toothed. *Akene* flat, winged; pappus short.



Anacyclus Pyrethrum: A, expanded flower; B, involucre seen from below; C, dried flower.

SOURCE.—Mediterranean Basin, coming solely from Algeria, thence to Mediterranean points.

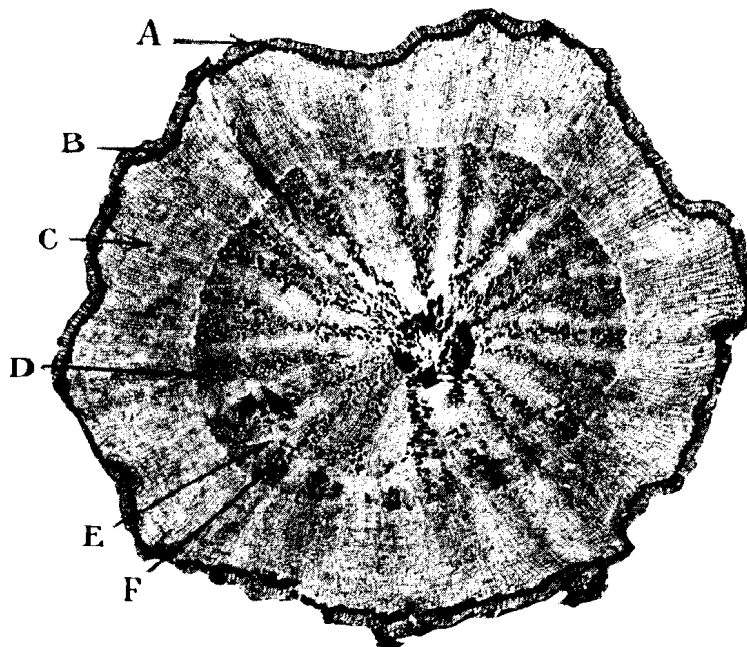


FIG. 250.—Pyrethrum—Cross-section of root. (11 diam.) A, Cork. B, Ring of stone-cells. C, Parenchyma of primary cortex. D, Cambium. E, Medullary ray. F, Xylem. (Photomicrograph.)

DESCRIPTION OF DRUG.—A **hard, compact**, somewhat fusiform root, about the size of the little finger, with sometimes leaf-remnants at the top, and beset with few or no hair-like rootlets; externally brownish, **deeply fissured** longitudinally. It breaks with a short fracture, showing a rather thick bark adhering closely to the pale brown wood, from which it is separated by a narrow cambium line. This woody column is traversed by broad, distinct medullary rays, and contains! as does also the bark, large scattered resin ducts. Odor very slight-, taste slight at first, but afterward **persistently acrid**, leaving a singular tingling sensation in the mouth and throat, and exciting a remarkable flow of saliva.

555a. *Pyrethrum Germanicum*, from *Anacyclus officinarum* Hayne, is of a grayish color, about half as thick as above, tapering to filiform at the lower end; has long been cultivated near Magdeburg and in Saxony. It resembles the above in foliage and flowers.

CONSTITUENTS.—A very acrid resinous substance, two acrid oils—pyrethrine, extracted by ether (crystalline, bitter, burning taste), which under action of alcoholic KOH decomposes into piperidine. Most of the parenchymatous cells are loaded with inulin, which forms about 35 per cent. of the root. Ash, not more than 5 per cent.

ACTION AND USES.—Used almost exclusively as a **sialagogue** in headache, neuralgic and rheumatic affections of the face, toothache, etc., or as a local stimulant in palsy of the tongue or throat, or relaxation of the uvula. Dose when chewed: 30 to 60 gr. (2 to 4 Gm.).

OFFICIAL PREPARATION.

Tinctura Pyrethri (20 per cent.) Used externally.

556. **PYRETHRI FLORES**.—INSECT FLOWERS. The flowers of (1) *Pyrethrum carne'um* and *Pyrethrum rose'um* Weber, yielding, when powdered, Persian or Caucasian Insect Powder, and (2) **Pyrethrum cinerariæfo'lium** Visiani, yielding Dalmatian Insect Powder, which is more powerful than the Persian powder; this latter is now produced of very superior quality in California by cultivation. The plants resemble matricaria and bear flower-heads about 38 mm. (1½ in.) in diameter, surrounded by an imbricate involucre, (1) having brownish scales with a white scarios (membranous) edge, whitish ray-florets, and yellow disk-florets, and (2) having greenish involucreal scales with scarios edge, rose-colored ray-florets, and yellow disk-florets. The flowers seldom come in market, but are in the form of a yellowish-brown or yellowishgreen powder, which is used either as a powder or in tincture as an insecticide. It is not actively poisonous to human beings. Its strength

or purity, and the variety from which obtained, may be ascertained by microscopical examination. A deficiency of pollen and presence of sclerenchymatous tissue would show a scarcity of flowers and the presence of stems in the powder, and consequent inferiority in strength.

557. **INULA**, N.F.—ELECAMPANE. The root of **In'ula Hele'nium**. Off. in U.S.P. 1890 Found in the market in slices cut in various directions. Externally grayish-brown, wrinkled, with overlapping bark. Internally gray. When dry, breaks with a horny fracture. Odor aromatic, suggestive of orris and camphor; taste slightly bitter, warm, aromatic. Gentle stimulant and tonic, supposed also to have diaphoretic, diuretic, expectorant, and emmenagogue properties. Chiefly used in this country for dyspepsia and pulmonary troubles. Dose: $\frac{1}{2}$ to 2 dr. (2 to 8 Gm.), in powder or decoction.

558. LAPPA, N.F.—LAPPA

BURDOCK ROOT



Arctium Lappa.

The dried root of **Arctium lappa** Linné, and possibly of other species of *Arctium*, collected from plants of the first year's growth.

BOTANICAL CHARACTERISTICS.
—*Root* biennial, fusiform; *stem* 1 to 3 feet high. *Leaves* strong-smelling, ovate, with cordate and crenate base, or lanceolate, with cuneate base. *Involucre* composed of imbricated coriaceous scales, the stiff, needle-like points of which are hooked. Heads solitary or clustered; *flowers* white or light purple, all tubular. *Akenes* oblong, flattened.

DESCRIPTION OF DRUG.—A fusiform, fleshy root several inches in length and about 25 mm. (1 in.) thick, sometimes sliced longitudinally; grayish-brown, longitudinally wrinkled from drying, and

having withered scales near the top; **internally** lighter colored, spongy, a **cross-section** showing a thick bark (in young roots, thin in old), the inner layer of which, and the medullium, is traversed by broad medullary rays. Fracture horny. It has a slight unpleasant odor, and a sweetish, somewhat bitter taste.

Powder.—Brownish-gray. Characteristic elements: Parenchyma of cortex, thin-walled, elongated with glassy masses and sphæro-crystals of inulin; ducts large and small, with reticulate, simple pores; wood fibers and resin ducts, few.

CONSTITUENTS.—Mucilage, sugar, fat, a little tannin, a bitter glucoside, and inulin.

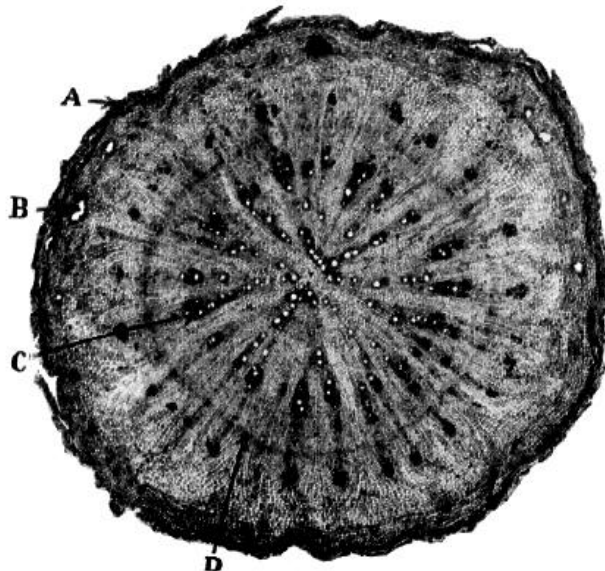


FIG. 251.—Lappa—Cross-section of root. (10 diam.) A, Cork. B, Resin cell. C, Xylem. D, Cambium. (Photomicrograph.)

ACTION AND USES.—Diuretic, diaphoretic, and alterative. Dose: $\frac{1}{2}$ to 2 dr. (2 to 8 Gm.). **Fluidextractum Lappæ**, Dose: $\frac{1}{2}$ to 2 fl. dr. (2 to 8 mils).

559. **LAPPÆ FRUCTUS**.—BURDOCK FRUIT. A somewhat angular fruit, about 6 mm. ($\frac{1}{4}$ in.) long, rough and wrinkled, and covered with short, stiff hairs, which are easily rubbed off. Very bitter. A tincture is used in psoriasis and other skin diseases.

560. **POLYMNIA UVEDALIA** Linné.—BEARSFOOT. An indigenous plant, the root of which, in ointment form, has had virtues ascribed to it as a discutient and anodyne, particularly in the treatment of malarial splenic enlargements.

561. **LACINIARIA SPICATA** Willdenow.—BUTTON SNAKEROOT. Habitat: United States. (Root.) Diuretic; also used as a gargle and injection. Dose: $\frac{1}{2}$ to 2 fl. dr. (2 to 8 mils).

562. **HELIANTHELLA TENUIFOLIA** Torrey and Gray.—The root of this plant has the properties of an aromatic expectorant and antispasmodic, used as an addition to cough mixtures.

563. **ECHINACEA**, N.F.—The root of **Echina'cea angustifo'lia** De Candolle. *Habitat*: Western United States. This plant has grown into considerable importance, especially among the eclectic practitioners, in the treatment of phagedenic ulcerations, boils, various forms of septicæmia, etc. The common name of the plant is "nigger-head." The flower-head has from twelve to fifteen rays, 2 inches long, rose-colored or red, drooping; receptacle conical, with finely tipped chaff, longer than the disk-florets; disks purplish. The root has a brownish-black color, the epidermis

shrunken causing longitudinally twisted wrinkles. Over 200,000 pounds were consumed in 1903, Since that time the demand has been kept up quite regularly at the same figure.



FIG. 252.—*Echinacea angustifolia*—Root. A, Cross-section of root. (Photograph.)

In cross-section are seen wood-wedges and medullary rays, colored dark gray or blackish; fracture short and rough; taste peculiar and somewhat acrid and biting, reminding one of pyrethrum; odor heavy, mousey, accompanied by a peculiar pungency. The root contains a very small percentage of alkaloid and a crystalline principle soluble in carbon disulphide. Active principle contained, apparently, in an oleoresin which represents the medicinal properties. Allied species: *Echinacea purpurea*.

564. **ARNICAE RADIX.**—ARNICA ROOT. A horizontal, contorted rhizome about 50 to 75 mm. (2 to 3 in.) long, and 3 to 4 mm- ($\frac{1}{8}$ to $\frac{1}{6}$ in.) thick; externally dark brown, rough from scars, longitudinally wrinkled, and beset with numerous thin, fragile rootlets. Fracture short, showing a rather thick bark containing a circle of resin cells near the cambium line, a circle of short, yellowish wood-bundles, and a very large, whitish pith. Odor slightly aromatic; taste pungent and bitter. Adulterated with other roots of the Compositae, also with *Geum urbanum* roots and *Frageria vesca* Off. in. U.S.P. 1890. Stimulant and tonic. Dose: 5 to 30 gr. (0.3 to 2 Gm.).

565. ARNICA.—ARNICA FLOWERS



1, rhizome and stem; 2, flowering stem;
3, vertical section of disk-flower; 4, ray-floret.

The dried flower heads of *Ar'nica montana* Linné.

DESCRIPTION OF DRUG.—About 25 mm. (1 in.) in length and 15 to 20 mm. ($\frac{3}{5}$ to $\frac{4}{5}$ in.) in diameter, surrounded by lanceolate, involucral scales; the receptacle is flat, and bears about 15 to 20 bright yellow, ligulate ray-florets, 3-toothed, striate, about 25 mm. (1 in.) long, and numerous shorter, tubular disk-florets; **pappus long and hairy**) giving the heads a characteristic appearance; **odor** peculiar and agreeable; taste persistently acrid and bitter. The powder is sternutatory. Adulterated with many flowers of the Compositae, such as calendula, anthemis, inula, senecio, etc.

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

CONSTITUENTS.—Four per cent. of arnicin, and 0.04 to 0.07 per cent. of butyraceous volatile oil. A bitter alkaloid arnicine with crystallizable salts was reported, but has not since been confirmed. Ash, not more than 9 per cent.

ACTION AND USES.—Same as the root. Dose: 15 to 30 gr. (1 to 2 Gm.). The tincture is used externally as a **vulnerary**.

OFFICIAL PREPARATION.

Tinctura Arnicae (20 per cent.)

Dose: 10 to 30 drops (0.6 to 2 Mils).

566. **CNICUS ARVENSIS** Hoffmann.—CANADA THISTLE. An indigenous plant, the rhizome of which is popularly used for its astringent properties.

567. **ERECHTHITES HIERACIFOLIA** Rafinesque.—FIREWEED. *Habitat:* United States. (Leaves.) The name (fireweed) comes from the fact that the plant springs up

spontaneously in burned districts. Tonic and astringent in dysentery, etc. Dose: 30 to 60 gr. (2 to 4 Gm.). The volatile oil of this plant has been used to adulterate the oil of erigeron.

568. **TRILISA ODORATISSIMA** Cassini.—DEER TONGUE. VANILLA LEAF. This plant contains **coumarin**, and the **leaves** are used in the Southern States to flavor tobacco. Aromatic, stimulant, and tonic; used as a corrective. Dose 30 to 60 gr. (2 to 4 Gm.).

569. **PTEROCAULON PYCNOSTACHYON** Elliott.—BLACK ROOT. Leaves used by the Indians as an alterative. Dose: 15 to 30 gr. (1 to 2 GM.).

570. **GUACO**.—By this name are known the leaves and roots of various herbs belonging to the genus **Mikania**, growing in Central and South America, where they are used as a febrifuge, anthelmintic, alterative, and alexipharmic. They at one time gained considerable attention in Europe in the treatment of epidemic cholera and chronic diarrhea. Dose: 15 to 30 gr. (1 to 2 Gm.).

571. **AMBROSIA ARTEMISIÆFOLIA** Linné.—RAGWEED. The leaves of this common weed have been used in domestic practice as an astringent, styptic, and hemostatic.

571a. **AMBROSIA**.—RAGWEED. The staminate flowers of **Ambrosia artemisiæfolia** Linné, North America. Staminate flowers very small, yellowish; surrounded by the cup-like, green involucre. *Preparation*: Fluidextract. *Properties*: Tonic and astringent. *Uses*: In treatment of inflammation from wounds and injuries; in hemorrhoidal tumors and ulcers; internally for hay-fever. **See Pollen Extract, under Serotherapy**. Also in the treatment of dysmenorrhea.

572. **STRUMARIUM**.—CLOTBUR. COCKLEBUR. The leaves of **Xanthium strumarium** Linné. Hemostatic and styptic.

573. **SPINOSUM**.—SPINY CLOTBUR. The herb of **Xanthium spinosum** Linné. Diaphoretic, sialogogue, and diuretic. It is asserted that it has been used with success in warding off hydrophobia. Dose of fluidextract: 15 to 30 drops (1 to 2 Mils).