considered more agreeable and effective. The so-called popular Italian castor oil is produced extensively around Verona, Italy, where only fresh seed thoroughly deprived of coating are expressed hydraulically without heat; this oil although remarkedly free from disagreeable odor and taste is none the less active. An ethereal or alcoholic tincture of the seed is claimed to be less irritating and nauseous. The press-cake, usually 60 p. c., is employed chiefly as a fertilizer, and, after the removal of ricin by salt solution, as a cattle-food. In India there are two varieties of seeds, *large* and *small*, the latter yielding the best oil.

PREPARATIONS.—1. *Collodion Flexile,* 3 p. c. 2. *Emulsum Olei Ricini, N.F.,* 35 p. c., + acacia 9, tincture of vanilla 2.5, syrup 20, water q. s. 100. Dose, ʒj–2 (30–60 cc.); 3. *Oleum Ricini Aromaticum, N.F.,* 97 p. c., + gluside $\frac{1}{20}$, oil of cinnamon $\frac{3}{10}$, oil of clove $\frac{1}{10}$, vanillin $\frac{1}{10}$, coumarin $\frac{1}{100}$, alcohol 3. Dose, ʒiv–8 (15–30 cc.). 4. *Linimentum Sinapis Compositum, N.F.,* 15 p. c.

Unoff. Preps.: Castor Oil Mixture (Br.), 37.5 p. c., ʒj–2 (30–60 cc.); Capsules, Paste.

PROPERTIES.—Purgative, demulcent. It is non-irritating until the duodenum is reached, where the bile and pancreatic juice decompose it into glycerin and ricinoleic acid; this latter combines with sodium, forming sodium rincinoleate, which mildly irritates the bowels, causing purgation, stimulating muscular glands and coat, but not the liver; acts in 4 to 6 hours, producing liquid stools without much pain or tenesmus, followed by sedative effect on intestines. Leaves are said to be galactagogic when applied to breast, and to impart cathartic power to the milk and various secretions. Glycerin increases the purgative effect.

USES.—Constipation, colic, diarrhea, dysentery, enteritis in pregnancy, puerperal state, tape and lumbricoid worms, traumatic fever, renal calculi, night-sweats, amenorrhea, engorged liver, hemorrhoids, cystitis, gonorrhea. In dysentery may add laudanum, ♏xx (1.3 cc.), to each dose in order to counteract any pain, tenesmus, or exhaustion from frequent passages; externally applied to warts, as a local sedative, protective; base of Turkish-red oil used in calico dyeing and printing.

Administration.—In emulsion flavored to suit, or equal quantities of oil and either heavy sarsaparilla, peppermint, or cinnamon syrup beaten together, or take with soda water, malt liquor, orange juice, coffee, etc. All disguise very effectively the nauseating oil taste. At one time the seed were employed, but action too violent; their griping principle (ricin) is said to reside in the embryo and testa, hence to make best oil most of these should be removed before expressing.

ROSA. ROSE, *U.S.P.*

Rosa gallica, *Linné.* { The dried petals, collected just before the expansion of the flower.

Habitat. W. Asia, S. Europe; cultivated (England, Holland, France, United States, etc.).

Syn. Rosa Gallica, Red Rose, Rosa Gall., French Rose, Provins Rose; Br. Rosæ Gallicæ Petala, Red Rose Petals, Flores Rosarum Rubrarum; Fr. Rose rouge —de Provins, Roses rouges; Ger. Französische Rose, Essigrosen-(blatter), Zuckerrose.

Ro'sa. L. fr. Gr. *ῥόδον*, Eng. rose, fr. Celtic *rhos*, red—*i. e.*, the prevailing color of the flowers.

Gal'li-ca. L. *gallicus*, of or pertaining to Gaul, now France—*i. e.*, country where once it flourished extensively—French rose.

PLANT.—Bushy shrub, .6–1 M. (2–3°) high, stems numerous, covered with prickles and a few sharp spines; leaves alternate, imparipinnate, 2 pairs opposite leaflets, these nearly sessile, ovate, rounded at base, acute at apex, serrate, stiff, keeled, rugose, with veins, pale, hairy below, leaf-serratures not edged with glands; flowers large, on long stalks, petals 5 in the wild state, more when cultivated, rich-crimson; fruit (hip) scarlet to orange-red, oblong, containing many 1-seeded achenes, calyx persistent. PETALS, either separate or imbricated in small cones, broadly ovate, summit rounded, deeply notched, margin entire, somewhat recurved, base obtuse, purplish-red except the light brown claw; texture velvety; when dry brittle; odor agreeable; taste astringent, slightly bitter. POWDER, reddish-brown—epidermal cells with purplish-red content (sap), fragments of fibro-vascular bundles, spiral tracheæ, rectangular cells with purplish content (sap). *Solvents:* boiling water; diluted alcohol. Dose, gr. 15–60 (1–4 Gm.).

Commercial.—Plant, in its many species and varieties, very largely cultivated domestically as well as commercially; petals are obtained by circumcising with a sharp knife the unopened corolla-buds, leaving the stamens behind on the calyx; or the entire blooms are cut off with knives or scissors, dried carefully but rapidly by stove heat (in order to preserve astringency and color), sifted, if necessary, from stamens, etc., and marketed; early collection is more astringent and of better color, qualities impaired by slow drying. It is claimed that 1000 flower-buds yield 50 pounds (23 Kg.) of fresh petals, which when dried become 5 pounds (2.3 Kg.).

ADULTERATIONS.—Petals of various red roses.

CONSTITUENTS.—Volatile oil (trace), mucilage, tannin (rosatannic acid, quercitannic acid?), gallic acid, anthrocyanin—sap pigment, quercitrin, quercetin (astringent and coloring), sugar, ash 3.5 p. c.

PREPARATIONS.—1. *Fluidextractum Rosæ.* Fluidextract of Rose. (Syn., Fldext. Ros., Fluid Extract of Rose; Fr. Extrait fluide de Rose rouge; Ger. Essigrosenfluidextrakt.)

Manufacture: Similar to Fluidextractum Ergotæ, page 63; 1st. menstruum: alcohol 50 cc., water 40 cc., glycerin 10 cc.; 2d: diluted alcohol. Dose, ♏xv–60 (1–4 cc.).

Preps.: 1. *Mel Rosæ.* Honey of Rose. (Syn., Mellitum Rosatum; Fr. Mellite de Roses rouges, Miel Rosat; Ger. Mel rosatum, Rosenhonig.)

Manufacture: 12 p. c. Mix fluidextract of rose 12 cc. with honey q. s. 100 Gm. Dose, ʒj–2 (4–8 cc.).

Prep.: 1. *Massa Hydrargyri* (33 p. c.)—32 p. c.

2. *Syrupus Rosæ, N.F.*, 12.5 p. c., + diluted sulphuric acid 1 p. c.

2. *Aqua Rosæ Fortior.* Stronger Rose Water. (Syn., Aq. Ros. Fort., Triple Rose Water, Aqua Rosæ; Fr. Eau distillée fort de Rose; Ger. Stärkeres Rosenwasser.)

Manufacture: The saturated aqueous distillate from fresh flowers of *Rosa centifolia.* It is colorless, clear, strong, pleasant odor and taste of fresh rose blossoms, free from empyreuma, mustiness, or fungoid growths; neutral, slightly acid; evaporate 100 cc.—residue .001 Gm.; no reaction with hydrogen sulphide T. S., or sodium sulphide T. S. (abs. of metallic substances). Dose, ʒij–8 (8–30 cc.).

Preps.: 1. *Aqua Rosæ.* Rose Water. (Syn., Aq. Ros., Aqua Rosarum; Fr. Eau distillée de Rose; Ger. Rosenwasser.)

Manufacture: Mix, immediately before using, stronger rose water, and distilled water, each 1 volume. Dose, ʒij–8 (8–30 cc.).

2. *Unguentum Aquæ Rosæ.* Ointment of Rose Water. (Syn., Ung. Aq. Ros., Cold Cream; Fr. Crême froide; Ger. Unguentum leniens—emolliens.)

Manufacture: Melt, in fine pieces, spermaceti 12.5 Gm., white wax 12 Gm., add expressed oil of almond 56 Gm., stir, heat until uniform; add gradually stronger rose water 19 Gm., previously warmed and having dissolved in it sodium borate .5 Gm., stir rapidly and continuously until congealed and uniform; must be free from rancidity, and if chilled should be warmed slightly before incorporating other ingredients. Should be kept in pure tin, collapsible tubes.

3. *Confectio Rosæ, N.F.*, rose 8 Gm., sucrose 64, honey 12, stronger rose water 16, Dose, ʒss–1 (2–4 Gm.).

3. *Infusum Rosæ Compositum, N.F.*, 1.3 p. c., + diluted sulphuric acid .9, sucrose 4, boiling water q. s. 100. Dose, ʒss–2 (15–60 cc.). 4. *Pilulæ Aloes et Mastiches, Lady Webster Dinner Pills, N.F.*, ½ gr. (.03 Gm.).

Unoff. Preps.: Infusion, 3.5 p. c. *Infusum Rosæ Acidum* (Br.) 2.5 p. c., + diluted sulphuric acid 1.25, water q. s. 100.

PROPERTIES.—Similar to tannin; tonic, mild astringent, carminative.

USES.—Uterine and other hemorrhages, aphthæ, ulcers of mouth, ears, anus, inflamed eyes, chapped hands, burns, flavoring vehicle, perfumery; ointment—soothing, emollient application to the skin, chapped hands and lips, abrasions, ulcers, frost-bite, etc.

Rosa centifolia

Rosa centifo'lia, Pale Rose.—The petals, collected after expanding, U.S.P. 1820–1890; W. Asia. Plant erect, 1–2 M. (3–6°) high, similar to but larger than *Rosa gallica;* stems covered with prickles, larger ones hooked; leaves imparipinnate, 2 pairs of opposite leaflets; flowers large, double, calyx persistent; fruit (hip) scarlet to orange-red, oblong, containing many 1-seeded achenes. Petals numerous, roundish-obovate, retuse, or obcordate, pink, fragrant, sweetish, slightly bitter, faintly astringent; contain volatile oil, mucilage, sugar, tannin, malates, phosphates (quercitrin?). This, although often mistaken for the Damask rose, is no doubt the most anciently cultivated variety of *R. gallica,* and exists in many hybrid forms which are employed indiscriminately. Used as mild carminative, for distilling the oil and U.S.P. stronger rose water—the latter being of fine flavor, and more used in this country, owing to prevalence and cheapness, than the imported. Dose, gr. 15–60 (1–4 Gm.). *R. cani'na, Dog Rose,* United States; leaflets 5–7, ovate, serrate, flowers pink, white; *R. blan'da, R. nit'i-da,* also employed.

Rosa canina.

Rosa damascena

R. damasce'na, Damascus Rose.—The volatile oil distilled from fresh flowers, U.S.P. 1840–1900; India, N. Africa, S. France, Bulgaria (Roumelia). Plant, prickly, resembling the ordinary rose bush, cultivated in hedge-like rows on southern slope of Balkan Mountains. Oil (otto, attar, essence of rose) pale yellow, transparent liquid, fragrant rose odor, mild sweetish taste, sp. gr. 0.860, alcohol (70 p. c.) precipitates stearoptene but dissolves eleoptene, congeals at 18–22° C. (64–72° F.); consists of solid portion (stearoptene) 12–14 p. c., being a mixture of odorless hydrocarbons, $C_{20}H_{42}$, etc., and a liquid portion (eleoptene) composed of (1) geraniol (rhodinol), $C_{10}H_{18}O$, 75 p. c., most fragrant, oxidized into aldehyde, citral (rhodinal), readily soluble in alcohol, (2) citronellol, $C_{10}H_{20}O$, small amount; when congealed should be liquefied by warming before dispensing. *Adulterations:* Spermaceti, paraffin (crystallize in opaque crust), fixed oils, volatile oils of guaiac-wood, palmarosa, rose geranium, etc.—having one or more similar ingredients (geraniol, etc.), recognized by congealing point and saponification value (10–17); synthetic rose oils—now largely manufactured as a substitute. Stimulant, carminative, aromatic; chiefly in perfumery, flavoring.

ROSMARINUS. ROSEMARY.

Oleum Rosmarini. Oil of Rosemary, *U.S.P.*

Rosmarinus officinalis, *Linné.* { A volatile oil distilled from the fresh flowering tops, yielding not less than 2.5 p. c. esters (bornyl acetate) nor less than 10 p. c. total borneol free and as esters.

Habitat. Mediterranean Basin—Spain to Asia Minor, N. Africa, reaching to Madeira and the Canary Islands; cultivated in gardens.

Syn. Garden Rosemary, Old-man, Folia Rosmarini, Folia Roris Marini, Folia Anthos; Fr. Romarin; Ger. Rosmarin, Meerthau; Ol. Rosmar., Rosemary Oil, Oleum Anthos; Fr. Essence de Romarin; Ger. Rosmarinöl.

Ros-ma-ri'nus. L. *ros*, dew, mist, + *marinus*, *maris*, of the sea—sea foam—*i. e.*, from its maritime habitat and glaucous appearance. *Rosemary*—not Mary's rose.

Of-fi-ci-na'lis. L. see etymology of (*Smilax*) *officinalis*, page 122.

PLANT.—Small perennial shrub 1–1.3 M. (3–4°) high, bushy, much branched; bark pale brown, twigs tomentose; flowers April-May, bilabiate, upper lip 2-parted, lower 3-divided, middle one being the largest, pale blue; fruit achenes, subglobose, smooth; leaves evergreen, many, sessile, 2.5 Cm. (1′) long, linear, both ends blunt, entire, margins revolute, dark green, shining above, woolly with white, stellate hairs beneath, like the flowers, with aromatic fragrance, camphor-like; taste bitter.

CONSTITUENTS.—Volatile oil 1 p. c., resin, tannin, bitter principle.

Oleum Rosmarini. Oil of Rosemary.—This volatile oil, obtained by distilling the fresh flowering tops with water or steam, is a colorless, pale yellow liquid, characteristic odor of rosemary, camphoraceous taste, soluble in 10 vols. of 80 p. c. alcohol, sp. gr. 0.903, dextrorotatory; contains pinene, $C_{10}H_{16}$, 80 p. c., camphene, cineol, $C_{10}H_{18}O$, camphor, $C_{10}H_{18}$, also at least 2.5 p. c. of esters, calculated as bornyl acetate, $C_{10}H_{17}C_2H_3O_2$, and 10 p. c. of total borneol, $C_{10}H_{17}OH$. Should be kept cool, dark, in well-stoppered, amber-colored bottles. Dose, ♏j–5 (.06–.3 cc.).

ADULTERATIONS.—OIL: Oil of turpentine, etc., recognized by odor and not being affected by an equal volume of alcohol, which dissolves out oil of rosemary.

Commercial.—The Dalmatian (Italian) oil of rosemary, distilled after the flowering season is over, and the French, distilled from the flowering tops and of finer odor, are the chief commercial varieties; the English, from cultivated plants, and the Spanish, being high priced are greatly esteemed by some, but little used.

PREPARATIONS.—1. *Linimentum Saponis*, 1 p. c. 2. *Tinctura Lavandulæ Composita*, $\frac{1}{5}$ p. c. 3. *Acetum Aromaticum, N.F.*, $\frac{1}{20}$ p. c. 4. *Linimentum Saponato-Camphoratum, N.F.*, $\frac{3}{5}$ p. c. 5. *Oleum Hyoscyami Compositum, N.F.*, $\frac{1}{5}$ p. c. 6. *Spiritus Odoratus, N.F.*, $\frac{7}{10}$ p. c.

Unoff. Preps.: Infusion, 5 p. c.; Spirit (Br.), 10 p. c., ♏x–30 (.6–2 cc.).

Rosmarinus officinalis: branch and flowers.

PROPERTIES.—Carminative, stimulant, diuretic, diaphoretic, emmenagogue; excessive doses cause death.

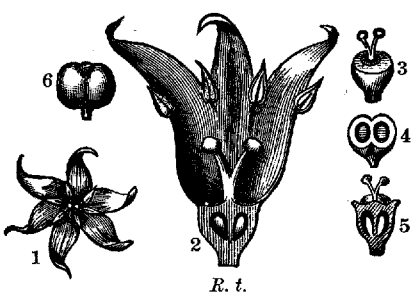
USES.—Colic, nervous disorders, menstrual derangements; externally in rheumatism, sprains, bruises. Stimulates the hair in alopecia, reduces temperature, and imparts violet odor to urine; mainly used in liniments, lotions, ointments, perfumery.

Rosmarinus officinalis: st, stamen with anther; *n*, style with stigma.

Tops or Leaves, U.S.P. 1820–1880.

Rubia

Ru'bia tincto'rum, Madder.—The root, U.S.P. 1820–1870; S. Europe, Asia. Perennial herb, square stem, covered with short prickles by which it climbs; leaves elliptical, 7.5 Cm. (3′) long; flowers yellow; root creeping, 5 Mm. ($\frac{1}{5}$′) thick, reddish, sweetish, bitter, acrid, astringent taste; contains rubian (yellow), alizarin (orange-red), ruberythrin (yellow needles, blood-red with alkalies), purpurin. Used as tonic, diuretic, emmenagogue; dropsy, amenorrhea, rachitis, dyeing. Dose, gr. 15–60 (1–4 Gm.).



R. t.

Rubia tinctorum: 1, open flower; *2*, longitudinal section of flower enlarged; *3*, ovary; *4*, cross-section of ovary; *5*, longitudinal section of ovary; *6*, fruit.

Rubus idaeus

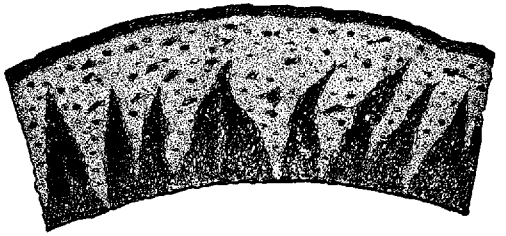
R. Idæ'us, or *R. strigo'sus; Rubi Idæi Fructus, Raspberry, N.F.*—The fresh, ripe fruit of several varieties; Europe, N. Asia, N. America. Shrub 2 M. (6°) high, glaucous, spinose; leaves imparipinnate, 1–3 pairs, sessile, ovate, serrate, whitish, downy leaflets; flowers white, 5's. Fruit, deprived of conical receptacle (hollow base), globular, hemispherical, composed of 20–30 small, rounded, polygonal, succulent drupelets (aggregate fruit), pericarps red, numerous non-globular hairs, mesocarps fleshy, juice red, parenchyma with calcium oxalate rosettes, endocarps small stones, wrinkled; odor characteristic, aromatic; taste pleasant, sweet, acidulous. Black Raspberries, the fresh ripe fruit of varieties of *R. occidenta'lis*, may be substituted for pharmaceutical purposes, either in part or wholly for Red Raspberries; most of these plants grow wild and under cultivation throughout N. America, supplying fruit that is in great demand, and a juice that ferments into wine, which upon distillation yields brandy more or less popular in bowel affections; contains volatile oil (trace), citric acid, malic acid, sugar 5 p. c., pectin, coloring matter. Refrigerant, mild laxative, dietetic; used as edible fruit and for preparing syrup; 1. *Syrupus Rubi Idæi;* add to every 100 cc. of clear, boiled, filtered juice, 200 Gm. sucrose: Preps.: 1. *Elixir Bromidorum Quinque*, 15 p. c. 2. *Elixir Gentianæ Glycerinatum*, 6 p. c.

Rubus Idæus.

5. *Quilla'ja Sapona'ria, Quillaja, Soap (Tree) Bark, N.F.*—The dried inner bark with not more than 5 p. c. of outer bark nor 1 p. c. of foreign organic matter; Chile, cult. in N. Hindustan. Tree 15–18 M. (50–60°) high; leaves oval, evergreen, coriaceous; flowers white, monœcious; fruit capsule with persistent calyx, many seeded. Bark in flat pieces of variable length, 3–8 Mm. ($\frac{1}{8}$–$\frac{1}{3}$′) thick, or small chips, brownish-white, often with cork patches, nearly smooth, occasional depressions, conical projections or channels; inner surface yellowish-white; fracture uneven, strongly fibrous; odor slight, taste acrid. Powder, pinkish-white, very sternutatory—elongated calcium oxalate prisms, irregular crystal-fibers with thick lignified walls, medullary rays, stone cells, starch grains, cork cells with brownish walls; solvents: alcohol, hot water; contains saponin (quillajic acid, $C_{19}H_{30}O_{10}$ + quillaja-sapotoxin, $C_{17}H_{25}O_{10}$), $C_{32}H_{56}O_{18}$, 9 p. c., starch, gum, sucrose, calcium oxalate and sulphate. Stimulant, diuretic, expectorant, irritant, sternutatory, detergent, local anesthetic, antipyretic, paralyzant to heart and respiration, irritant to respiratory passages, poison to voluntary muscles; like senega; bronchitis, coryza, rhinitis, emulsifying agent, eruptions, scalp sores, fetor of feet, hair tonics, washing silks. Dose, gr. 15–30 (1–2 Gm.); 1. *Tinctura Quillajæ*, 20 p. c. (boiling water, then 35 p. c. alcohol); dose, ʒss–1 (2–4 cc.); 2. *Liquor Picis Carbonis*, 10 p. c. Fluidextract, ♏v–15 (.3–1 cc.).

Rubus villosus

Ru'bus villo'sus, R. nigrobac'cus, R. cuneifo'lius, + *Eubatus* section, *Rubus, Blackberry Bark, N.F.*—The dried bark of the rhizome and roots with not more than 10 p. c. of adhering wood nor 3 p. c. of other foreign organic matter; N. America, fields, thickets, cult. Pubescent perennials; stems angular, woody, with stout recurved prickles; leaflets 3–5, ovate, cuneate, petiolate, serrate, rough above, pubescent beneath, 2.5–10 Cm. (1–4′) long; flowers white, racemes; fruit (aggregate drupe —carpels 20 +), 12–25 Mm. ($\frac{1}{2}$–1′) long, black, pulpy, delicious. Bark of rhizome 1–2 Mm. ($\frac{1}{25}$–$\frac{1}{12}$′) thick, in long, tough, flexible bands or quills, 3–6 Mm. ($\frac{1}{8}$–$\frac{1}{4}$′) broad, brownish, grayish-brown, smooth or



Rubus villosus: transverse section of bark, magnified 15 diam.

scaly, inner surface yellowish, coarsely striate, fracture tough-fibrous, readily splitting; inodorous; taste strongly astringent, bitterish. Powder, dark brown—cortical parenchyma, calcium oxalate rosettes, many simple and compound starch grains, cork tissue; solvents: boiling water, diluted alcohol; contains tannin 12–17.5 p. c., gallic acid .4 p. c., villosin (saponin) .8 p. c., resin 7 p. c., volatile oil, fixed oil, wax, ash 3 p. c. Astringent, tonic, similar to tannin; diarrhea—children and adults in summer. Dose, ʒss–1 (2–4 Gm.); 1. *Fluidextractum Rubi* (diluted alcohol), dose, ♏x–60 (.6–4 cc.): Prep.: 1. *Syrupus Rubi*, 25 p. c., dose, ʒj–4 (4–15 cc.). Decoction, 5 p. c. (water or milk), ℥j–2 (30–60 cc.); Syrup of fruit (juice 100, sucrose 200—heat); Wine; Brandy.

Rumex

Ru'mex cris'pus, or *R. obtusifo'lius, Rumex, Yellow (Curled) Dock, N.F.*—The dried root with not more than 5 p. c. of stem-bases or other foreign organic matter; Europe, N. America. Common obnoxious weeds, 30–120 Cm. (1–4°) high, coarsely angled; leaves (lower) 15–35 Cm. (6–14′) long, decreasing toward summit, lanceolate, crisped, wavy; flowers terminal panicle becoming a dense mass of rusty-brown 3-winged capsules. Root, nearly simple, few rootlets, somewhat twisted, up to 30 Cm. (12′) long, 7 Cm. (3′) thick, reddish-brown, grayish from adhering soil, annulate above, wrinkled longitudinally, indented root-scars, stem-scars or remains (hollow); fracture short, dusty, fibrous; usually split longitudinally or cut transversely, 2 Cm. ($\frac{1}{5}$′) long; odor slight; taste astringent, bitter. Powder, brownish —calcium oxalate rosettes, crystals, numerous starch grains, few fibers, tracheæ, cork cells light brown; contains (cascara-) emodin .17 p. c., chrysophanic acid (rumicin, lapathin), tannin, calcium oxalate, starch. Astringent, alterative, tonic, laxative, antiscorbutic; similar to rhubarb and sarsaparilla; cutaneous eruptions, scorbutic manifestations, itch,

Rumex crispus.

scrofula, syphilis, hepatic congestion, dyspepsia, intermittents; leaves used as a laxative diet, and as spinach. Dose, gr. 15–60 (1–4 Gm.); 1. *Fluidextractum Rumicis* (diluted alcohol), dose, ♏xv–60 (1–4 cc.). Decoction; Ointment.

R. britan'nica, Water Dock. The root, U.S.P. 1820–1850. Europe, naturalized in N. America. Plant 1.6–2 M. (5–6°) high, leaves lanceolate, acute, transversely veined, obscurely crenate, .3–.6 M. (1–2°) long; root more astringent but physically and medicinally similar to *R. crispus*, with which it is often indiscriminately collected. *R. sanguin'eus, Red-veined Dock.* Leaf-veins and stems reddish; *R. aqua'ticus*, fruit smooth, both astringent. *R. Acetosel'la, Field* or *Sheep Sorrel*, contains acid potassium oxalate and tartaric acid, sour taste lost upon drying; refrigerant, diuretic, good diet in scurvy.

Ruta graveolens.

Ruta

Ru'ta grave'olens.—The leaves, U.S.P. 1830–1870; S. Europe, cultivated. Plant .6–1 M. (2–3°) high, woody; flowers yellow; fruit capsule, 4–5-lobed; seed black, many, all parts active; leaflets 12–25 Mm. (½–1′) long, 6 Mm. (¼′) wide, crenate, thick, pellucid-punctate, aromatic, bitter; contain volatile oil (Oleum Rutæ, U.S.P. 1870–1880, greenish-yellow, aromatic), rutin, (rutic or rutinic acid, $C_{42}H_{50}O_{25}$—bitter, yellow, crystalline glucoside, identical with barosmin, decomposing into quercetin, etc.). Stimulant, emmenagogue, nervine; hysteria, colic, amenorrhea, menorrhagia, metrorrhagia—due to atony of uterus; dangerous abortifacient; large doses irritant-poison—severe gastro-enteritis, vomiting, abdominal pain, distention, bloody stools, strangury, convulsions, rarely death. Dose, gr. 5–20 (.3–1.3 Gm.); oil, ♏j–5 (.06–.3 cc.).

Sabbatia

Sabba'tia angula'ris, American Centaury.—The herb, U.S.P. 1820–1870; United States. Plant .3–.6 M. (1–2°) high, stem branched above, square, smooth; leaves ovate, 2.5 Cm. (1′) long, heart-shaped; flowers deep rose, central star greenish, wheel-shaped, 5-parted, bitter; contains bitter principle, fat, erythrocentaurin. Used as tonic, febrifuge, diaphoretic, rheumatism, sore throat, fevers. Dose, gr. 15–60 (1–4 Gm.). *S. Elliot'tii, Quinine Flower; S. campes'tris*, and *Erythræ'a Centau'rium, European Centaury;* all may be used similarly.

Salix

SALIX. SALIX (Willow).

Salicinum. Salicin, $C_{13}H_{18}O_7$, *U.S.P.*

Salix and **Populus**, several species. } A glucoside.

Habitat. Europe, N. America; cultivated.
Syn. White Willow, Common European-, Duck-, Huntington-, Salicin Willow, Withe, Withy; Fr. Saule blanc, Salicine; Ger. Weidenrinde, Salicin.
Sa'lix. L. see etymology, above, of Salicaceæ.
Pop'u-lus. L. poplar, fr. *populus*, the people—being often planted along the public ways in Rome, where it was called *arbor populi*, tree of the people.

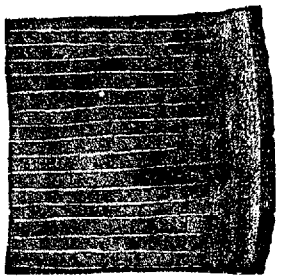
Plants.—These two juxta-positioned genera are composed mostly of large trees 15–18 M. (50–60°) high, with flexible branches: *Salix* leaves, long pointed, entire or glandularly toothed; *Populus* leaves, broad, more or less heart-shaped, ovate, toothed; flowers May, both in catkins appearing before the leaves, dicœcious, buds covered with scales, or a varnish; barks of both genera resemble; that of *Salix* slips from the wood more readily.

Constituents.—Salicin 1–3 p. c., tannin 12 p. c., extractive matter.

Salicinum. Salicin.—Obtained by several methods: 1. Add litharge or basic lead acetate to hot concentrated decoction of young bark to remove tannin, gum, extractive; the filtrate contains salicin and some absorbed lead, the latter is separated by adding sulphuric acid and barium sulphide, while salicin, upon concentration of the filtrate, crystallizes out. When basic lead acetate is used, the free acid should be neutralized with calcium carbonate, and then the filtrate evaporated. 2. Boil bark with milk of lime to remove tannin, evaporate filtrate to

soft extract, digest this with alcohol, from which salicin will crystallize after distilling off the alcohol. It is in colorless, silky, shining, needles or prisms, white, crystalline powder, odorless, very bitter taste, soluble in water (23.5), hot water (3.3), alcohol (88.5), hot alcohol (30), insoluble in chloroform, ether; aqueous solution (1 in 30) neutral, levorotatory, melts at 200° C. (392° F.). *Tests:* 1. Heat small portion in test-tube until brown, add distilled water (few cc.), + a drop of ferric chloride T. S.—violet color. 2. With sulphuric acid—red color, disappearing on adding distilled water; incinerate—ash .05 p. c. 3. Heat gently .1 Gm. with potassium dichromate .2 Gm. + diluted sulphuric acid 2 cc.—fragrant odor of salicylic aldehyde. 4. Aqueous solution (1 in 50) 10 cc., + 1 cc. tannic acid T. S., picric acid T. S., or mercuric potassium iodide T. S.—no precipitate (abs. of alkaloids; another 10 cc., + a drop of ferric chloride T. S.—not violet (abs. of salicylic acid). *Impurities:* Heavy metals, alkaloids, salicylic acid. Should be kept in well-closed containers. Dose, gr. 10–30 (.6–2 Gm.).

Commercial.—The *White Willow* (*Salix al'ba*) and *Crack Willow* (*S. frag'ilis*) contain most tannin, the *Purple Willow* (*S. purpu'rea*) most salicin, it being even in the leaves, although largest quantity in bark of young wood. *Populus al'ba, P. angustifo'lia, P. acumina'ta, P. trem'ula,* all yield salicin to a considerable extent.



Willow bark: transverse section, magnified 15 diam.

PREPARATIONS.—(Unoff.): May give in powder, pill, syrup, water, or with glycyrrhiza extract, in small and frequent doses.

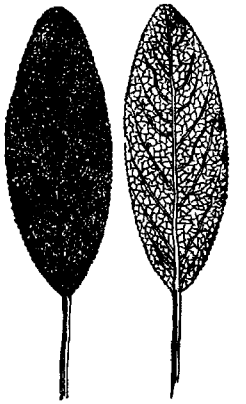
PROPERTIES.—Tonic, antiperiodic, antipyretic, antiseptic, antiferment, non-toxic; slower, weaker, less depressing to heart than salicylic acid, like it—circulates in the blood as sodium salicylate; converted in stomach into glucose and saligenin, eliminated by urine as saligenin, salicylic, salicyluric, salicylous acids.

USES.—Acute rheumatism, fevers; relieves pain, arterial swellings, intermittents (inferior to quinine), coryza, hay fever, influenza, neuralgia, diabetes. Externally—gangrenous wounds, eczema, cancer, burns, fetid perspiration—applied in solution with borax.

Salvia

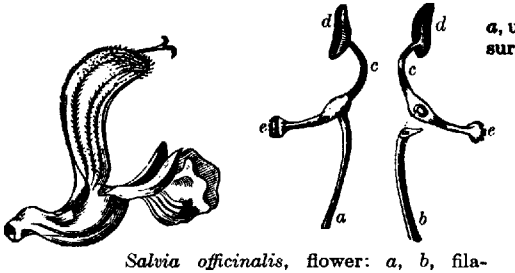
Sal'via officina'lis, (Garden, Meadow) Sage.—The dried leaves, U.S.P. 1840–1900; S. Europe, warm stony places; cultivated universally. Perennial; stem semi-shrubby, .6 M. (2°) high, quadrangular, gray-pubescent, branched; flowers, cymes, blue with white and purple, on woolly stalks, calyx tubular, 2-lipped, upper with 3, lower with 2 acute teeth; corolla tubular, bilabiate, lower in 3 rounded lobes, central one largest; fruit 4 achenes; seed solitary. Leaves ovate-oblong, 3–7.5 Cm. ($1\frac{1}{5}$–3′) long, apex subacute, base subcordate, crenulate, thick, grayish-green, reticulate-veined, pubescent, petiolate; odor aromatic; taste aromatic, bitter, astringent; should be collected when flowering and dried carefully; solvents: diluted alcohol, boiling water; contains volatile oil .5–2 p. c., resin, tannin, bitter principle (similar to

Salvia officinalis.



a b

Sage leaf: *a*, upper surface; *b*, lower surface.



Salvia officinalis, flower: *a*, *b*, filaments; *c*, connective; *d*, fertile anthers; *e*, sterile anthers.

amaroid marrubiin), gum. Stimulant, tonic, astringent, vulnerary, condiment; dyspepsia, colliquative sweats, seasoning fat fowl, pork; infusion (externally)—ulcers of mouth, throat, indurated sores, nasal catarrh, suppression of mammary secretion; gargle may be sweetened (sugar, honey) and have added vinegar, alum, borax, potassium chlorate, etc.; ancients valued it highly. Dose, gr. 15–60 (1–4 Gm.); fluidextract, ♏xv–60 (1–4 cc.); infusion, 5 p. c., ℥j–2 (30–60 cc.); water (Aqua Salviæ), distil 1 part with water 10; gargle. *S. praten'sis,* S. Europe; *S. lyra'ta,* N. America, slightly aromatic, and *S. polysta'chya, Chia-seed,* Mexico, are aromatic and bitter, all being used interchangeably; infusions of either produce (hot) or check (cold) excessive sweating.

Sambucus

Sambu'cus canaden'sis or *S. ni'gra, Sambucus, Elder Flowers, N.F.*—Caprifoliaceæ. The air-dried flower with not more than 2 p. c. of foreign organic matter; N. America (damp places). Semi-shrubby perennial, slightly woody, 1.5–3 M. (5–10°) high; stem branching, smooth; fruit, ovoid drupe, 6 Mm. (¼′) long, red then purplish-black. Flowers, small 2–3 Mm. ($\frac{1}{12}$–$\frac{1}{8}$′) broad, shriveled; corolla cream-colored, brownish-yellow, rotate, campanulate, 5-lobed; stamens 5, anthers yellow, pollen with punctate markings; odor faintly sweet, aromatic; taste slightly bitter. Powder, brownish-yellow—soon becomes worm eaten unless a preservative (sodium chloride) is added; contains volatile oil .3–.5 p. c., resin, fat, wax, mucilage, tannin. Stimu-

lant, carminative, diaphoretic, sudorific, diuretic, alterative, flavoring; used mostly externally in fomentation, poultice, and ointment; rheumatism, erysipelas, abscesses, etc.; the water for cooling application to the eyes. Dose, ʒss–1 (2–4 Gm.); 1. *Fluidextractum Stillingiæ Compositum*, 12.5 p. c. 2. *Species Laxativæ*, 25 p. c. *S. ni'gra.*—Europe; tree, 4.5–6 M. (15–20°) high, 10–15 Cm. (4–6′) thick, compound cymes smaller than the preceding. *S. Eb'ulus, Dwarf Elder.* All parts with strong, disagreeable odor, bitterish, acrid taste, the 4-seeded fruit, resembling elderberries; laxative; *S. maderen'sis*, Madeira; less aromatic than *S. nigra.*

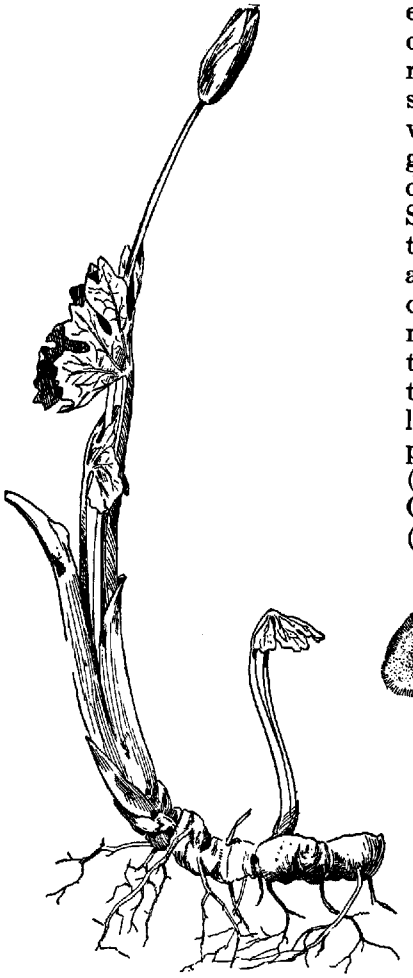
Sambucus canadensis.

Sandarac

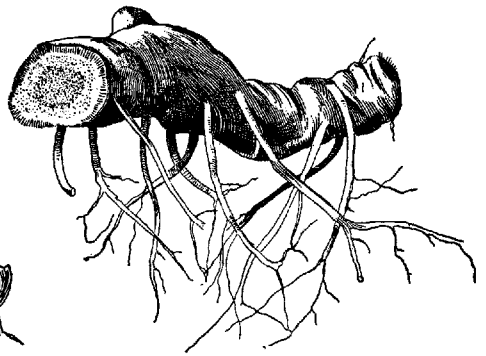
Cal'litris quadrival'vis, Sandaraca (*Sandarac*).—N. W. Africa. It is a resin which exudes spontaneously or from incisions made through the bark; occurs in elongated pale yellow tears 5–15 Mm. ($\frac{1}{5}$–$\frac{3}{5}$′) long, covered with whitish dust, of a glass-like luster, transparent, hard, brittle; odor and taste terebinthinate, balsamic, bitter, soluble in hot alcohol, ether; it resembles peas in size, often mixed with mastic, owing to its cheapness, but distinguished by being pulverulent when chewed (and not adhesive as with mastic); contains 3 resins, differing in solubility, also bitter principle; according to Tschirch—sandaracolic acid 85 p. c., callitrolic acid 10 p. c., volatile oil (amount depending upon freshness); mild stimulant; mainly used in varnishes.

Sanguinaria

Sanguina'ria canaden'sis, Sanguinaria, Blood Root, N.F.—The dried rhizome and roots with not more than 2 p. c. of foreign organic matter; N. America. Perennial herb, in early spring puts forth a rounded palmate 5–9-lobed leaf and a slender scape 10–20 Cm. (4–8′) high, bearing a large, single white flower; fruit, June, capsule (pod), oblong, many-seeded. Rhizome horizontal, occasionally branched, subcylindrical, flattened, 2–7 Cm. ($\frac{4}{5}$–3′) long, 5–15 Mm. ($\frac{1}{5}$–$\frac{3}{5}$′) thick, dark brown, slightly annulate, few stem-scars, many broken filiform roots; odor slight; taste persistently acrid and bitter. Powder, brownish-red, sternutatory — numerous starch grains resembling those of wheat, latex cells with brownish resin masses, few tracheal fragments; solvents: alcohol, diluted acetic acid, water; contains chelerythrine, sanguinarine, protopine, β-homochelidonine, resin, starch, ash 8 p. c. Systemic emetic, stimulating expectorant, sialagogue, alterative, tonic, acro-narcotic poison; chronic bronchitis, croup, asthma, gastro-intestinal catarrh, jaundice, dyspepsia, torpid liver. *Poisoning:* Wash out the stomach, give diffusible stimulants, amyl nitrite, morphine, atropine. Dose, expectorant, gr. 1–8 (.06–.5 Gm.); emetic, gr. 15–30 (1–2 Gm.); 1. *Fluidextractum Sanguinariæ* (1st menstruum: hydrochloric acid



Sanguinaria canadensis.



Sanguinaria rhizome, showing cross-section.

5 cc., water 20, alcohol 75, 2d: 75 p. c. alcohol); 2. *Tinctura Sanguinariæ*, 10 p. c., dose, ♏v–60—ʒj–2 (.3–4;—4–8 cc.); 3. *Syrupus Pini Albæ Compositus*, $\frac{4}{5}$ p. c. *Acetum*, 10 p. c.; *Infusion*, 5 p. c., ℥ss–4 (15–120 cc.).

SANTALUM ALBUM. SANDALWOOD, *N.F.*

Oleum Santali. Oil of Santal, *U.S.P.*

Santalum album, *Linné.* { A volatile oil distilled from the dried heart-wood, yielding not less than 90 p. c. of alcohols, calculated as santalol.

Habitat. S. India, E. Indian Islands, Malabar, Macassar (mountains); cultivated.

Syn. White Sandal Wood (young wood), White Saunders, Saunders, Yellow Sandal (old wood), Almug; Ol. Santal., Santalwood Oil, Oil of Sandalwood, Oleum Ligni Santali, Oleum Santali Flavi; Fr. Santal Citrin; Essence de Santal, Oleum Santali æthereum; Ger. Gelber Sandel; Sandelöl, Santelöl, Ostendisches Sandelholzöl.

San'ta-lum. L. see etymology, above, of Santalaceæ.

Al'bum. L. *albus*, white or light—*i. e.*, the color of the sapwood.

PLANT.—Small tree 6–9 M. (20–30°) high, bark grayish-brown; leaves oval, smooth, glaucous beneath; flowers small, numerous cymes; odorless, color variable, violet-pink, red, yellow. Wood—Santalum Album, Sandalwood, *N. F.* The heart-wood with not more than 1 p. c. of foreign organic matter, yielding not less than 3.5 p. c. of volatile oil. It is in billets, pieces, chips, varying shapes and sizes, heavy, hard, splitting easily, yellow inside (heart-wood), whitish (sapwood); odor characteristic, aromatic, persistent; taste peculiar, aromatic. The heart-wood only should be used, which natively is obtained by felling trees of .3 M. (12′) diameter, hacking off sapwood, or allowing these trunks to remain on the ground until sapwood is eaten away by ants, thereby becoming 10–20 Cm. (4–8′) thick. This, when rubbed, rasped, or heated, gives pleasant roseate odor.

Santalum album: flowering branch; also flower and fruit, enlarged.

CONSTITUENTS.—Volatile oil 2–5 p. c., resin, tannin.

Oleum Santali. Oil of Santal.—This volatile oil, distilled from the wood, is a pale yellow, somewhat viscid, oily liquid, characteristic odor and taste of sandalwood, soluble in 70 p. c. alcohol (5), solution being slightly acid, sp. gr. 0.972, levorotatory; contains alcohols, calculated as santalol (most important constituent), $C_{15}H_{26}O$, 90 p. c., and santalal, $C_{15}H_{24}O$, both being decomposed by distillation over P_2O_5—santalol yielding santalene, $C_{15}H_{24}$, and santalal giving $C_{15}H_{22}$; also present sesquiterpene, possibly acids. *Tests:* 1. Australian oil, sp. gr. 0.953, and W. Indian oil, sp. gr. 0.965, are both dextrorotatory. 2. Should be clear in 10 vols. of 70 p. c. alcohol (abs. of cedar-wood oil, castor oil, other fatty oils). Should be kept cool, dark, in well-stoppered, amber-colored bottles. Dose, ♏v–20 (.3–1.3 cc.).

ADULTERATIONS.—Castor oil, other fixed oils, chloroform, gurjun balsam oil, volatile oil of copaiba and of cedar-wood, made from lead-pencil chips by distillation, etc. While that distilled in India and Germany is a good article, that made in England is considered the best and purest, hence is more expensive.

PREPARATIONS.—I. WOOD: 1. *Fluidextractum Santali Albi, N.F.* (alcohol), dose, ʒss–2 (2–8 cc.): Prep.: 1. *Elixir Sabal et Santali Compositum, N.F.*,, 6.5 p. c. 2. *Tinctura Sabal et Santali, N F.*, 6.5 p. c.; II. OIL (Unoff.): *Capsules, Emulsion, Mass, Pills, Wafers.*

PROPERTIES.—Astringent, stimulant, diuretic, disinfectant, expectorant. Excreted by bronchial and genito-urinary mucous membranes, stimulating and disinfecting secretions of both.

USES.—Bronchitis, gonorrhea, chronic and subacute inflammations of mucous membranes, cystitis, pyelitis, chronic diarrhea. Very much like copaiba and cubeb in action, and should be continued some time after discharges have ceased. Extensively employed in perfumery. The wood is used natively for fevers, indigestion, palpitation, inflammations, skin diseases; also as incense in Chinese temples, and by cabinet-makers for caskets, jewel boxes, and as a perfume. There are three varieties: 1, Malabar; 2, Macassar; 3, W. Indian.

Allied Plants:

1. *Santalum Freycinetia'num* and *S. pyrula'rium* of the Sandwich Islands. *S. Ya'si* of the Feejee Islands. *S. austro-caledon'icum* of New Caledonia. All 3 furnish oil of good quality.

2. *Venezuela Sandal Wood.*—Rutaceæ. This supplies the market with W. Indian sandalwood oil.

SASSAFRAS. SASSAFRAS, *N.F.*

Sassafras Medulla. Sassafras Pith, *N.F.*

Oleum Sassafras. Oil of Sassafras, *U.S.P.*

Sassafras variifolium, (*Salisbury*) *O. Kuntze.* } A volatile oil distilled from the root.

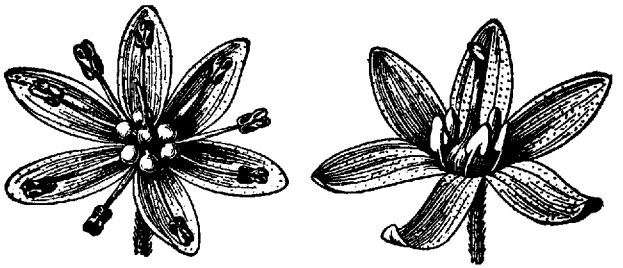
Habitat. N. America—Canada, Florida to Texas; sandy, light soil, in the open.
Syn. Sassaf., Saxifrax, Saloop, Ague Tree, Cinnamon Wood; Sassafras (Cortex) Radix; Fr. Écorce de Sassafras; Ger. Lignum Sassafras, Sassafrasholz, Sassafrasrinde; Sassaf. Med.; Ol. Sassif., Sassafras Oil; Fr. Essence de Sassafras; Ger. Sassafrasöl.

Sas'sa-fras. L. *saxum*, rock, + *frangere*, to break—*i. e.*, grows in crevices of rocks; Sp. for *saxifrage*, name given by Monardes, Spanish botanist of 16th century.

Va-ri-i-fo'li-um. L. *varius*, varying, + *folium*, leaf—*i. e.*, leaves of several forms on the same tree, ovate, entire, 3-lobed and cuneate at base.

Plant.—Shrub in the North, tree in the South, 9–24 M. (30–80°) high, .3–.6 M. (1–2°) thick; wood whitish, reddish, light, strong, durable, aromatic; bark of stem and large branches rough, deeply furrowed, grayish, divisible into layers, young end-twigs smooth, green; leaves 10–15 Cm. (4–6′) long, varying shape; flowers, March-May, dicœcious, fragrant, appearing before leaves, small, greenish-yellow, racemes; fruit oval drupe, size of a pea, deep blue, 1-seeded. Bark — Sassafras, Sassafras, *N.F.* The dried bark of the root with not more than 4 p. c. of adhering wood, outer corky tissues or other foreign organic matter, yielding not more than 5 p. c. of acid-insoluble ash. It is in irregular, transversely curved or quilled pieces, 1–15 Cm. ($\frac{2}{5}$–6′) long, 1–4 Mm. ($\frac{1}{20}$–$\frac{1}{6}$′) thick, orange-brown, nearly smooth, irregular ridges, inner surface reddish-brown, obscurely short-striate; fracture short, corky layer, yellowish-white inner bark; odor aromatic; taste slightly mucilaginous, astringent, pungent. Powder, reddish-brown—numerous starch grains, bast-fibers spindle-shaped, red masses of tannin, tracheæ. Dose, ʒss–1 (2–4 Gm.). Pith—Sassafras Medulla, Sassafras Pith, *N.F.* The dried pith (stem) with not more than 1 p. c. of foreign organic matter, yielding not more than .5 p. c. of acid-insoluble ash. It is in subcylindrical, curved pieces, 2–10 Cm. ($\frac{4}{5}$–4′) long, 2–5 Mm. ($\frac{1}{12}$–$\frac{1}{5}$′) thick, light-weight, whitish, occasional wood fragments adhering; fracture short; odor slight, sassafras-like; taste mucilaginous; mounts in water—thin layer of mucilage from inner walls of cells; macerate several hours .5 Gm. with cold distilled water 25 cc., filter, mucilaginous solution with alcohol (1)—no precipitate, unless excess added.

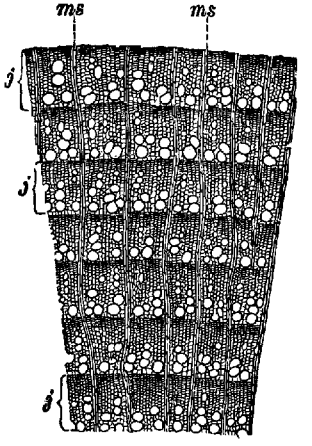
Sassafras variifolium: 1, fruiting twig; 2, flowering twig.


a *b*
Sassafras variifolium: a, staminate flower; *b*, pistillate flower.

Constituents.—I. Bark: Volatile oil 6–9 p. c, Sassafrid 9 p. c., tannin 6 p. c., resin, starch, gum, wax, ash 30 p. c. II. Pith: gum, volatile oil.

Oleum Sassafras. Oil of Sassafras.—This volatile oil distilled from the root (better—root-bark) with water or steam, is a yellow, reddish-yellow liquid, characteristic odor and taste of sassafras, soluble in 90 p. c. alcohol (2), solution being neutral, sp. gr. 1.070, dextrorotatory; contains chiefly safrol, $C_{10}H_{10}O_2$, 80 p. c., pinene and phellandrene, $C_{10}H_{16}$, 10 p. c., *d*-camphor 6.8 p. c., eugenol, $C_{10}H_{12}O_2$, .5 p. c., cadinene, residue 3 p. c. Should be kept cool, dark, in well-stoppered, amber-colored bottles. Dose, ♏j–5 (.06–.3 cc.).

Sassafrid.—Supposed to be altered tannin, the result of oxidation, analogous to cinchona-red; some disclaim its presence in fresh bark; crystallizes in yellowish-brown granules, soluble in alcohol, insoluble in ether, solutions colored red by alkalies, precipitated by alkaline earths (carmine-red), ferric salts (greenish-brown), lead acetate (white) inodorous, nearly tasteless.



Sassafras wood: cross-section, magnified 20 diam.; *j*, annual rings; *ms*, medullary rays.

Preparations.—Oil: 1. *Syrupus Sarsaparillæ Compositus*, $\frac{1}{50}$ p. c. 2. *Syrupus Eriodictyi Aromaticus*, *N.F.*, $\frac{1}{20}$ p. c. 3. *Syrupus Pini Albæ Compositus*, *N.F.*, $\frac{1}{50}$ p. c. 4. *Syrupus Trifolii Compositus*, *N.F.*, $\frac{1}{25}$ p. c. Bark: 1. *Fluidextractum Sarsaparillæ Compositum*, *N.F.*, 10 p. c. 2. *Syrupus Pini Albæ Compositus*, *N.F.*, $\frac{7}{10}$ p. c. Pith: 1. *Mucilago Sassafras Medullæ*, *N.F.*, 3 p. c. Dose, *ad libitum*.

Unoff. Preps.: Bark: *Fluidextract*, ʒss-1 (2–4 cc.). *Infusion* (*Tea*). Dose, *ad libitum*.

Properties. — Alterative, diaphoretic, stimulant, emmenagogue.

USES.—To purify blood, skin diseases, rheumatism, syphilis. Infusion valuable antidote for poison-ivy, internally and externally; it (tea) was popular at one time for so-called thinning the blood (alterative) in spring; given with sarsaparilla, guaiacum, mezereum, etc.; oil popular flavoring agent in confectionery, drinks, soaps, etc., antiemetic, antagonist to narcotic effects of tobacco, hyoscyamus, etc.

Derivative Products:

1. *Safrolum, Safrol,* $C_{10}H_{10}O_2$—$C_6H_3.C_3H_5.(OOCH_2)$.—This chemically is the methylene ether of allyl pyrocatechol, occurring in the oils of camphor, star-anise, cinnamon, etc., and constitutes 80 p. c. of the oil of sassafras. It is obtained chiefly from the red oil of camphor by collecting that fraction boiling at 230° C. (446° F.), purifying the same by repeated chilling and crystallization; it is a colorless or faintly yellow liquid, sassafras-like odor, sp. gr. 1.105, optically inactive, cooled to —20° C. (—4° F.) solidifies to a mass of crystals, melting at 11° C. (52° F.), soluble in alcohol (1), 70 p. c. alcohol (30), miscible with ether, chloroform, boils at 233° C. (451° F.); heated with alcoholic potassium hydroxide solution forms isosafrol, which is less toxic than safrol; with bromine yields crystals of $C_{10}H_5Br_5O_2$. Reduces arterial pressure by depressing vasomotor center; taken a long period produces fatty degeneration of heart, liver, and kidneys; it is eliminated as piperonalic acid. Dose, ♏j–2 (.06–.13 cc.).

2. *Sassafras Lignum, Sassafras Wood.*—Contains little volatile oil; used like the bark, but very weak medicinally.

Scopola

Sco'pola carniol'ica, Scopola.—The dried rhizome containing .5 p. c. of mydriatic alkaloids, U.S.P. 1900; C. Europe, Germany, Austro-Hungary, Carniola. Shrub, 20–60 Cm. (8–24′) high, usually branchless; leaves oblong-lanceolate, wavy or notched toward apex, petiolate, reticulate, flowers tubular, campanulate, brownish-purple; fruit capsule, circumscissile, dehiscent. Rhizome flexuous, cylindraceous, mostly in pieces 2.5–7.5 Cm. (1–3′) long, .8–1.6 Cm. ($\frac{1}{3}$–$\frac{2}{3}$′) thick, often split before drying; upper surface with large, closely set cup-shaped stem-scars, margins irregularly contracted, brownish, longitudinally wrinkled, obscurely annulate, nodular-roughened, fracture short, sharp; wood indistinctly radiate, central pith horny; nearly inodorous; taste sweetish, bitterish, acrid; solvents: 80 p. c. alcohol, water partially; contains scopolamine .05 p. c., hyoscyamine .5 p. c., atropine, scopoletin, ash 7-10 p. c. Mydriatic, analgesic, hypnotic, antiphlogistic; glaucoma, ptyalism, hyperidrosis. Should not be given in renal affection nor in advanced age, and cases of poisoning should be treated as in belladonna. Dose, gr. 1–3 (.06–.2 Gm.); extract, gr. $\frac{1}{4}$–$\frac{1}{2}$ (.016–.03 Gm.); scopolamine, gr. $\frac{1}{250}$–$\frac{1}{60}$ (.00025–.001 Gm.). *S. japon'ica, Japanese Belladonna,* plant resembles very closely *S. carniolica,* differing only in having the style curved, calyx-teeth unequal, leaves less obovate with longer petioles; rhizome 10 Cm. (4′) long, 12 Mm. ($\frac{1}{2}$′) thick; this also yields atropine, scopolamine, etc.

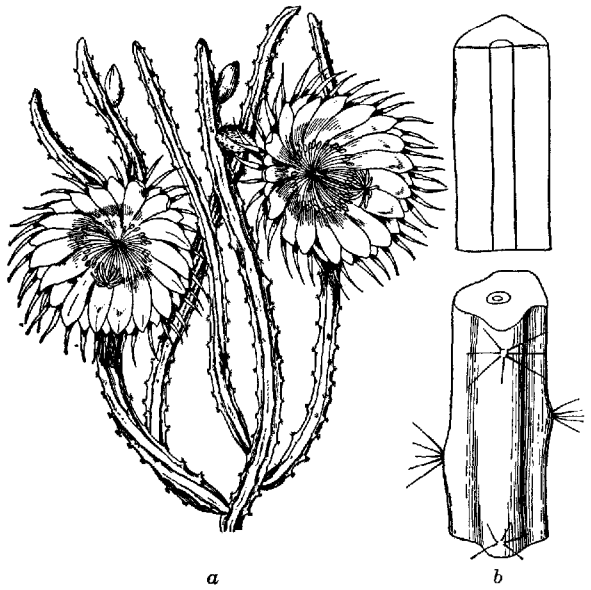
Scopola carniolica: a, flowering and fruiting branch ($\frac{1}{4}$ nat. size); also flower, stamen, anther, pistil, fruit, seed, enlarged.

Scutellaria

Scutella'ria lateriflo'ra, Scutellaria, Skullcap, Mad-dog, N.F.—The dried underground portion, with not more than 3 p. c. of foreign organic matter; N. America, United States, damp thickets, ditch banks. Perennial herb .3–.6 M. (1–2°) high; stem branched, smooth, quadrangular; leaves opposite, 5 Cm. (2′) long, ovate-lanceolate, acuminate, coarsely serrate, rounded at base, petiolate; flowers 6 Mm. ($\frac{1}{4}$′) long, 1-sided axillary leafy racemes, pale blue corolla and bilabiate calyx, closed in fruit, upper lip helmet-shaped, including 4 didynamous stamens (upper pair shorter); odor slight; taste slightly bitter. Powder, dark green—numerous non-glandular hairs, glandular hairs, smooth pollen grains, chlorenchyma, epidermal cells and stomata, lignified fibers, narrow tracheæ, occasional epidermal cells of corolla, fragments pink in chloral hydrate T. S.; solvents: diluted alcohol, boiling water; contains scutellarin, volatile oil, tannin, sugar, ash 12 p. c. Tonic, nervine, antispasmodic; epilepsy, hysteria, nervous exhaustion, chorea, delirium tremens, tremors, spasms, muscular twitching, hyperesthesia, neuralgia, convulsions, intermittents, anuresis, hydrophobia. Dose, ʒss–1 (2–4 Gm.); 1. *Fluidextractum Scutellariæ* (diluted alcohol), dose, ʒss–1 (2–4 cc.); 2. *Tinctura Viburni Opuli Composita,* 1 p. c. Decoction, 5 p. c., ℥j–2 (30–60 cc.); Extract, gr. 5–10 (.3–.6 Gm.). *S. integrifo'lia,* hairy, terminal racemes, *S. pilo'sa,* hairy, terminal racemes, leaves in distinct pairs, *S. galericula'ta,* nearly smooth, flowers single, axillary—all used interchangeably.

Selenicereus

Selenice'reus grandiflo'rus, Cactus Grandiflorus, Night Blooming Cereus, N.F.—Cactaceæ. The fresh succulent stem of the wild growing plant; Mexico, W. Indies, cultivated. Small shrub, .3–1 M. (1–3°) high; stem green, fleshy, branching; flowers white, sessile, large, fragrant, opening at night, petals and stamens numerous; fruit white berry, size of an egg. Stem (drug) in pieces of varying length, 1.5–4 Cm. ($\frac{3}{5}$–$1\frac{3}{5}$′) thick, 5–9-angled, angles 2 Cm. ($\frac{4}{5}$′) apart with tufts of 9–12 acicular spines, each 5 Mm. ($\frac{1}{5}$′) long, and same number of bristles 1 Cm. ($\frac{2}{5}$′) long, branched roots at irregular intervals; odor strong, herby; taste acidulous, mucilaginous; solvent: alcohol; contains cactine, acid resinous glucoside, resins, calcium oxalate. Cardiac stimulant (tonic), diuretic, similar to digitalis, but non-cumulative, counter-irritant; cardiac palpitation and weakness, heart failure from valvular disease, angina pectoris, aortic regurgitation, dropsies, low fevers, Graves' disease, tobacco toxemia, sexual exhaustion. Dose, gr. 5–10 (.3–.6 Gm.); 1. *Tinctura Cacti Grandiflori*, 50 p. c. (alcohol), dose, ♏xv–30 (1–2 cc.). Decoction, 5 p. c., ℥j–2 (4–8 cc.); Fluidextract.



a *b*

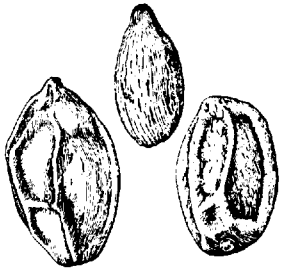
Selenicereus grandiflorus: *a*, flowering stem; *b*, section of stem, showing cross and longitudinal sections.

Senecio aureus

Senec'io au'reus, Senecio, Life Root Plant, Ragwort, Squaw-weed, N.F.—The dried plant with not more than 10 p. c. of foreign organic matter; Eastern N. America. Perennial herb .3–.6 M. (1–2°) high, nearly smooth, fluted, sparingly clothed with small leaves, also a basal rosette, and several yellow heads (corymb) at summit, white floccose when young, then glabrous; radical leaves petiolate, rounded, 5–7 Cm. (2–3′) broad, crenate-dentate, cordate; stem-leaves lyrately pinnate, then pinnatifid, sessile; heads slender, 12–25 Mm. ($\frac{1}{2}$–1′) broad, involucral scales in 2 series closely appressed; rays 10, bright yellow, disk flowers many, small, bearing a glabrous achene, white pappus; odor characteristically aromatic; taste bitter, astringent, acrid, pungent. Powder, dark green—many twisted non-glandular hairs with thin walls and oily content; leaf tissue composed of chlorenchyma, epidermal cells, elliptical stomata; solvent: diluted alcohol; contains volatile oil, resin, bitter principle (senecin), tannin, ash 10 p. c. Stimulant, diuretic, emmenagogue, vulnerary; atonic conditions, amenorrhea, dysmenorrhea; popular with "Eclectics," Homeopaths, and American Indians. Dose, ʒss–1 (2–4 Gm.); 1. *Fluidextractum Senecionis* (67 p. c. alcohol), dose, ʒss–1 (2–4 cc.). Decoction, Infusion, each 5 p. c., ʒj–2 (30–60cc.).

Serenoa

Sere'noa serrula'ta, Saw Palmetto Berries, N. F.—Palmaceæ. The partially dried, ripe fruit with not more than 1 p. c. of foreign organic matter; should contain 10–15 p. c. of its natural moisture when used for pharmaceutical preparations; S. United States—near seacoast. Small, stout, evergreen shrub, large underground trunk; leaves orbicular, .6–1 M. (2–3°) long, .3–.6 M. (1–2°) broad, 10–12-cleft, petioles aculate-serrate. Fruit, 1-seeded drupe, similar to olive, ovoid, 1.5–3 Cm. ($\frac{3}{5}$–$1\frac{1}{5}$′) long, 1–1.5 Cm. ($\frac{2}{5}$–$\frac{3}{5}$′) broad, bluish-black, smooth, oily, shriveled from contraction of sarcocarp; epicarp and sarcocarp forming thin coriaceous shell enclosing thin reddish-brown endocarp which encloses an ovoid, reddish-brown seed; odor pronounced, aromatic; taste sweetish, aromatic, acrid. Powder, yellowish-brown—parenchyma cells of sarcocarp, yellowish amorphous substance, endosperm, large pores, stone cells; solvent: 80 p. c. alcohol; contains volatile oil .5–1 p. c., fixed oil 10–15 p. c., fat, alkaloid, resin, dextrin, glucose; seed—fixed oil 12 p. c. Sedative, diuretic, expectorant, tonic, anticatarrhal; chronic bronchitis, phthisis, inflammation of genito-urinary tract, nose, larynx, atonic impotence. Dose, gr. 15–60 (1–4 Gm.); 1. *Fluidextractum Sabal* (80 p. c. alcohol), dose, ♏xv–60 (1–4 cc.); 2. *Elixir Sabal et Santali Compositum*, 26 p. c. + triticum 26, fldext. zea 26, fldext. sandalwood 6.5; 3. *Tinctura Sabal et Santali*, 20 p. c. + sandalwood 6.5 (80 p. c. alcohol), dose, ʒj–2 (4–8 cc.). Inhalation—mix alcoholic solution with boiling water—inhale vapor.



Saw Palmetto; fruit and seed.

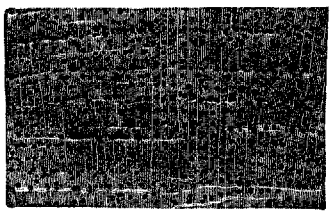
Sesamum

Ses'amum in'dicum; Oleum Sesami, Sesame Oil, Teel Oil, Benne Oil, N.F.—Padaliaceæ. The fixed oil obtained from the seeds of one or more cultivated varieties; India, Africa, cult. in S. United States. Annual herb, 1–1.3 M. (3–4°) high, quadrangular, hairy; leaves lanceolate-ovate; flowers campanulate, 4 Cm. ($1\frac{3}{5}'$) long, pale purple; fruit, capsule, 2.5–5 Cm. (1–2′) long, quadrangular, pericarp leathery, olive-green, dehiscent; seed 5 Mm. ($\frac{1}{5}'$) long, testa thick, yellowish, variegated; contain fixed oil 47–56 p. c., proteins 22 p. c., mucilage 4 p. c., ash 4.8 p. c. Oleum Sesami, pale yellow cily liquid; almost odorless, bland taste, slightly acid, slightly soluble in alcohol, miscible with ether, chloroform, petroleum benzin, carbon disulphide, sp. gr. 0.918; contains triglycerides of oleic (chiefly) and linoleic acids 75 p. c., also myristin, palmitin, stearin 20–25 p. c., sesamin. Laxative, demulcent, emollient, nutritious; similar to olive oil, but less agreeable and digestible; mostly in hair preparations, liniments; internally in emulsion. Dose, ℥ss–2 (15–60 cc.); 1. *Linimentum Ammoniæ*, 75 p. c., + aq. ammon. 25 p. c.; 2. *Olea Infusa*, 100 p. c.

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

Simaruba

Simaru'ba ama'ra (S. officina'lis, S. medicina'lis, Quassia Simaruba).—The bark (of root), U.S.P. 1820–1870; Guiana to N. Brazil, W. Indies. Tree 15–18 M. (50–60°) high, crooked branches; leaves 22.5–30 Cm. (9–12′) long, leaflets 3–5 pairs, 5–10 Cm. (2–4′) long; flowers yellow; fruit drupe; bark flat, curved, or quilled, .5–1 M. (20–40′) long, 3 Mm. ($\frac{1}{8}'$) thick, yellowish-brown, striate, fibrous, bitter; contains picrasmin, resin, volatile oil, calcium oxalate. Tonic, febrifuge, diuretic (large doses cause vomiting and purging); dysentery, diarrhea (*dysentery bark*), etc.; in infusion, decoction. Dose, gr. 10–30 (.6–2 Gm.).


Jamaica quassia wood: cross-section magnified 3 diam.

Simaruba amara (officinalis): *1*, calyx and ovary; *2*, corolla; *3*, stamens; *4*, stamen and anther.

Simaba

Sima'ba ce'dron and *S. ferrugin'ea.*—Colombia, Brazil; resembles simaruba, but flowers hermaphrodite; fruit pear-shape, size of hen's egg. Used natively as febrifuge and as antidote to poisonous animal bites.

Sinapis (Brassica) arvensis

Brassica arven'sis (Sinapis'trum), Charlock, Wild Mustard.—Europe, United States; an annual, troublesome weed; seed smoothish, dark brown, smaller and less pungent, than our official black mustard. *B. olera'cea, Cabbage*, Europe; leaves large, smooth, glaucous, very different from cultivated varieties. *B. campes'tris;* Europe, Russia, Asia. Wild annual, .3–.6 M. (1–2°) high, flowers bright yellow; of this we have several cultivated varieties which give edible roots and seeds of some value, thus: (*a*) var. *Na'pus, Turnip*—seed larger than official black mustard, 1.6–2 Mm. ($\frac{1}{16}$–$\frac{1}{12}'$) thick, brown or black, finely pitted, slightly acrid; (*b*) var. *Ra'pa, Rape, Colza*—seed larger than mustard or turnip, 2–2.5 Mm. ($\frac{1}{12}$–$\frac{1}{10}'$) thick, finely pitted, blue-black, slightly acrid; both yield a bland, yellow fixed oil under the names of turnip-seed oil and rape-seed oil; (*c*) var. *Rutaba'ga, Swedish Turnip*—seed also small and contain oil and pungency.


Brassica campestris.

Sinapis alba

Sinapis alba. White (Yellow) Mustard, U.S.P. 1830–1910.—Plant and habitat similar to official. Seed, 1–2 Mm. ($\frac{1}{26}$–$\frac{1}{12}'$) thick, subglobular, testa yellowish, minutely pitted, embryo yellowish, oily, with curved hypocotyl, 2 conduplicate cotyledons; inodorous; taste mildly pungent, acrid; powder contains few or no starch grains; contains fixed oil 20–25 p. c., sinalbin, sinapine sulphocyanide, lecithin, albumin 28 p. c., gum and mucilage 19 p. c. (mainly in testa), myrosin, other proteins, ash 4 p. c. Used for flavoring, etc., similar to the official, but milder in action as allyl isothiocyanate is not developed by macerating with water, but a weaker compound—acrinyl isosulphocyanide.

SARSAPARILLA. SARSAPARILLA, *U.S.P.*

Smilax { **medica,** *Chamisso et Schlechtendal,* **officinalis,** *Kunth,* **ornata,** *Hooker filius.* } The dried root (rhizome and crown portion being excluded before grinding or powdering) with not more than 2 p. c. foreign organic matter, yielding not more than 2 p. c. (Mexican 4 p. c.) acid-insoluble ash.

Habitat. Tropical America, Mexico to Brazil; Andes and Chinqui Mountains, 1,200–2,400 M. (4,000–8,000°) elevation; swampy forests.

Syn. Sarsap., 1. Mexican, Vera Cruz, Tampico Sarsaparilla; 2. Honduras, Bearded, Red Sarsaparilla; 3. C. America, Jamaica, Costa Rica, Lima Sarsaparilla; Sarsæ Radix; Fr. Salsepareille du Mexique; Ger. Radix Sarsaparillæ, Sarsaparille.

Smi'lax. L. Bindweed, Gr. σμῖλαξ, the yew, fr. σμίλη (Eng. smile), a scraper—*i. e.*, stems rough with prickles.

Med'i-ca. L. *medicus*, medical, curative—*i. e.*, its healing properties.

Of-fi-ci-na'lis. L. *officina*, a work shop, = *opus*, work, + *facere*, to do, to make—*i. e.*, used in or belonging to the shop or store.

Or-na'ta. L. *ornatus*, fr. *ornare*, to adorn—adorned, decorated, ornamented—*i. e.*, beautiful fruit and foliage.

Sar-sa-pa-ril'la. L. fr. Sp. *zarzaparilla—zarza*, a bramble, + *parra*, a vine, or from *Parillo*, a physician said to have discovered and employed it.

PLANTS.—Large perennial, thorny climbers; rhizomes short, thick, knotted, nodes thick, from which spring purplish-white roots 2–2.5 M. (6–8°) long, and a few rootlets; stems many, stiff, woody, angular, ridged, subterete or quadrangular, prickles at nodes; leaves 10–30 Cm. (4–12′) long, 7.5–15 Cm. (3–6′) wide, petioles 5 Cm. (2′) long, quadrangular, cordate, rounded lobes at base, entire, glabrous, leathery, dark glossy green; flowers dicœcious, 10–20 together in umbels; fruit small berry, 8 Mm. ($\frac{1}{3}$′) thick, red, 2–3-seeded. ROOT (*S. medica*): *Mexican*, in loose bundles, or pressed bales, single bundles, 30–60 Cm. (12–24′) long, composed of 20–35 folded roots attached to a crown with one or more stout stems; roots 3.5–6 Mm. ($\frac{1}{7}$–$\frac{1}{4}$′) thick, usually shrunken forming sharp longitudinal ridges and broad furrows, often containing some blackish earth, grayish-brown, dark brown, finely hairy; nearly devoid of branches or fibrous rootlets; fracture brittle (cortex), tough and fibrous (central cylinder); cortex mealy, whitish, brownish, horny; woody zone yellow, porous; pith whitish, distinct; nearly odorless; taste mucilaginous, sweetish, acrid; (*S. officinalis*): *Honduras*, in compact, cylindrical bundles, 30–55 Cm. (12–22′) long, 8–15 Cm. (3–6′) thick, composed of long, folded roots bound together by a number of circular turns; roots 2–5 Mm. ($\frac{1}{12}$–$\frac{1}{5}$′) thick; dark-, reddish-brown, longitudinally wrinkled or finely furrowed, usually without earth, with occasional fibrous rootlets; fracture short, sometimes tough and fibrous (central cylinder); internally reddish-brown, dark brown, occasionally light gray cortex, a light yellow porous woody zone and a whitish pith; (*S. ornata*): *Central American, Jamaica*, in more or less compact, somewhat flattened bundles, 30–45 Cm. (12–18′) long, 10–15 Cm. (4–6′) broad, composed of folded roots loosely

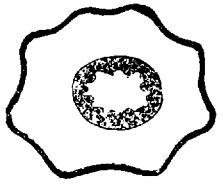
Smilax: branch with flowers and fruit.

bound together by a few circular turns; roots 2–5 Mm. ($\frac{1}{12}$–$\frac{1}{5}$′) thick, grayish-, reddish-brown, longitudinally wrinkled, occasionally nearly smooth, rarely furrowed, without earth, bearing numerous coarse fibrous rootlets; fracture short or tough and fibrous in central cylinder, internally white or dark brown cortex, and porous wood zone, a yellow or white pith. POWDER, grayish-brown—numerous starch grains, .003–.023 Mm. ($\frac{1}{8800}$–$\frac{1}{1075}$′) broad, spherical, biconvex calcium oxalate raphides, singly or in groups up to .15 Mm. ($\frac{1}{175}$′) long; cells of hypodermis and endodermis with lemon-yellow, reddish-yellow porous walls (Mexican—uneven or irregular thickening), cells being .08–.5 Mm. ($\frac{1}{1250}$–$\frac{1}{50}$′) long; fragments of tracheæ with thickenings, fibers with thin lignified or porous walls. *Solvents:* diluted alcohol; boiling water, injured by continued boiling. Dose, ʒss–2 (2–8 Gm.).

Commercial.—Sarsaparilla was carried to Europe from Peru, St. Domingo, Brazil, by the Spaniards in 1550, and has been in general use ever since. Plants occur in very thick undergrowth that renders careful collection quite troublesome, which is effected by grubbing,

Mexican sarsaparilla.

pulling, etc., so as to avoid extermination; those fully grown often yield at first cutting 30–60 pounds (13.6–27 Kg.), and every 2 years thereafter smaller quantities of more slender, less starchy roots. Collectors accept as best that having many roots from stem, persistent acrid taste, closely set prickles and thin leaves, and according to physical properties recognize two kinds (*a*) *Non mealy:* Mexican, Jamaica, thin, not cracked, red, brown, little or no starch, usually pasty, rarely in granules, somewhat horny with longitudinal and irregular folds; thought best as bark and pith are relatively small, roots have more rootlets, greater acridity, and yield most extract,



Mexican sarsaparilla: cross-section; magnified 3 diam.

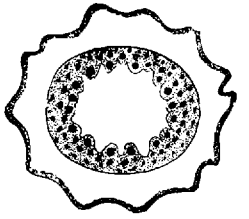
Central American, Jamaica sarsaparilla.

dissolving clearly in cold water; (*b*) *Mealy:* Honduras, Para, more or less swollen, pale yellow, transversely cracked, considerable starch, usually in fine granules, seldom pasty. There are four varieties: 1, *Mexican,* once thought valueless, but now, owing to acridity, most valuable; grows in Mexican Andes, around Orizaba, Vera Cruz, etc., being considered a variety of *S. officinalis,* with slender branches, and often without prickles; 2, *Central American, Jamaica,* grown chiefly in Costa Rica, some in the Amazon Valley, and called "Jamaica" as it is exported through that province; resembles Honduras, but redder, less wrinkled and amylaceous, and yields more extract; 3, *Honduras,* most popular, grown in Honduras, Guatemala, Peru, Colombia, C. America; enters market in bales, skins, 100 pounds (45.3 Kg.); 4, *Para* (*Brazilian, Rio Negro, Lisbon—S. papyra'cea*), in compact cylindrical bundles, 30–90 Cm. (12–36′) long, 15–20 Cm. (6–8′) thick, closely and neatly bound, by a stem of a vine, and ends evenly trimmed; rootlets few, dark, amylaceous, acrid, resembling Honduras, and growing in N. Brazil, Guiana (Para, Maranham); considered a variety of *S. officinalis,* with older stems and lower branches remaining square, angles with flattened prickles and much more membraneous leaves; rather rare, and the only one of the four varieties not recognized in U. S. P.

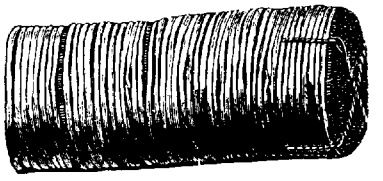
Honduras sarsaparilla.

The *Guayaquil* (*S. officinalis*), growing in W. Andes valleys, occasionally enters market, usually loose and carelessly packed in bales, rhizome and stem portions often included; roots dark with much fiber, bark furrowed, thick, somewhat amylaceous, internally pale yellow. Roots are taken also from *S. syphilit'ica* (Colombia), *S. glau'ca* (Mexico) *S. util'is* (Jamaica), etc.

CONSTITUENTS.—Saponin-like substance (separable into 3 glucosides—Sarsasaponin, Parillin, Smilasaponin) 3 p. c., volatile oil, resin, starch 10–15 p. c., pectin, coloring matter, calcium oxalate and other salts, ash 7–10 p. c.



Honduras sarsaparilla: cross-section; magnified 3 diam.



Para sarsaparilla.

Sarsasaponin, $C_{22}H_{36}O_{10}$, is the most important component, being 3–4 times more active than the other two; it is crystallizable, soluble in water, alcohol, more so with heat.

Parillin (Smilacin), $C_{26}H_{44}O_{10}$, crystallizable, soluble in water, alcohol, frothing with agitation, aqueous solution precipitated by lead acetates, tannin; boiled with diluted acids splits into sugar and parigenin.

Smilasaponin, $C_{20}H_{32}O_{10}$, non-crystallizable, soluble in water, alcohol.

PREPARATIONS.—1. *Fluidextractum Sarsaparillæ.* Fluidextract of Sarsaparilla. (Syn., Fldext. Sarsap., Fluid Extract of Sarsaparilla; Extractum Sarsæ Liquidum; Fr. Extrait fluide de Salsepareille; Ger. Sarsaparillafluidextrakt.)

Manufacture: Moisten, macerate for 6 hours in tightly-covered containers 100 Gm. with enough diluted alcohol, pack, percolate with same menstruum until exhausted, reserve first 85 cc., reclaim alcohol, evaporate to soft extract, which dissolve in the reserve, mix thoroughly, add menstruum q. s. 100 cc. Dose, ʒss–1 (2–4 cc.).

Preps.: 1. *Syrupus Sarsaparillæ Compositus.* Compound Syrup of Sarsaparilla. (Syn., Syr. Sarsap. Co., Syrupus Sudorificus; Fr. Sirop de Salsepareille composé, Sirop sudorifique; Ger. Zusammengesetzter Sarsaparillsirup.)

Manufacture: Fluidextract of sarsaparilla 20 cc., fluidextract of glycyrrhiza 1.5, oil of sassafras .02, oil of anise .02, methyl salicylate .02, alcohol 1.94, add this solution to syrup 76.5 cc. Dose, ʒj–4 (4–15 cc.). Prep.: 1. *Syrupus Bromidorum, N.F.,* 45 p. c.

2. *Fluidextractum Sarsaparillæ Compositum, N.F.,* 75 p. c. + glycyrrhiza 12, sassafras 10, mezereum 3. Dose, ʒss–1 (2–4 cc.).

Unoff. Preps.: Compound Decoction 10 p. c. (+ sassafras 2, guaiacum wood 2, glycyrrhiza 2, mezereum 1), ʒj–4 (30–120 cc.). *Decoction. Extract*, gr. 5–10 (.3–.6 Gm.). *Extract Comp.*; *Syrup.*

PROPERTIES.—Alterative, diuretic, diaphoretic, tonic. Mostly believed to be of little service unless associated with other drugs, such as potassium iodide, guaiac, sassafras, mezereum, etc.

USES.—As a blood purifier in scrofula, cutaneous diseases, abscesses, ulcers, tertiary syphilis with mercuric chloride or potassium iodide or both; gout, rheumatism.

Incompatibles: Alkalies, iodine, and corrosive sublimate is claimed to be converted into calomel by the compound syrup. *Smilax chi'na, S. pseu'do-china, S. tamnoi'des, S. as'pera* and *Ca'rex arena'ria, German Sarsaparilla,* are used like official.

Solanum carolinense

S. carolinen'se, Solanum, Horse-nettle, Berries, N.F.—The air-dried ripe fruit with not more than 5 p. c. of immature fruit nor 2 p. c. of foreign organic matter; C. and S. United States. Perennial herb, .3–.6 M. (1–2°) high, stellate-pubescent, grayish-green, sharp yellow prickles. Fruit, globose, shriveled, .8–2 Cm. (⅓–⅘′) thick, orange-yellow, glabrous, fleshy, 2-celled, many-seeded, calyx persistent; stellate, pubescent, enclosing half of berry, seed orbicular, flat, yellow, shining; odor pepper-like; taste bitter, acrid. Powder, brownish—numerous fragments of seed-coat and epicarp, cells with yellowish amorphous content; solvent: diluted alcohol; contains solanine, solanidine, resin, fat, volatile oil, ash 6 p. c. Tonic, antiepileptic, antitetanic; tetanus, epilepsy, convulsions—albuminuria, pregnancy; better than bromides; disastrously fatal to cattle. Dose, ʒss–1 (2–4 Gm.); 1. *Fluidextractum Solani* (67 p. ç. alcohol), dose, ʒss–1 (2–4 cc.); *Tincture. S. panicula'tum*, S. America; tonic, diuretic, antiperiodic; vesical catarrh.

Solanum Dulcamara.

Dulcamara

Dulcamara:
transverse section of a branch magnified 3 diam.

Solanum dulcamara

Sola'num Dulcama'ra, Dulcamara, Bittersweet, N.F.—The dried stem with not more than 2 p. c. of foreign organic matter; Europe, Asia (N. America). Climbing pubescent shrub, around dwellings, in thickets; leaves cordate, halberd-shaped, pubescent beneath; flowers purple, whitish; fruit oval red berry, many-seeded. Stem woody at base, branching 3–4.5 M. (10–15°) high, collected when 1–2 years old, autumn or early spring, cut into short sections, 8 Mm. (⅓′) long, 5 Mm. (⅕′) thick, cylindrical, hollow, angular, striate, warty; bark thin, greenish-brown, glabrous, wood yellowish, in 1–2 concentric rings; odor slight; taste bitter, then sweet. Powder, greenish-yellow—tracheæ with pores, markings, wood-fibers, bast-fibers, cork cells, few hairs, starch grains, numerous microcrystals; solvents: diluted alcohol, water partially; contains dulcamarin (picroglycion, dulcarin) .4 p. c., solanine, resin, gum, wax, benzoic acid, starch, calcium lactate. Narcotic, diuretic, diaphoretic, alterative, deobstruent; large doses produce vomiting, faintness, vertigo, convulsive muscular movements, dryness and constriction of the throat, thirst, diarrhea, weakened heart action, paralysis. Cutaneous eruptions, rheumatism, gout, bronchitis, whooping-cough, nasal, vesical, and pulmonary catarrhs, mania with strong venereal desire, neuralgia. *Poisoning:* Same as for belladonna. Dose, ʒss–1 (2–4 Gm.); 1. *Fluidextractum Dulcamaræ* (diluted alcohol), dose, ʒss–1 (2–4 cc.).

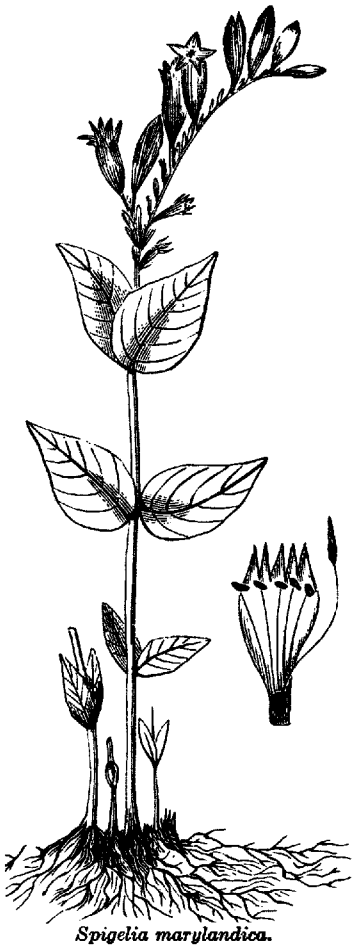
Solidago

Solida'go odo'ra, Sweet or *Anise-scented Golden-rod.*—The leaves and tops, U.S.P. 1820–1870; N. America. Perennial herb, .6–1 M. (2–3°) high, greenish-yellow, pubescent; leaves lanceolate, pellucid-dotted, 2.5–5 Cm. (1–2′) long, 12 Mm. (½′) wide; flowers yellow, racemes; fruit achenes; odor and taste sweet, anise-like, more pronounced when bruised; contains volatile oil. Stimulant, rubefacient, anodyne, carminative, diaphoretic, aromatic; hemorrhages, colic, neuralgia, amenorrhea, rheumatism; infusion, oil. Dose, ʒss–2 (2–8 Gm.); oil, ♏j–5 (.06–.3 cc.).

Spigelia

Spige'lia marylan'dica, Spigelia, Pinkroot.—The dried rhizome and roots with not more than 10 p. c. of stems or other foreign matter, U.S.P. 1820–1910; United States, Maryland, southward. Perennial herb, .3–.6 M. (1–2°) high, purplish; leaves sessile, entire, ovate-lanceolate; flowers large, scarlet red, on one side of stem above the leaves; fruit 2-seeded. Rhizome, horizontal, 1.5–5 Cm. (⅗–2′) long, 2–5 Mm. (1/12–⅕′) thick, dark brown, cup-shaped scars above, numerous roots beneath; fracture short, brittle, 3 zones—pith, wood, bark; odor slightly aromatic; taste bitter, pungent. Powder, grayish-brown—starch grains, lignified tracheæ, tracheids, bast-

fibers, reddish-brown epidermal cells; solvents: diluted alcohol, boiling water; contains bitter principle (?), spigeline, volatile oil, resins, tannin, wax, fat, gum, ash 8–10 p. c. Anthelmintic, toxic, mydriatic; large doses narcotic poison; to destroy round worms, usually associated with senna or calomel, or followed by Epsom salt. *Poisoning:* Vertigo, dilated pupils, dry throat, convulsions, delirium—diffusible stimulants: ammonia, brandy, amyl nitrite, atropine, digitalis, Dose, ʒss–2 (2–8 Gm.); children gr. 10–20 (.6–1.3 Gm.); Fluidextract (diluted alcohol); Compound Infusion (Worm Tea), 15 Gm. + senna 10, fennel 10, manna 30, water q. s. 500 cc., ℥ij–5 (60–150 cc.). *S. anthel'mia, Demerara Pink Root, Worm Grass.*—W. Indies. Used for a long time by the native Indians as a vermifuge and narcotic; fresh root has nauseous odor, is bitter, acrid, and kills cattle. *Phlox' caroli'na, Carolina* or *Georgia Pink.*—This has a knotty and lighter colored rhizome with a central pith; it is also an anthelmintic, as is *P. glaber'rima.*



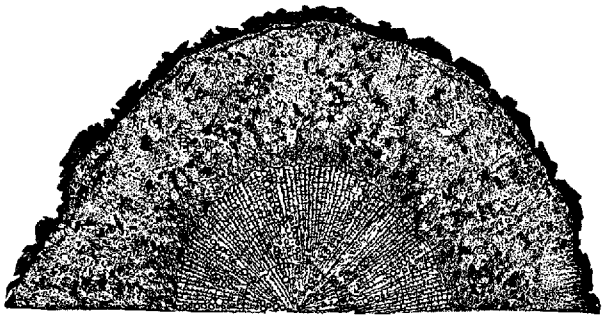
Spigelia marylandica.

Spiraea

Spirœ'a tomento'sa, Hardhack.—The root, U.S.P. 1820–1870; N. America; shrub, .6–1 M. (2–3°) high, stem ferruginous, tomentous, leaves dark green, but rusty-white beneath; flowers purple; fruit 1-seeded pod; root consists of brown, bitter, astringent bark, and hard, white, tasteless wood; contains tannin, bitter principle, volatile oil. Astringent, tonic; diarrhea, cholera infantum, hemorrhages, gonorrhea, ulcers, etc.; infusion, decoction, extract. Dose, ʒss–1 (2–4 Gm.).

Stillingia

Stillin'gia sylvat'ica, Stillingia, Queen's Root, N.F.—The dried root with not more than 3 p. c. of foreign organic matter, and that which has been stored for more than 2 years must not be used; S. United States. Perennial lactiferous (when wounded emits milky juice) herb, .3–1 M. (1–3°) high; leaves lanceolate, sessile, serrate; flowers yellow, monœcious; fruit rough round capsule, 3-celled, each cell 1-seeded. Root, terete, unequally tapering, rarely branched, 20–40 Cm. (8–16′) long, .5–3 Cm. (⅕–1⅕′) thick; usually in cut pieces, 2–5 Cm. (⅘–2′) long; reddish-brown, wrinkled, fracture fibrous; internally—bark thick, spongy, fibrous with resin cells, easily separable from porous, radiate wood; odor distinct; taste bitter, acrid, pungent. Powder, pinkish-brown—numerous starch grains with central cleft, fragments with secretion cells bearing resin, tracheæ, wood-fibers, bast-fibers, brownish cork cells, calcium oxalate crystals in rosettes; solvents: boiling water, diluted alcohol; contains sylvacrol (resin), volatile oil 3–4 p. c., glucoside, tannin 10–12 p. c., gum, starch, ash 5 p. c. Alterative, expectorant, diuretic, diaphoretic, sialagogue, cholagogue, antivenereal; large doses emetic, cathartic, increases heart action, circulation, various secretions; syphilis, scrofula, skin and chronic hepatic affections. Dose, 15–30 gr. (1–2 Gm.); 1. *Fluidextractum Stillingiæ* (diluted alcohol), dose, ♏xv–30 (1–2 cc.): Prep.: 1. *Elixir Corydalis Compositum,* 6 p. c.; 2. *Fluidextractum Stillingiæ Compositum,* 25 p. c., + corydalis 25, blue flag, sambucus, chimaphila, āā 12.5, coriander 6.3, prickly ash berry 6.2, diluted alcohol q. s. 100, dose, ʒss–1 (2–4 cc.): Prep.: 1. *Syrupus Stillingiæ Compositus,* 25 p. c., glycerin 10, syrup 65, dose, ʒj–4 (4–15 cc.). Decoction, 5 p. c., ℥j-2 (30-60 cc.), Extract, gr. 2–5 (.13–.3 Gm.), Tincture 10 p. c., ʒss–2 (2–8 cc.). *Stillingia sebif'era, L. sebum,* tallow, + *ferre,* to bear; China; S. Carolina, Georgia, Florida—sea coast. Tree 6–9 M. (20–30°) high, fruit 3-celled, 3-seeded, imbedded in solid, inodorous fat (palmitin, stearin), melts at 44° C. (112° F.), called China or Vegetable Tallow; used for candles.

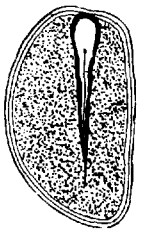


Stillingia root: magnified 10 diam.

Strychnos ignatii

Strychnos Igna'tii, Ignatia, Saint Ignatius Bean, Ignatia Amara, N.F.—The dried ripe seed, yielding not less than 2 p. c. of alkaloids nor more than 1 p. c. of foreign organic matter; Philippine Islands. Large climbing shrub; leaves ovate, acute, smooth, flowers white, tubular, racemes; fruit resembles a pear, pericarp brittle. Seed, 24 imbedded in bitter pulp, 20–30 Mm. (⅘–1⅕′) long, 15 Mm. (⅗′) broad and thick, heavy, hard, horny, angularly ovate, with obtuse angles, several sided, grayish-black, nearly smooth, few hairs; fracture granular and translucent in small fragments, small irregular cavity in center with embryo; nearly inodorous, intensely bitter. Powder, grayish-brown—cells of epidermis and seed-coat, polygonal cells with granular contents from endosperm, few hairs in spreading clusters, embryo tissue of small thin-walled cells; solvent: alcohol; contains more strychnine, but less total alkaloids than nux vomica—strychnine .5–1.5 p. c., brucine .5–1.4 p. c., proteins 10 p. c., ash 4 p. c. Properties, uses and

poisoning similar to nux vomica. Dose, gr. ½–3 (.03–.2 Gm.); 1. *Extractum Ignatiæ, Powdered Extract of Ignatia,* 6 p. c. alkaloids, (75 p. c. alcohol), dose, gr. ⅛–½ (.008–.03 Gm.); 2. *Tinctura Ignatiæ,* 10 p. c., ⅕ p. c. alkaloids (88 p. c. alcohol), dose, ♏v–20 (.3–1.3 cc.). *S. Tieu'te.*—Java; seed resemble nux vomica but smaller, whiter; contain strychnine, brucine; extract used natively for arrow poison. *S. potato'rum,* India; seed subglobular, 12 Mm. (½′) wide, brownish-gray, not bitter, no strychnine; used natively for clearing muddy water. *S. Colubri'na,* India; yields true *Lignum Colubrinum,* for which nux vomica branches often are substituted. All parts bitter and contain strychnine and brucine; once used as antidote to snake-bites, hence the name. *S. toxif'era (Castelnæa'na), Curara, Curare, Woorara, Urari.*—Brazil, Guiana. Extract of bark (South American arrow poison), blackish, hygroscopic, bitter, friable, 75 p. c. soluble in water; contains curarine, $C_{18}H_{35}N$ (yellowish-brown, bitter alkaloid), resin, fat. Diaphoretic, sedative, irritant; best drug in tetanus. Dose, gr. $\frac{1}{10}$–⅓ (.006–.02 Gm.); curarine gr. $\frac{1}{100}$ (.0006 Gm.)—resembles digitalis in action.



Ignatia: vertical section.

Strychnos nux-vomica

NUX VOMICA. NUX VOMICA, *U.S.P.*

Strychnos Nux-vomica, *Linné.* { The dried, ripe seed, yielding not less than 2.5 p. c. of alkaloids.

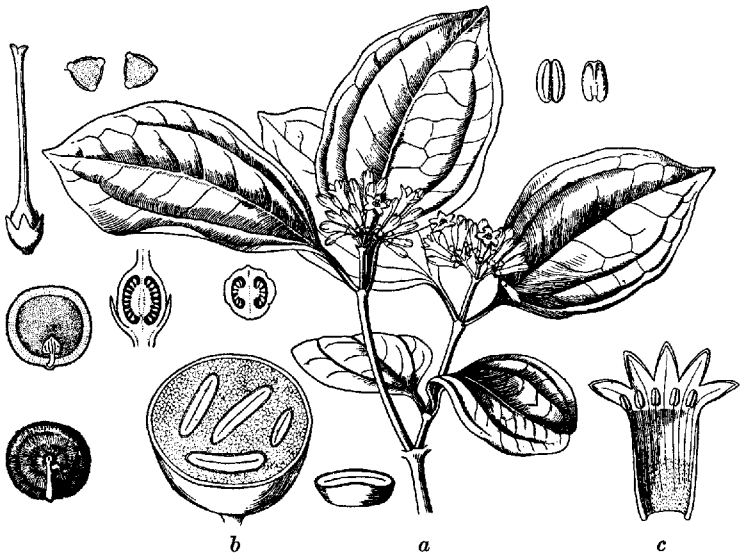
Habitat. India, Hindustan, E. India islands, Malabar, Ceylon, Java, N. Australia.

Syn. Nux Vom., Dog (Quaker, Bachelor's) Buttons, Vomit (Poison) Nut, Dog Poison, Crow-fig, Ratsbane, False Angustura, Columbrina, Ordeal-root, Nux Metella, Semen Nuces Vomicæ; Fr. Noix vomique; Ger. Semen Strychni, Brechnuss, Krähenaugen.

Strych'nos. L. fr. Gr. *στρύχνος,* night shade, equivalent to L. *solanum,* used anciently for several poisonous plants, but not for the present one.

Nux' Vom'i-ca. L. *nux,* a nut, + *vomere,* to vomit—*i. e.,* excessive doses may vomit, or require vomiting to save life, small doses may allay it.

PLANT.—Small tree, 4.5–9 M. (15–30°) high, trunk short, thick, crooked, branches irregular, bark yellowish-gray, nearly smooth; leaves exstipulate, 5–10 Cm. (2–4′) long, roundish, oval, 3–5-nerved, apex acute, entire, shining; flowers in winter, whitish, funnel-shaped, 8 Mm. (⅓′) long, paniculate cymes; fruit shining, globular, 4–5 Cm. (1⅗–2′) thick, rind thin, tough, orange-yellow when ripe, filled with poisonous white gelatinous pulp in which 1–5 seed are immersed irregularly. SEED, orbicular, nearly flat, occasionally irregularly bent, 10–30 Mm. (⅖–1⅕′) broad, 4–5 Mm. (⅙–⅕′) thick, very hard when dry; grayish, greenish-gray, covered with appressed hairs giving a silky luster; hilum—a circular scar at the center of one of the flattened sides and connected with micropyle at the edge by a ridge; internally showing a thin, hairy seed-coat and large grayish-white endosperm,



b a c

Strychnos Nux-vomica: a, flowering branch (¼ natural size); *b,* cross-section of fruit; *c,* corolla; also anther, pollen, pistil, ovary, seed, enlarged.

at one end of which is embedded a small embryo with 2 ovate 5–7-nerved cotyledons; inodorous; taste intensely, persistently bitter. POWDER, light gray—chiefly thick-walled endosperm cells containing fixed oil globules, few aleurone grains, lignified non-glandular hairs with walls having large pores, few spherical starch grains in tissues of adhering pulp. *Solvents:* 75 p. c. alcohol; boiling water partially. Dose, gr. ½–5 (.03–.3 Gm.).

ADULTERATIONS.—SEED: Rare—as nothing resembles them closely; POWDER: Common—various inert substances (increasing amount of hairs) and olive stones, often 50 p. c. RASPED: "Vegetable ivory" (coroso, negrito), seeds of *Phytel'ephas macrocar'pa* (Australia, used natively for making buttons) and of *Metrox'ylon vitie'se* (so-called Australian "coroso," Fiji Islands, imported into Hamburg for the purpose; odorless, tasteless, bony, revealing decided structural differences under the microscope).

Commercial.—Plant resembles our dogwood and its fruit a small orange. Seed are washed free of pulp and dried in the sun, the best being recognized by light color, ample breadth, thin edge, excessive silkiness, and prominent hilum; they may readily be powdered by breaking into small pieces and drying several days with hot air or carefully applied direct heat; powder should be uniform so as not to retard or prevent thorough exhaustion by menstruum. There are four varieties valued in the order named: 1, *Bombay;* 2, *Cochin (Calcutta);* 3, *Ceylon;* 4, *Madras.*

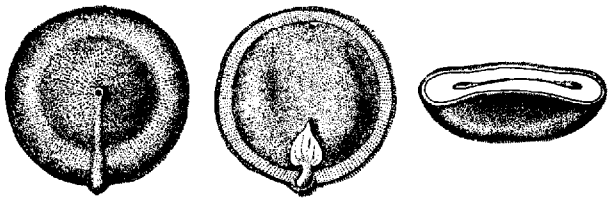
CONSTITUENTS.—Alkaloids 2.5–4–5.3 p. c.: Strychnine .25–2 p. c., Brucine .5–2 p. c., Igasurine (probably impure brucine), all combined with igasuric (strychnic, tannic, caffeo-tannic) acid; Loganin, fixed oil, proteins 11 p. c., yellow coloring matter, gum, sugar 6 p. c., ash

1–3.5 p. c. Dunstan and Short found total alkaloids to vary from 2.74 p. c. in small Madras to 3.9 p. c. in large, silky Bombay seed, of which 30–50 p. c. was strychnine.

Strychnina, Strychnine, $C_{21}H_{22}O_2N_2$, *N.F.*—This alkaloid is found not only in nux vomica, but also in other loganiaceous plants (seeds); it was discovered by Pelletier, 1818, and may be obtained by boiling powdered seed with acidulated (HCl or H_2SO_4) water, thus liberating tannic (igasuric) acid, mucilage, coloring matter, etc., and forming chlorides or sulphates of the alkaloids; concentrate and add milk of lime to decompose alkaloidal salts (forming $CaCl_2$ or $CaSO_4$) and to precipitate strychnine and brucine; wash precipitate, treat it with diluted alcohol to dissolve brucine, or with alcohol or benzene to take out strychnine, thus leaving brucine in the mother-liquor. If diluted alcohol be used for brucine, then by boiling residue with alcohol strychnine is obtained; can purify with animal charcoal and reprecipitate with ammonia. It is in colorless, transparent, prismatic crystals, white crystalline powder, odorless (must use great caution in tasting, and then only in very dilute solutions, which are exceedingly bitter—1 in 700,000), permanent, soluble in water (6420), boiling water (3100), alcohol (136), boiling alcohol (34), chloroform (5), benzene (180), very slightly in ether; saturated solutions alkaline, levorotatory; forms numerous salts (hydrochloride, nitrate, phosphate, sulphate, etc.). With sulphuric acid containing 1 p. c. of ammonium vanadate—deep violet-blue, changing to deep purple, cherry-red; incinerate 1 Gm.—ash .1 p. c.; solution of .1 Gm. in sulphuric acid 2 cc.—only pale yellow (abs. of readily carbonizable organic substances) until a fragment of potassium dichromate is added—deep blue color, changing to deep violet, purplish-red, cherry-red, orange, yellow. Add .1 Gm. to mixture of equal vols. nitric acid and distilled water—may produce yellow color, but no red or reddish (abs. of brucine). *Impurities:* Brucine, readily carbonizable organic substances; commercial strychnine contains some homo-strychnine, $C_{22}H_{24}O_2N_2$. Dose, gr. $\frac{1}{60}$–$\frac{1}{20}$ (.001–.003 Gm.).

Strychninæ Nitras, Strychnine Nitrate, $C_{21}H_{22}O_2N_2.HNO_3$, *U.S.P.*—(Syn., Strych. Nit; Fr. Azotate (Nitrate) de Strychnine; Ger. Strychninum nitricum, Strychninnitrat, Salpetersaures Strychnin.) Obtained by dissolving strychnine (1) in diluted nitric acid (1,886), or strychnine (5), hot dist. water (50), dilute nitric acid q. s., when neutral evaporate, crystallize. It is in colorless, glistening needles, white, crystalline powder, odorless (must use great caution in tasting, and then only in very dilute solutions, which are exceedingly bitter—1 in 700,000), permanent, soluble in water (45), boiling water (10), alcohol (150), hot alcohol (80), glycerin (50), chloroform (105), insoluble in ether; saturated aqueous solution neutral, slightly acid, levorotatory; contains 84.13 p. c. of the alkaloid. *Tests:* 1. Superimpose in a test-tube an aqueous solution of the salt upon diphenylamine T. S.—a blue color at zone of contact; heated with hydrochloric acid—bright red. 2. Aqueous solution (1 in 100) 20 cc. acidulated with 2 drops diluted nitric acid, + 5 drops of silver nitrate T. S.—no opalescence at once (abs. of chloride); similar solution 20 cc. + 5 drops of barium nitrate T. S.—no immediate turbidity (abs. of sulphate). Should be kept dark in well-closed containers. Dose, gr. $\frac{1}{60}$–$\frac{1}{20}$ (.001–.003 Gm.).

Strychninæ Sulphas, Strychnine Sulphate, $(C_{21}H_{22}O_2N_2)_2.H_2SO_4.5H_2O$, *U.S.P.*—(Syn., Strych. Sulph.; Fr. Sulfate de Strychnine; Ger. Strychninum sulfuricum, Strychninsulfat, Schwefelsaures Strychnin.) Obtained by dissolving strychnine in diluted sulphuric acid, avoiding excess, evaporating filtrate, crystallizing. It is in colorless, white, crystals, white, crystalline powder, odorless, efflorescent (must use great caution in tasting, and then only in very dilute solutions, which are exceedingly bitter—1 in 700,000), soluble in water 35, boiling water (7), alcohol (81), hot alcohol (26), chloroform (220), glycerin, insoluble in ether; saturated aqueous solution (1 in 50) neutral, slightly acid, levorotatory; contains 78.03 p. c. of the alkaloid. *Tests:* 1. Aqueous solution with barium chloride T. S.—white precipitate, insoluble in hydrochloric acid. 2. Dried to constant weight at 100° C. (212° F.)—loses 11 p. c. (all water of crystallization); ash .1 p. c. Should be kept dark, in well-closed containers. Dose, gr. $\frac{1}{60}$–$\frac{1}{20}$ (.001–.003 Gm.).



Nux vomica: whole seed, cut longitudinally, and cut transversely.

Brucine (Brucina), $C_{23}H_{25}O_4N_2$.—Named after James Bruce (1730–1794), a Scotch traveler, and obtained in extracting strychnine; occurs in rectangular, octahedral crystals, containing $4H_2O$, soluble in water (850), readily in chloroform, alcohol, ammonia, creosote; forms numerous salts, less bitter than strychnine, 12 times weaker, 3 times slower physiologically; by some considered to be strychnine + resin, as it has same action. *Test:* 1. With nitric acid—blood-red color, changing to orange-yellow; now add stannous chloride, sulphurous acid, or any deoxidizing agent—violet-red (this completely bleaches morphine-red). Dose, gr. $\frac{1}{12}$–$\frac{1}{2}$ (.005–.03 Gm.).

Igasurine (Igasuria), fr. Malay, *igasura,* the nux vomica.—Obtained from mother-waters of strychnine and brucine after their precipitation with lime; occurs in white crystals; by some claimed to be a mixture of 9 alkaloids, mostly brucine; others doubt its existence.

Igasuric Acid.—Identical with tannic or caffeo-tannic acid, amorphous, dark green with ferric salts, by hydrolysis yields glucose and caffeic acid.

Loganin, $C_{25}H_{34}O_{14}$.—Bitter glucoside, in white prisms, soluble in water, alcohol; with sulphuric acid—red, then purple, and splits into dextrose and loganetin.

PREPARATIONS.—SEED: 1. *Extractum Nucis Vomicæ.* Extract of Nux Vomica. (Syn., Ext. Nuc. Vom., Powdered Extract of Nux Vomica; Fr. Extrait de Noix vomique; Ger. Extractum Strychni, Brechnussextrakt.)

Manufacture: Macerate, percolate 100 Gm. with 75 p. c.. alcohol containing acetic acid 1 p. c. until exhausted, reclaim alcohol, concentrate to 20 cc., transfer to flask or separator, add water 15 cc. + purified petroleum benzin 20 cc., shake thoroughly several minutes, decant benzin layer, shake residue again with purified petroleum benzin 10 cc., decant benzin layer, reject benzin solutions. Evaporate fat-free residue on water-bath to dryness, stirring frequently; assay and add q. s. dried starch for extract to contain 15.2–16.8—16 p. c. of the alkaloids. Pulverize, mix thoroughly, pass through fine sieve. Should be kept in small, wide-mouthed, tightly-stoppered bottles. Dose, gr. $\frac{1}{8}$–$\frac{1}{2}$ (.008–.03 Gm.): Preps.: 1. *Pilulæ Aloes et Podophylli Compositæ, N.F.*, $\frac{1}{4}$ gr. (.016 Gm.). 2. *Pilulæ Ferri, Quininæ, Aloes et Nucis Vomicæ, N.F.*, $\frac{1}{4}$ gr. (.016 Gm.).

2. *Tinctura Nucis Vomicæ.* Tincture of Nux Vomica. (Syn., Tr. Nuc. Vom.; Fr. Teinture de Noix-vomique; Ger. Tinctura Strychni, Brechnusstinktur, Krähenaugentinktur.)

Manufacture: 10 p. c. Similar to Tinctura Veratri Viridis, page, 104, 1st menstruum: 75 p. c. alcohol containing 1 p. c. of acetic acid, 2d menstruum: 75 p. c. alcohol; contains .237–.263—.25 Gm. of alkaloids in each 100 cc. Dose, ♏v–20 (.3–1.3 cc.).

3. *Fluidextractum Nucis Vomicæ, N.F.*, (75 p. c. alcohol), 2.5 Gm. alkaloids in each 100 cc. Dose, ♏j–5 (.06–.3 cc.). STRYCHNINE: 1. *Elixir Ferri Pyrophosphatis, Quininæ et Strychninæ, N.F.*, $\frac{1}{125}$ gr. in each ʒj. 2. *Elixir Pepsini, Bismuthi et Strychninæ, N.F.*, $\frac{1}{100}$ gr. in each ʒj. 3. *Liquor Hypophosphitum Compositus, N.F.*, $\frac{1}{250}$ gr. in each ʒj. 4. *Pilulæ Aloini, Strychninæ et Belladonnæ, N.F.*, $\frac{1}{125}$ gr. in each. 5. *Pilulæ Aloini, Strychninæ et Belladonnæ Compositæ, N.F.*, $\frac{1}{125}$ gr. in each. 6. *Pilulæ Ferri, Quininæ, Strychninæ et Arseni Fortiores, N.F.*, $\frac{1}{20}$ gr. in each. 7. *Pilulæ Ferri, Quininæ, Strychninæ et Arseni Mites, N.F.*, $\frac{1}{50}$ gr. in each. 8. *Pilulæ Laxativæ Compositæ, N.F.*, $\frac{1}{125}$ gr. in each. 9. *Syrupus Ferri Quininæ et Strychninæ Phosphatum, N.F.*, $\frac{1}{80}$ gr. in each ʒj. 10. *Syrupus Hypophosphitum Compositus, N.F.*, $\frac{1}{80}$ gr. in each ʒj. STRYCHNINE NITRATE: 1. *Elixir Glycerophosphatum Compositum, N.F.*, $\frac{1}{160}$ gr. in each ʒj. 2. *Syrupus Phosphatum cum Quinina et Strychnina, N.F.*, $\frac{1}{125}$ gr. in each ʒj. STRYCHNINE SULPHATE: 1. *Elixir Cinchonæ Alkaloidorum, Ferri, Bismuthi et Strychninæ, N.F.*, $\frac{1}{100}$ gr. in each ʒj. 2. *Elixir Cinchonæ Alkaloidorum, Ferri et Strychninæ, N.F.*, $\frac{1}{100}$ gr. in each ʒj. 3. *Elixir Ferri, Quininæ et Strychninæ, N.F.*, $\frac{1}{100}$ gr. in each ʒj.

Unoff. Preps.: Abstract (seed), gr. $\frac{1}{4}$–2 (.016–.13 Gm.). Decoction (leaves)—externally in rheumatism. Elixirs, Solutions, Syrups of various salts of strychnine.

PROPERTIES.—Motor excitant, spinant, tonic, stomachic, respiratory, cardiac, muscular, and nervous stimulant, antiseptic, poisonous. Strychnine and nux vomica are identical, increasing the vascularity of gastric mucous membrane, secretion of gastric juice, and peristalsis by stimulating the intestinal muscular coat (purgative), stimulates direct the cardiac muscles or the motor ganglia and nerves of special sense; strychnine, full dose, gr. $\frac{1}{10}$ (.006 Gm.), gives dilated pupils, jerky limbs, spasmodic respirations, stiff lower jaw, cerebral tension, shuddering, depression, facial smile or grin. Thebaine (opium) acts similarly. The spasms of tetanus are constant, of strychnine intermittent, with meaningless smile, the modified lockjaw, absence of wound, and rapidly developed symptoms differentiate the two. Strychnine is absorbed rapidly, but eliminated slowly by urinary, salivary, and cutaneous channels.

USES.—Strychnine was used first in paralysis, and now in atonic dyspepsia, gastric catarrh, bowel atony, pregnancy and phthisis vomiting, nervous cough, bronchitis, anemia, paralytic condition, lead palsy, inebriate and diphtherial paralysis, amaurosis from lead, tobacco, alcohol, paralysis of bladder, incontinence of urine, sexual impotence, tetanus, chorea, epilepsy, delirium tremens, spermatorrhea, neuralgia, dysmenorrhea, diarrhea, dysentery, cholera, antidote to chloral hydrate, morphine, physostigmine. A tolerance for it is established quickly, but gr. $\frac{1}{12}$ (.005 Gm.) has killed, while gr. $\frac{1}{2}$–2 (.03–.13 Gm.) as a rule is considered fatal; extract, gr. 3 (.2 Gm.) also have killed.

Poisoning: Strychnine, gr. $\frac{1}{2}$ (.03 Gm.), or more, produces within half an hour difficult breathing, sense of suffocation and impending death, muscular rigidity, stiffness of neck, tonic or persistent convulsions of all extensor muscles, coming on at intervals 3–30 minutes, lasting a few seconds to one or more minutes, these quickly recurring at every noise, touch or peripheral irritation, between convulsions complete relaxation, face dusky and with ghastly grin, angles of mouth drawn back and upward, body curved so as to rest on head and heels, eyeballs prominent, pupils dilated during paroxysm, eyes fixed and open, lips livid, great thirst but unable to drink owing to spasms of jaws, respiration suspended during convulsions, pulse feeble and rapid, involuntary defecation and urination, lockjaw, death in 2–3 hours from asphyxia; mind clear until near the end, when carbon dioxide narcosis (cyanosis), exhaustion and nervous storm set in. Place in horizontal position, in dark room remote from all noise, use evacuants, (stomach-pump, emetics, purgatives), follow with antidotes: tannin dissolved in water, charcoal, potassium permanganate; if ingested relax (convulsions) with chloroform or ether, and give by rectum potassium bromide gr. 60 (4 Gm.) and chloral hydrate, gr. 40 (2.6 Gm.) in starch water; amyl nitrite, (soluble iodides, tobacco, opium, physostigmine, atropine, conium, cannabis). Empty bladder often (catheter), practise artificial respiration.

Incompatibles: Chloral hydrate, potassium bromide, tobacco, chloroform, ether, tannin, bromides, iodides, chlorides.

Synergists: Motor excitants, ergot, ustilago, electricity, cold.

Allied Product:

1. The bark was once (1806–1837) upon the market in England and Holland, being mixed usually with Angustura, and since then has been known as *False Angustura Bark;* it is poisonous, gray, cork patches rust-color, warty, inside brown, fracture smooth, no white striæ (calcium oxalate); contains strychnine, brucine, etc. The wood is used in domestic practice; all portions are medicinal.

BENZOINUM. BENZOIN, *U.S.P.*

Styrax Benzoin, *Dryander,* or other species. { The balsamic resin with not more than 1 p. c. foreign organic matter (Siam), yielding 75 (Sumatra)–90 (Siam) p. c. alcohol-soluble extractive and 1 (Sumatra)–.5 (Siam) p. c. acid-insoluble ash.

Habitat. East Indies—Sumatra, Siam, Java, Borneo, Malay Peninsula, Laos; cultivated; grown upon interior hills and sea coast plantations.

Syn. Gum Benjamin, Benzoin Laurel, Benjamin tree, Resina Benzoe, Asa Dulcis; Fr. Benjoin (de Sumatra); Ger. Benzoë, Benzoe.

Sty'rax. L. see etymology, above, of Styraceæ.

Ben-zo-i'num. L. fr. Ar. *luban, jawa,—lu* + *ban* + *join,* contracted, lit. "incense of Java," in universal use.

Ben-zo'in. The original word and mostly used.

PLANT.—Handsome tree, medium height, with dense spreading crown; bark grayish, tomentose; leaves oblong, downy, 7.5–12.5 Cm. (3–5′) long, acuminate, dentate; flowers inside reddish, outside white, hairy, anthers 2-celled. BALSAMIC RESIN: *Sumatra Benzoin,* in blocks, lumps of variable size made up of tears compacted together with reddish-brown resinous mass; tears yellowish-brown, fresh fracture milky-white; hard, brittle, softened by heat; odor aromatic, when boiled with water suggesting cinnamic acid or storax; taste aromatic, slightly acrid—gritty on chewing; *Siam Benzoin,* in pebble-like tears of variable size, compressed, yellowish-brown, separate or slightly agglutinated, fracture milky-white, hard, brittle, softened by heat; odor agreeable, balsamic, vanilla-like; taste aromatic, slightly acrid—plastic on chewing. *Tests:* 1. Alcohol dissolves 75 (Sumatra)–90 (Siam) p. c., the solution being acid, and milky with water. 2. Heat fragments in test-tube—sublimate formed just above melted mass, in plates, small rod-like crystals strongly polarizing light (Sumatra), or in long rod-shaped crystals slightly polarizing light (Siam). 3. Ethereal solution added to small quantity of sulphuric acid—brownish-red (Sumatra), purplish-red (Siam). 4. Heat .5 Gm. with potassium permanganate T. S. 10 cc.—Sumatra only develops odor of benzaldehyde. 5. Treat 1 Gm. with warm carbon disulphide 15, + 5 cc. filtrate spontaneously evaporated—residue not over 12.5 p. c., and responds to tests of benzoic acid. *Impurities:* Rosin, foreign resins, etc. Dose, gr. 5–30 (.3–2 Gm.).

ADULTERATIONS.—Wood, bark, splinters, earthy matter, stones, resinous matrix (in cake benzoin—remaining behind when treated with alcohol or sublimed), 10–40 p. c.

Commercial.—Trees contain no resin-receptacles and only the unhealthy afford resin—a pathological product (tannate transformation resulting from wounding)—which is obtained, July–Nov., from both wild and cultivated plants over 6 years old having a trunk 15–20 Cm. (6–8′) thick, by making between the ground and the first branches longitudinal or oblique incisions, or a circle of notches through the bark into which the white liquid resin slowly exudes; after 3 months, when dry and hard (concreted), it is picked out, cut or scraped off with knives or sharp sticks, placed into baskets, and assorted according to size, cleanness, and quality, the larger tears (marbles, almonds) commanding the higher price. Each tree yields annually about 3 pounds (1.5 Kg.) for 12 years, when they are cut down; the first 3 years' product, called natively *head benzoin,* is best, being more fragrant and filled with white tears; the next 7–8 years' yield, *belly benzoin,* is browner, with less white tears, while by felling the trees and splitting the stems an inferior quality, *foot benzoin, "foots,"* is scraped off, being dark and mixed with wood, bark, etc. These names correspond to our *superior, medium, inferior*—both having the same relative values, 105, 45, 18. It is received at the Sumatra ports in cakes wrapped in matting, there softened by heat, packed into chests, and sent to Penang and Singapore, thence into commerce; in Siam it is conveyed on bullocks' backs to Menam River, thence via Bangkok to market in cubical blocks. There are five varieties—the first two being recognized by U.S.P.: 1, *Sumatra,* grayish-brown, with many white tears mixed with resinous matrix of unknown origin, reddish-brown with age; 75 p. c. soluble in alcohol, odor weak, storax-like; inferior kinds with few or no tears, but many chips of wood, bark, etc., especially in the center—"drossy" or "false packed;" 2, *Siam,* best, reddish-brown, in small or large tears; 90 p. c. soluble in alcohol, odor strongest, most agreeable, vanilla-like, taste bitter; occurs in two forms: (*a*) tears—almond-shaped lumps, often 2.5 Cm. (1′) long, more or less flattened; (*b*) amygdaloid—tears agglutinated with reddish-brown matrix; 3, *Penang,* similar to Sumatra, but odor even more storax-like, and possibly from other species of *Styrax;* 4, *Palembang,* free from tears, pale reddish-brown, opalescent luster (due to moisture, becoming moldy), little odor; contains benzoic acid, no cinnamic acid nor vanillin; tincture gives flocculent precipitate, not milkiness, in water; seldom reaches our market; 5, *False* (*Catappa—Bu'ceras* (*Termina'lia*) *angustifo'lius*—Combretaceæ); whitish-brown aromatic exudate obtained by incisions; resembles benzoin slightly; used as incense in E. India. While the quality of all varieties depend upon the amount of tears, yet the Sumatra is the great article of commerce, although the Siam is purest, least variable, and best flavored.

CONSTITUENTS.—Sumatra: Benzoic acid 10–20 p. c., Cinnamic acid, small amount or wanting, Resins, Vanillin .1–1 p. c., volatile oil (benzoic acid ester—aromatic, neutral) .3 p. c., styracin 2–3 p. c., styrol, benzaldehyde, phenyl-propyl cinnamate, 2 esters 75 p. c. (of which 92.6 p. c. is resinotannol, 7.4 p. c. benzoresinol)—yielding cinnamic acid 33 p. c.; Siam: less benzoic acid, little or no cinnamic acid, more vanillin, 1–1.5 p. c., benzoresinol benzoate, $C_{16}H_{26}O$, 5 p. c. (long white prisms), resinotannol benzoate, $C_{12}H_{14}O_3$, 57 p. c., ash 2 (Sumatra) –2.5 (Siam) p. c.

Acidum Benzoicum. Benzoic Acid, C_6H_5COOH, *U.S.P.*—(Syn., Acid Benz., Acidum Benzoicum Sublimatum, Flores Benzoes, Flowers of Benzoin; Fr. Acide benzoïque, Fleurs de Banjoin; Ger. Benzoesäure, Benzoeblumen.) This organic acid—*English* variety, is obtained (*wet process*) by boiling benzoin several hours with milk of lime, filtering