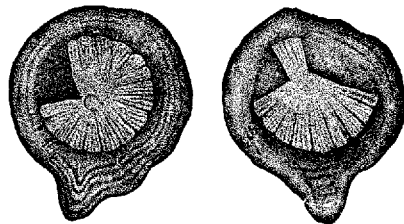


ADULTERATIONS.—Allied species, also gillenia, triosteum (rhizome and roots), American gentians (rootlets), often to 25 p. c.—result of careless collection and intentional fraud; in Europe occasionally the underground portion of *Cynan'chum Vincetox'icum*. Of these none has a keel, some contain starch, and all differ in odor, color, and taste.

Commercial.—The official root, as well as some of the growing plants of this genus emit a slight wintergreen odor; the southern root is smaller and usually paler, while the Manitoba is larger and stouter, often dark, with purple discoloration about the crown; the large, broad-leaved form is considered var. *latifo'lia*. Root should be collected in the autumn, and comes chiefly from Minnesota and northward.

CONSTITUENTS.—Saponin-like compound 5–6 p. c., composed of senegin 1.5 p. c., and polygalic acid 4 p. c. (analogous to saponin and components, quillaja-sapotoxin, quillajic acid, of quillaja), fixed oil 8–9 p. c., volatile oil .12 p. c., methyl salicylate (increasing with age), resin, polygalite, sugar 7 p. c., pectin and albuminoids 18.40 p. c., malates, yellow coloring matter, ash 4–5 p. c.



Senega: transverse sections magnified.

Senegin (*polygalin, saponin*), $C_{32}H_{54}O_{18}$.—Obtained by exhausting root with 60 p. c. alcohol, concentrating, precipitating with alcohol and ether; mother-liquor contains the salt of an organic acid. It is a neutral glucoside, white, amorphous, inodorous powder, insoluble in alcohol, not precipitated by normal lead acetate, and forms soapy emulsion with boiling water; by hydrochloric acid decomposed into glucose and sapogenin, $C_{14}H_{22}O_2$.

Polygalic Acid, $C_{19}H_{30}O_{10}$.—Sparingly soluble in alcohol, insoluble in ether or chloroform, precipitated by neutral and basic lead acetates.

Fixed Oil.—Obtained from root by ether; contains virgineic acid which gives disagreeable aroma.

Volatile Oil.—This is a mixture of valer(ian)ic ether and methyl salicylate.

PREPARATIONS.—1. *Fluidextractum Senegæ*. Fluidextract of Senega. (Syn., Fldext. Seneg., Fluid Extract of Senega; Fr. Extrait fluide de Polygale de Virginie; Ger. Senegafluidextrakt.)

Manufacture: Macerate, percolate 100 Gm. with alcohol 200 cc. + water 100 cc., proceed with menstruum (same strength) until exhausted, reserve first 80 cc., evaporate remainder to soft extract, which dissolve in the reserve, add ammonia water gradually until faintly alkaline (slight odor of ammonia), and menstruum q. s. 100 cc. Dose, \mathfrak{m} v–30 (.3–2 cc.).

Preps.: 1. *Syrupus Senegæ*. Syrup of Senega. (Syn., Syr. Seneg.; Fr. Sirop de Polygale; Ger. Senegasirup.)

Manufacture: 20 p. c. Mix ammonia water 1 cc. with fluidextract of senega 20 cc., add syrup q. s. 100 cc.; mix well. Dose, \mathfrak{z} j–2 (4–8 cc.).

2. *Syrupus Scillæ Compositus*, 8 p. c. 3. *Mistura Pectoralis*, N.F., 3.5 p. c.

Unoff. Preps.: *Abstract*, gr. 5–10 (.3–.6 Gm.). *Infusum Senegæ* (Br.), 5 p. c., \mathfrak{z} iv–16 (15–60 cc.). *Liquor Senegæ Concentratus*, 50 p. c., \mathfrak{z} ss–j (2–4 cc.). *Tinctura Senegæ* (Br.), 20 p. c. (60 p. c. alcohol), \mathfrak{z} ss–j (2–4 cc.).

PROPERTIES.—Stimulating expectorant, diuretic, diaphoretic, irritant. Produces throat and gastro-intestinal irritation, some salivation with inclination to cough, increased bronchial secretion; large doses vomit and purge. Insufflation causes sneezing, coughing, and nasal catarrh. Externally—an irritant to the skin. Senegin is a violent irritant, heart depressant, likewise same to vascular, nervous, and muscular systems. It is excreted by kidneys, skin, bronchial mucous membrane, all being stimulated and irritated by it.

USES.—Secondary stage of acute and in chronic bronchitis, in typhoid pneumonia, asthma, croup, renal dropsy, promotes expectoration; no value when mucus tough and scanty, or unless the primary acute inflammation has been subdued; slight value in dropsy. In amenorrhæa, give decoction two weeks before each menstruation, chronic rheumatism, rheumatic paralysis; senegin in gr. 2 (.13 Gm.) doses for uterine hemorrhage. Popular with North American Indians for rattlesnake and other snake-bites.

Polygala alba

Polygala al'ba, *White, Texas or False Senega*.—West of Mississippi River; root 6 Mm. ($\frac{1}{4}$ ') thick, resembling official, but has a lighter color internally, also a cylindrical wood, and is destitute of keel; contains polygalic acid 3 p. c.; yields light-colored infusion and tincture. *P. Boyki'nii*, Southern States; like the *P. alba*, only thinner, yet some consider both to be one and the same species.

Polygala spp.

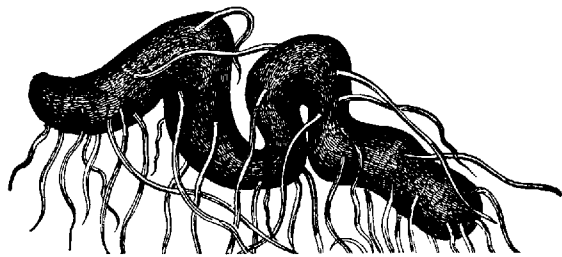
Polygala polyg'ama (*rubel'la*), *Bitter Polygala*.—The root and herb, U.S.P. 1820–1870; Canada–Florida. Plant 15–22.5 Cm. (6–9') high; leaves mucronate; flowers purple; keel crested, shorter than the wings; fruit 2-seeded, capsule oblong; contains bitter principle analogous to senegin; similar to *P. ama'ra* of Europe. Tonic in bronchial catarrh; large doses laxative, diaphoretic.

Polygonatum

Polygona'tum (*Convallaria*) *multiflo'rum*, *European Solomon's Seal*, and *P. commuta'tum* (*gigante'um*), *American Solomon's Seal*.—Rhizome similar and contains convallarin, asparagin, mucilage, starch.

Polygonum bistorta

Polyg'onum Bistor'ta, *Bistort*.—Europe, Asia, N. America, in meadows. Produces an S-shaped rhizome, bent upon itself—bistorted. 5 Cm. (2') long, 15 Mm. ($\frac{3}{8}$ ') thick, flattened or channeled, upper side transversely striate, root-scars on under side, red-brown; contains tannin 20 p. c., starch, calcium oxalate; tonic, astringent. Dose, gr. 5–30 (.3–2 Gm.).



Polygonum Bistorta: rhizome, natural size.

Populus

Populus ni'gra, *P. can'dicans*, or *P. balsamif'era*, *Populi Gemmæ*, *Balsam Poplar Buds*, *Balm of Gilead Buds*, *N. F.* The air dried, closed, winter leaf-buds with not more than 10 p. c. of flower buds, yielding not more than 1 p. c. of acid-insoluble ash; United States, Canada. Large tree. Buds conical, pointed, up to 2 Cm. ($\frac{1}{2}$ ') long, 2-5 Mm. ($\frac{1}{12}$ - $\frac{1}{5}$ ') thick, consisting of closely imbricated scales, brown, glossy, glutinous with fragrant resin; internally with abundant oleoresin and salicin crystals; odor pleasant, balsamic; taste aromatic, bitter; contains volatile oil, resin. Stimulating expectorant, antinephritic, anti-rheumatic, tonic; bronchitis, nephritis, catarrh, rheumatism; ulcers—ointment. Dose, gr. 15-30 (1-2 Gm.); 1. *Syrupus Pini Albæ Compositus*, 1 p. c.: Prep.: 1. *Syrupus Pini Albæ Compositus cum Morphina*.

Potentilla tormentilla

Potentilla Tormentilla, *Tormentil*.—The rhizome, U.S.P. 1820-1870; Europe. Plant resembles *P. canaden'sis*, *Cinquefoil*, perennial, 25-30 Cm. (10-12') high, green or reddish leaves, trifoliate; leaflets cuneate; flowers yellow; fruit achenes, reniform. Rhizome 5 Cm. (2') long, 12 Mm. ($\frac{1}{2}$ ') thick, tuberculate, brownish-red; bark thin, wood-wedges small, distant; pith large, inodorous, astringent; contains tannin 25 p. c., red coloring matter (tormentil-red), kinovic acid, ellagic acid. Astringent, tonic like kino and catechu; diarrhea, dysentery, spongy gums (gargle), ulcers, gleet; decoction, infusion. Dose, gr. 10-30 (.6-2 Gm.).



Potentilla Tormentilla: rhizome and transverse section.

Prinos

Ilex verticilla'ta (*Pri'nos verticilla'tus*), *Prinos*, *Black Alder*, *Winter-berry*.—Ilicaceæ (Aquifoliaceæ). The bark, U.S.P. 1820-1880; N. America, swamps; shrub, 2-2.5 M. (6-8°) high; leaves serrate, pubescent beneath; flowers white; fruit scarlet berry, size of pea. Bark thin, fragments 1 Mm. ($\frac{1}{25}$ ') thick, brown-ash color, with white patches, black dots and lines; inner surface greenish, striate, bitter, astringent; contains, tannin, resin, bitter principle. Astringent, tonic, alterative, febrifuge, substitute for cinchona; diarrhea, fevers, ulcers, etc. Dose, ζ ss-1 (2-4 Gm.); decoction, fluidextract.

Prunella

Prunel'la (*Brunel'la*) *vulga'ris*, *Self-heal*, *Heal-all*. Plant .3 M. (1°) high, flowers purplish-blue, in dense spike, leaves hairy, bitter, astringent.

Prunus domestica

Prunus domes'tica, *Prunum*, *Prune*, *N.F.*—The partly dried ripe fruit, with 30-35 p. c. of natural moisture when used for pharmaceutical purposes; W. Asia, cult. in S. France, California. Tree, 4.5-6 M. (15-20°) high; leaves 5 Cm. (2') long, dentate, ovate, pubescent beneath; flowers whitish. Fruit (drupe), 3-4 Cm. ($1\frac{1}{5}$ - $1\frac{3}{5}$ ') long, ellipsoidal, brownish-black, shriveled, sarcocarp sweet, acidulous, putamen hard, smooth or ridged; seed almond-shaped, but smaller, bitter almond taste. Of the several varieties, the St. Catherine and Greengage are finer as a dessert, and Prune de St. Julian (France) as a medicine; contains sugar 12-25 p. c., pectin, albumin, malic acid, tartaric acid, salts; seed—fixed oil, amygdalin, emulsin. Nutritive, laxative, demulcent; constipation—skins indigestible; fermented and distilled for brandy, which contains alcohol 40 p. c. Should be kept cool, in air-tight containers. Dose, *ad libitum*; 1. *Confectio Sennæ*, 7 p. c.



Prunus Laurocerasus.

Prunus laurocerasus

P. Laurocer'asus, *Cherry Laurel*, *Laurocerasi Folia* (Br.).—Fresh leaves; W. Asia. Ornamental shrub or tree, 3-6 M. (9-20°) high; leaves 15 Cm. (6') long, obovate, oblong, serrate, coriaceous; bitter almond odor; aromatic, bitter taste; contains prulaurasin, $C_{40}H_{67}O_{30}N$ (similar to amygdalin), emulsin, tannin, sugar, fat, wax, phyllic acid (crystalline, occurring also in leaves of almond, apple, maple, peach); yields hydrocyanic acid .12 p. c., and oil of bitter almond (benzaldehyde) .5 p. c., in which spring leaves are richest. Sedative, narcotic; used to make cherry laurel water (*Aqua Laurocerasi*, Br.) by distilling 400 cc. from leaves 320 Gm. + water 1000 cc. Dose, ζ ss-2 (2-8 cc.).



Prunus persica

Prunus Laurocerasus.

Amygdalus (Prunus) Per'sica, Peach.—Persia, cultivated largely in the United States, etc. Fruit edible, abounding in sugar, juice ferments, and upon distillation yields peach brandy; kernels poisonous from yielding HCN, often substituted for bitter almonds, also contain fixed oil resembling that of almond, for which it is an adulterant; leaves mild sedative in doses of gr. 15–30 (1–2 Gm.), in infusion.

Prunus serotina

PRUNUS VIRGINIANA. WILD CHERRY, U.S.P.

Prunus serotina, Ehrhart. { The stem-bark collected in autumn and carefully dried. Borke (ross—sloughing dead tissues), if present, should be removed.

Habitat. N. America (Can. to Fla., to Minn., Neb., Kan., La., to Texas), in woods.

Syn. Prun. Virg., Wild Black Cherry Bark, Cabinet (Rum, Whisky, Blackchoke, Wild) Cherry; Br. Pruni Virginianæ Cortex, Virginian Prune Bark; Fr. Écorce de Cérissier de Virginie; Ger. Wildkirschenrinde.

Prunus. L. fr. *πρῦνη*, a plum tree; *prunum*, a plum—*i. e.*, classic name.

Se-rot'i-na. L. *serotinus*, fr. *serus*, late—*i. e.*, the latest of the genus to bloom and fruit.

Vir-gin-i-a'na. L. of, or belonging to Virginia—*i. e.*, Virginian.

PLANT.—Large tree 9–24 M. (30–80°) high; trunk regular, straight, with blackish, rugged outside bark, that of young branches smooth, red or purplish; leaves 5–12.5 Cm. (2–5') long, oval, petiolate, serrate, teeth glandular, glabrous, shining, bright green, with 2 small glands on the margin at the base; flowers May–June, appearing after the leaves, small, white, racemes; fruit August, drupe, size of a pea, purplish-black, pulpy, sweet, acidulous, slightly astringent and bitter—bitter cherries; seed subglobular bitter almond flavor, containing bland, yellowish-green fixed oil 25 p. c. **BARK**, usually in transversely curved pieces, 2.5–8 Cm. (1–3½') long, 12–25 Mm. (½–1') broad, .5–8 Mm.

($\frac{1}{50}$ – $\frac{1}{3}$ ') thick; outer surface (rossed bark) light brown, greenish-brown, smooth, except numerous lenticel-scars (unrossed bark), reddish-brown, glossy, smooth, with light colored, transversely elongated lenticels, roughened, flaky with gray lichens; inner surface light brown, with delicate, reticulate striations, numerous minute fissures; fracture short, granular; odor distinct, resembling bitter almond when macerated in water; taste astringent, aromatic, agreeable bitter. **POWDER**, light brown—fragments of yellow-brown cork, stone cells, few bast-fibers, not greatly elongated, frequently accompanied by crystal-bearing fibers, calcium oxalate prisms, rosette aggregates, starch grains .002–.015 Mm. ($\frac{1}{12500}$ – $\frac{1}{1665}$ ') broad. Young, thin bark best, and that from very large or small branches should be rejected. Should be kept dark, in tightly-closed containers. *Solvents*: hot or cold water. Dose, ʒss–1 (2–4 Gm.).

ADULTERATIONS.—Unrossed bark, that of old stems, also that of choke cherry, which closely resembles the official, but as a rule is either thinner or thicker, and breaks with a very tough fracture like slippery elm.

Commercial.—The Latin official name, from its long usage, has been retained, although misleading; *Prunus virginiana* was given early by Linnæus to Choke Cherry, a shrub 2.5–3 M. (8–10°) high, having more sharply-toothed leaves, shorter racemes, and astringent, dark red, crimson fruit, size of wild cherry. It has received various names at different times, as *Prunus ru'bra*, *P. obova'ta*, *P. virginiana*, *P. serotina*, *Cerasus serotina*, *C. virginiana*. The true official *Prunus serotina* grows in fertile soil in fields, woods, along fences, seldom in clusters; wood is valuable for furniture, being hard, red, fine-grained, and easily polished. Bark after collection is (rossed) deprived of outside layer (periderm or ross—cork and parenchymatous cells), exposing green phelloderm, and then dried; while that from all portions of the tree is used, that from the root is strongest, yet it all soon deteriorates, consequently only the fresh-dried should be employed; the average bark collected in April yields most starch, but least tannin, and hydrocyanic acid—.0478 p. c.; in June—.0956 p. c.; in Oct.—.1436 p. c. or $\frac{1}{7}$ gr. (.009 Gm.) from 100 gr. (6.5 Gm.) bark, which equals 7–8 m (.5 cc.) of 2 p. c. acid; some bark reverse these seasonal percentages; young bark may yield of acid .183–.250 p. c., old bark .159–.335 p. c.

CONSTITUENTS.—Amygdalin, Emulsin, Bitter principle, tannin 2–4.5 p. c., gallic acid, resin, starch, (volatile oil, hydrocyanic acid, benzoic acid from oxidation of benzaldehyde?).

Amygdalin.—Cyanogenetic glucoside, similar to laurocerasin (prulaurasin) obtained by the action of alcohol; it is bitter, non-crystalline, and not precipitated by ether, hence in this differs from that in bitter almond.



Prunus serotina.

Emulsin.—Enzyme or ferment, identical with emulsin or synaptase, extracted by water; white powder when pure, and by its action on amygdalin, in the presence of water, develops hydrocyanic acid and the volatile oil of bitter almond, neither of which, as such, existed previously in the bark. These two are obtained also by distilling the seed with water, when they come over more or less mixed. The poisonous property of the oil depends largely upon the amount of acid present, and when freed of this, the oil becomes a bland, colorless liquid resembling that from bitter almond. Some think the ferment neither emulsin nor synaptase, but a closely analogous compound.

Bitter Principle.—Obtained by mixing soft aqueous extract with alcohol, shaking with milk of lime, evaporating filtrate, boiling residue with alcohol, evaporating, getting brown, bitter, gelatinous mass, which is insoluble in ether, soluble in alcohol, brownish-red with sulphuric acid.

PREPARATIONS.—1. *Syrupus Pruni Virginianæ*. Syrup of Wild Cherry. (Syn., Syr. Prun. Virg.; Br. Syrup of Virginian Prune; Fr. Sirop d'Écorce de Cerisier; Ger. Wildkirschenrindensirup.)

Manufacture: 15 p. c. Mix glycerin 5 cc. with water 20, moisten wild cherry bark 15 Gm. with 10 cc. of mixture, pack in percolator, add remainder of mixture, and enough water to saturate and leave stratum above, macerate for 24 hours, percolate with water into sucrose 80 Gm. q. s. 100 cc., dissolve by agitation without heat. Should be kept cool, in non-metallic, tightly-closed containers, as it rapidly loses hydrocyanic acid under favorable conditions. Dose, ʒj-4 (4-15 cc.); mainly for flavoring.

2. *Fluidextractum Pruni Virginianæ, N.F.*, moisten, 100 Gm., with glycerin 20 cc. + water 40, pack, macerate 24 hours; percolate with alcohol 25 cc. + water 15, finally with 25 p. c. alcohol q. s., 100 cc. Dose, ʒss-1 (2-4 cc.): Prep.: 1. *Elixir Taraxaci Compositum, N.F.*, 3.5 p. c.

3. *Syrupus Pini Albæ Compositus, N.F.*, 8.5 p. c.

Unoff. Preps.: *Infusion*, 4 p. c., dose, ʒss-2 (15-60 cc.). *Tinctura Pruni Virginianæ* (Br.), 20 p. c. + alcohol 62.5 p. c., finally add glycerin 10 p. c., dose, ʒss-1 (2-4 cc.).

PROPERTIES.—Sedative, pectoral, aromatic bitter tonic, astringent; increases appetite, digestion. Volatile oil—local stimulant on alimentary canal like cascarilla, serpentaria, etc. Hydrocyanic acid—sedative, nervine, large doses decrease heart action. Tannin is astringent.

USES.—Consumption, cough, bronchitis, scrofula, heart palpitation, stomach atony, dyspepsia, hectic fever, debility; cold infusion in ophthalmia. It is much inferior to cinchona in intermittents.

Ptelea

Ptelea trifoliata, *Wafer-ash*, *Hop-tree*, *Swamp-Dogwood*, *Wing-seed*, *Shrubby Trefoil*.—Root-bark; N. America—N.Y.—Fla.—Texas; rocky places. Handsome shrub, 2.4-3.6 M. (8-12°) high, branches dark brown; leaves petiolate, light green, trifoliolate; leaflets sessile, ovate, short-acuminate, crenulate, lateral ones inequilateral, terminal one cuneate at base, finely pellucid-punctate; root-bark one or more

inches long, light brown, wrinkled, with thin epidermis, internally yellowish-white, darker by exposure, odor peculiar, aromatic, taste bitter, pungent, acrid; contains berberine (bitter, tonic), tannin, gallic acid, resin. Aromatic, tonic, stimulant, antiperiodic; dyspepsia, low fevers with gastro-intestinal irritation, typhoid conditions. Dose, gr. 15-30 (1-2 Gm.); infusion, ʒss-1 (15-30 cc.); fluidextract. Leaves and young shoots anthelmintic; fruit (samara) aromatic, bitter, good substitute for hop.

Pterocarpus marsupium KINO. KINO, U.S.P.

Pterocarpus Marsupium,
Roxburgh.

{ The dried juice from the trunk, yielding not less than 45 p. c. alcohol-soluble extractive, or 80 p. c. water-soluble extractive.

Habitat. E. India, in forests; C. and S. India (Malabar), Ceylon, Bengal.
Syn. Gummi (Resina) Kino, Vengay, Bastard Teak, Bija, Amboyna Kino Tree; Br. Kino, Kino Eucalypti (Eucalyptus (Red) Gum); Fr. Kino de l'Inde; Ger. Kino.

Mar-su'pi-um. L. *marsupium*, a pouch, bag, purse—i. e., shape of the fruit.
Ki'no. E. India name as given the extract.

PLANT.—Large tree, 18-24 M. (60-80°) high, .6-1 M. (2-3°) thick, many spreading branches; bark brownish-gray, internally red and fibrous; leaves alternate, imparipinnate, deciduous; leaflets 5-7, alternate, 5-10 Cm. (2-4') long, obovate, emarginate, coriaceous; flowers May-June, pale yellow; fruit indehiscent pod, orbicular, 2.5-4 Cm. (1-1½') broad; seed 1, kidney-shaped. **JUICE** (kino), in small, brittle, angular fragments, usually less than 10 Mm. (¾') broad, dark reddish-brown, reddish-black; inodorous; taste very astringent; upon mastication coloring saliva pink. **POWDER**, dark red—angular fragments, with glass-like, conchoidal surface, thinner pieces translucent, yellowish-red, brownish-red; mounted in water—fragments rounded, gradually disintegrate, leaving colorless, granular particles, some being rod-shaped bacteria and a few cellular fragments; mounted in alcohol—red color of fragments deepens, translucency increases, the angular outlines being preserved while solution takes place. **Tests:** 1. Add boiling water, cool, filtrate faintly acid; with ferric chloride T. S.—dark green precipitate; with alkalis—reddish-violet color. **Solvents:** alcohol, to the extent of 90 p. c.; boiling water to the extent of 40-80 p. c.; alkalis, with impairment of astringency. Dose, gr. 5-20 (.3-1.3 Gm.).

ADULTERATIONS.—Inferior juices, catechu, dragon's blood (insoluble in water), kinos containing gum (swelling in water, alcohol), etc.

Commercial.—Plant, called natively *Buja*, is prized for fine timber and juice, the privilege of tapping trees for the latter being granted by the government to highest bidders; it is collected to some extent the entire year, but chiefly during inflorescence, dry season, February-March (when it is better and easier dried), by cutting into the tree-trunk to the cambium a perpendicular incision and lateral feeders; the juice, resembling currant-jelly, exudes freely into clay cups, bamboo-joints, etc., placed at the bottom of main incision, when it is dried in

the sun and air (inspissated) or boiled to the consistency of a thick extract, occasionally skimming off impurities, then poured into shallow pans to dry until crumbly (half-inch layer requiring a week) and packed in wooden boxes for market. Trees yield most at night and when small often are killed by excessive bleeding, which may be averted by resting alternate years; each produces about 24 ounces (.7 Kg.) that upon evaporation becomes half as much kino. Liquid preparations, especially in diluted alcohol tend to gelatinize (with loss of astringency) from presence of an enzyme—destroyed by boiling—and should be kept in small bottles and seldom opened; the menstruum making a permanent solution is alcohol 65, water 20, glycerin 15 volumes, although alcohol 50, water 25, glycerin 25 usually gives satisfaction. There are several varieties: 1, *Malabar* (*E. India*), official, described above, rarely found on the market; 2, *African* (*Gambia*—*P. erina'ceus*), similar to preceding, not in our market but common in England; contains tannin 50–60 p. c.; 3, *Bengal* (*Palas*, *Butea Gummi* (Br.)—*Bu'tea frondo'sa*) in transparent ruby-red tears, fragments, often with leaf-vein impressions, brittle, not adhesive on mastication, yields pyrocatechin on dry distillation, one-third to one-half soluble in hot alcohol, the remainder being mucilaginous matter; contains tannin 15–35 p. c.; 4, *Australian* (*Botany Bay*, *Kino Eucalypti* (Br.)—*Eucalyptus rostra'ta*, *E. amygdalina*, *E. resinif'era*, and other species of *Myrtaceæ*), not very brittle, adheres to teeth, tinges saliva red, soluble in alcohol, 80–90 p. c., in water, lessening with age; furnishes much of the present commercial kino; contains tannin 45–50 p. c.; 5, *W. India* (*Jamaica*, *Caracas*—*Coccol'oba uvif'era*, *Polygonaceæ*), obtained by boiling the violet-brown wood and bark of the large tree, evaporating the decoction; resembles official but has brownish tint, less glossy, bitter, soluble in water, alcohol (90 p. c.); contains tannin 70 p. c.



Pterocarpus Marsupium (Kino): A, flowering twig; 1, 2, 3, parts of the flower; 4, stamens; 5, pistil; 6, fruit; 7, vertical section of winged fruit.

CONSTITUENTS.—Kino-tannic acid, $C_{18}H_{18}O_8$, 40–80 p. c., Kino-red, $C_{28}H_{22}O_{11}$, Pyrocatechin (pyrocatechuic acid, catechol), $C_6H_6O_2$, Kinoin, $C_{14}H_{12}O_6$, gum, ash 1.3–3 p. c.

Kino-tannic Acid.—Similar to catechuic acid, always mixed with coloring matter and pectin in extraction; with ferric salts—greenish-black, with ferrous salts in neutral solutions—violet color.

Kino-red.—Obtained by exposing cold aqueous solution to the air, when red precipitate slowly forms, hastened by heating, or heat kinoin to $130^\circ C.$ ($266^\circ F.$); it is amorphous, tasteless, nearly insoluble in water, and is the anhydride of kinoin: $2C_{14}H_{12}O_6 - H_2O = C_{28}H_{22}O_{11}$.

Pyrocatechin.—Obtained by treating kino with ether, or the product of dry distillation of kino contains much of it, which may be purified by resublimation; soluble in ether, water.

Kinoin.—Boil kino with diluted hydrochloric acid, kino-red immediately separates, now agitate clear solution with ether; occurs in white crystals, slightly soluble in ether, cold water, red with ferric chloride.

PREPARATIONS.—1. *Tinctura Kino*. Tincture of Kino. (Syn., Tr. Kino; Fr. Teinture de Kino; Ger. Kinotinktur.)

Manufacture: 10 p. c. Agitate thoroughly in a flask 10 Gm. with boiling water 50 cc., heat for 1 hour on water-bath containing boiling water, shaking frequently, cool, add recently boiled water q. s. 50 cc., then add alcohol 50 cc., stopper flask, set aside in cool place for 24 hours, decant through cheesecloth. Should be kept cool, dark, in small, tightly-stoppered bottles. Dose, $\mathfrak{z}ss-2$ (2–8 cc.).

Unoff. Preps.: *Compound Powder of Kino and Opium*, 75 p. c., + opium 5, cinnamon 20, dose, gr. 10–15 (.6–1 Gm.). *Compound Tincture of Kino and Opium*, 20 p. c. (tincture), + tincture of opium 10, $\mathfrak{z}ss-1$ (2–4 cc.). Fluidextract, Infusion, Gargle.

Owing to gum (pectin) coagulating, the liquid preparations are very unstable, consequently catechu often is used instead with equally good results.

PROPERTIES.—Astringent, tonic, hemostatic; similar to but less powerful than tannin; locally inferior to other astringents.

USES.—Diarrhea, pyrosis, menorrhagia, dysentery, leucorrhœa, ulcers, sore throat, epistaxis, hemorrhages, diabetes, manufacture of wines. Useful in dyeing and tanning, but rather too expensive.

Incompatibles: Aqueous solution is precipitated by gelatin, soluble salts of iron, silver, lead, antimony, mercuric chloride, sulphuric, nitric, and hydrochloric acids.

Pterocarpus santalinus

SANTALUM RUBRUM. RED SAUNDERS, U.S.P.

Pterocarpus santalinus, } The heart-wood.
Linné filius.

Habitat. Madras; cultivated in S. India, Ceylon, Philippines.

Syn. Santal. Rub.; Red Santal, Chandam, Chundana, Ruby Wood; Br. *Pterocarpus* Lignum, Red Saunders (Santal) Wood; Fr. Santal Rouge; Ger. Rothes Sandelholz.

Pter-o-car'pus. L. from Gr. πτερόν wing, + καρπός fruit—i. e., its winged fruit pods or legumes girdled with a broad crisped wing.

San-ta-lin'us. L. adj. form fr. *sandal*, Pers. *sandal*, useful; Gr. σάνταλον.

San'ta-lum. L. noun form; sandalwood, saunders.

Ru'brum. L. *ruber*, red, ruddy—i. e., the color of the wood.

PLANT.—Tree 6–9 M. (20–30°) high, .3–.5 M. (12–18') thick, some trunks hollow; leaves trifoliate; leaflets broadly oval, emarginate, 5–15 Cm. (2–6') long, hoary beneath; flowers yellow, papilionaceous corolla, spikes; fruit orbicular legume, wing slightly crisped, 2-seeded. **HEART-WOOD**, in billets, logs, 1–1.6 M. (3–5°) long, 10–20 Cm. (4–8') thick, deprived of light-colored sap-wood, hard, heavy, dark reddish-brown, splitting coarse-splintery; usually in coarse powder, purplish to brownish-red, nearly odorless and tasteless. **POWDER**, reddish-brown—numerous wood-fibers of irregular outline and sharp pointed ends, occasionally forked, lumina filled with fine, granular protoplasmic content, occasional tracheæ filled with yellow, resinous masses, medullary rays 1 cell wide, 3–6 deep, crystal-fibers with prisms of calcium oxalate; mounts in chloral hydrate T. S.—deep, rich red color. **Tests:** 1. Mix .5 Gm. with ether 10 cc.—solution orange-yellow, with greenish fluorescence in bright light; .5 Gm. with alcohol 10 cc.—solution distinctly red. 2. Mix .5 Gm. with water 10 cc.—liquid clear and colorless. **Solvents:** alcohol; ether; acetic acid; alkaline solutions; boiling water or diluted alcohol partially.

PREPARATION.—1. *Tinctura Lavandulae Composita*, 1 p. c.

CONSTITUENTS.—Santalin .25–.5 p. c., Santal, Pterocarpin, Homoptero-carpin.

Santalin (*santalic acid*), $C_{17}H_{16}O_6$.—Coloring matter, obtained by precipitating alcoholic tincture with lead acetate, washing precipitate with hot alcohol, decomposing it with hydrogen sulphide in the presence of alcohol, evaporating; occurs in red needles, inodorous, tasteless, resinous, soluble in alcohol (blood-red), ether (yellow), sulphuric acid (deep red), alkalies (violet), also in oils of clove, cinnamon, bergamot, bitter almond.

Santal, $C_8H_6O_3$, **Pterocarpin**, $C_{20}H_{18}O_6$, **Homoptero-carpin**, $C_{24}H_{24}O_6$ —All occur in colorless scales—the latter soluble in carbon disulphide and when fused with potassium hydroxide yields phloroglucin.

USES.—Red Saunders has no important medicinal properties, being used only for imparting color. Employed natively as an astringent and with sapan wood for dyeing silk, cotton, wool, giving various reds according to mordants used.

Pulsatilla — *Pulsatilla* (*Anemone*) *vulgaris*, *P. pratensis*, or *P. patens*, *Pulsatilla*, *Pasque Flower*, *N. F.*—The dried herb with not more than 5 p. c. of foreign organic matter; Europe (England, Siberia). Perennial herbs, 10–25 Cm. (4–10') high, covered with soft, silky hairs. Leaves and flowering scapes matted, silky-villous, petioles hollow often purplish, blades pinnately cleft, flowering scape up to 30 Cm. (12') in length, solid below, hollow above, flowers purplish, terminal, bell-shaped, 6 sepals, fruit achene, plumose-tailed; nearly odorless; taste acid. Powder, brownish—thick-walled hairs, tracheæ, stomata, epidermal cells with wavy vertical walls, calcium oxalate crystals and starch grains few or absent; contains anemonin (activity—volatile, causing drug to be inert after 1 year), acrid anemone camphor, volatile oil, iso-anemonic acid, $C_{15}H_{14}O_7$, ash 10 p. c. Sedative, anodyne, mydriatic, diuretic, diaphoretic, emmenagogue, expectorant, vesicant, emetic, poisonous—similar to aconite, causing tingling, numbness, reducing

respiration, temperature, cardiac and arterial tension, paralysis of motion and sensation; dysmenorrhea, bronchitis, asthma, whooping-cough, gastritis, epididymitis, orchitis, conjunctivitis, eczema, ulcers, meningitis. **Poisoning:** Symptoms and treatment similar to aconite. Dose, gr. 1–5 (.06–.3 Gm.); 1. *Tinctura Pulsatilla*, 10 p. c. (75 p. c. alcohol), dose, m̄xv–30 (1–2 cc.). **Extract** (expressed juice + alcohol), gr. ½–3 (.03–.2 Gm.); Homeopathic tincture (extract); anemonin, gr. ¼–¾ (.016–.05 Gm.). *P. hirsutissima* (*Anemone patens* var. *Nuttalliana*); herb, U.S.P. 1880, W. N. America, flowers whitish, purplish, sepals 5–7, —2.5–4 Cm. (1–1½') long, developed before the leaves; *A. quinquefolia* (*nemorosa*), *Wood Flower*, *Wood Anemone*, N. America; flowers purplish-white, *A. coronaria*, *A. sylvestris*, and *A. ranunculoides*, Levant, Asia, Europe, are all acrid and deteriorate upon drying.



Pulsatilla (*Anemone*) *Pulsatilla*.



Pulsatilla (*Anemone*) *pratensis*.

Punica

GRANATUM. POMEGRANATE, U.S.P.

Punica Granatum, { The dried bark of the stem or root, with not
Linné. more than 2 p. c. wood, or other foreign
organic matter.

Habitat. S. W. Asia, India, Persia, Arabia, China, Japan, E. and W. Indies; naturalized in subtropics, S. United States, etc.; cultivated for fruit, ornamental flowers.

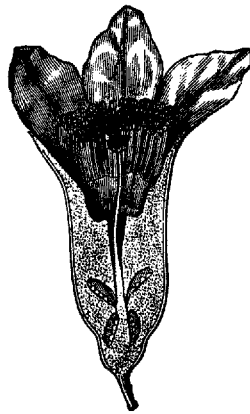
Syn. Granat., Pomegranate Bark, Grenadier, Punic (Carthaginian, Garnet) Apple; Granati Cortex; Fr. Écorce de (Grenadier) Balaustier; Ger. Granatrinde.

Pu'ni-ca. L. *punicus*, of or belonging to Carthage, near which city it is said to have first been found, or fr. *punicus*, scarlet—i. e., the color of its flowers.

Gra-na'tum. L. *granatus*, having many grains or seeds, fr. *granum*—i. e., the many-seeded fruit.

Pome'gran-ate. L. *pomum*, a fruit, + *granatus*, grained.

PLANT.—Shrub or small tree, 4.5 M. (15°) high, branches angular, with spiny ends; young shoots and buds red; leaves 2.5–5 Cm. (1–2')

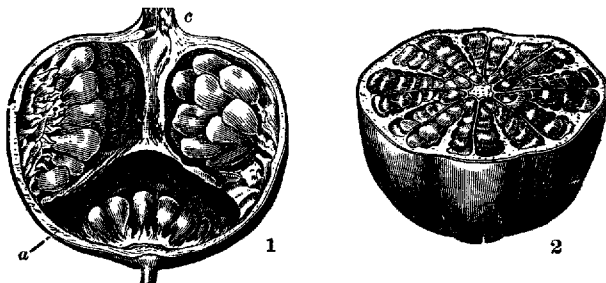


Punica Granatum: flower.



Punica Granatum: flowering branch.

long, shining, lanceolate, entire, half evergreen; flowers June-Sept., large; calyx shining, scarlet, tubular, 3 Cm. ($1\frac{1}{2}$ ') long; corolla crimson, 5-7 petals; fruit (balausta), 5-10 Cm. (2-4') broad, resembles an orange, quince, or tomato, 5-8-angled over the dissepiments, short-necked at top. Internally, below the median line, divided by a diaphragm into two stories—upper with 5-9 irregular cells, lower and smaller with 1-3 vertical partitions (cells); seed angular 12 Mm. ($\frac{1}{2}$ ') long, so numerous that they, with the thin surrounding edible pulp, fill entire fruit. BARK (stem), in pieces 2-8 Cm. ($\frac{1}{2}$ - $3\frac{1}{2}$ ') long, .5-3.5 Mm.



Punica Granatum: 1, longitudinal cross-section; 2, transverse cross-section; a, inner rind and ovules; c, the remaining calyx.

($\frac{1}{5}$ - $\frac{1}{7}$ ') thick, yellowish-brown, with patches of grayish lichens, elliptical lenticels, furrows or abraded patches of cork, wrinkled; inner surface light yellow, finely striate; fracture short, phelloderm dark green; inner bark yellowish-green; (root) in transversely curved pieces yellowish-brown, conchoidal depressions, irreg-



Granati cortex:
bark of the root.

ular patches of cork; internally dark yellow, medullary rays extending nearly to outer surface; odor slight; taste astringent, bitter, nauseous. POWDER, yellowish-brown—calcium oxalate in rosette aggregates, numerous starch grains, .002-.01 Mm. ($\frac{1}{12500}$ - $\frac{1}{2500}$ ') broad, whitish cork, stone cells, long wood fibers, tracheae. Tests: 1. Macerate 1 Gm. for 1 hour in distilled water 100 cc., add to 10 cc. of yellow filtrate 1 drop of ferric chloride T. S.—bluish-black precipitate; to another 10 cc. add 40-50 cc. of calcium hydroxide T. S.—orange-brown flocculent precipitate. Should be kept in tightly-closed containers. Solvents: boiling water; diluted alcohol. Dose, ʒss-2 (2-8 Gm.).

SUBSTITUTIONS. — 1, *Bux'us semper'virens*, Boxwood Bark; 2, *Berberis vulgaris*, Barberry Bark; neither contain tannin, hence infusions do not precipitate blue-black with iron like pomegranate bark; they also are very bitter,

and the former has a nearly white inner surface; 3, *Granati Fructus Cortex*; this contains tannin 19-28 p. c., extractive 21 p. c., gum 34 p. c., and has the same effect as the bark.

Commercial.—Root-bark is three times stronger in alkaloids than stem-bark, but both deteriorate rapidly with age owing to the alkaloids undergoing decomposition; the white-flowered plant yields the richest bark which is imported chiefly in the dry state from France, Italy, although we use much of our native product. In addition to bark occasionally the flowers, fruit, rind, and acidulous seed-coating are employed domestically; some prefer the bark from uncultivated plants.

CONSTITUENTS.—Tannic acid 20-22 p. c., Alkaloids 1.71 (black-flowered)-2.43 (red-flowered)-3.75 p. c. (white-flowered)—Pelletierine (punicine) .5-1.5 p. c., iso-pelletierine, methyl-pelletierine, pseudo-pelletierine (granatonine), mannite (punicin, granatin), gallic acid, sugar, gum, pectin, calcium oxalate, ash 10-16 p. c.

Tannic Acid, $C_{20}H_{16}O_{13}$.—This is a mixture of gallotannic acid and punicotannic (granatotannic) acid, the latter insoluble in alcohol, ether, precipitates gelatin, tartar emetic, iron salts, with dilute acids splits into sugar and ellagic acid.

Pelletierine, $C_8H_{15}ON$ (in honor of Pelletier).—This is obtained by mixing bark with milk of lime, displacing with water, exhausting percolate with chloroform. It is regarded by Tanret, its discoverer, to be the anthelmintic constituent, and is a colorless, oily, aromatic alkaloid, resinifying on exposure, soluble in water, alcohol; forms crystalline salts (nitrate, sulphate, tannate, etc.)—considered to be a mixture of the several alkaloids. Dose, gr. 3-8 (2-5 Gm.).



Granati cortex: transverse section, magnified 10 diam.

Pelletierinæ Tannas, Pelletierine Tannate, U.S.P.—(Syn., Pellet. Tann., Punicine Tannate; Fr. Tannate de Pelletierine; Ger. Pelletierinum tannicum, Gerbsaures (Pelletierin) Punicin.) This is a mixture in varying proportions of the tannates of four alkaloids (punicine, iso-punicine, methyl-punicine, pseudo-punicine), and is obtained by mixing ground bark with milk of lime, percolating with water until exhausted, shaking out percolate with chloroform, and chloroformic solution of free alkaloids with very dilute sulphuric acid; to neutral solution of mixed sulphates add solution tannic acid, whereby tannates are precipitated, dry. It is a light yellow, odorless, amorphous powder, astringent taste and weak acid reaction, soluble in water (250), alcohol (16), ether (420), warm dilute acids, insoluble in chloroform; ash from .2 Gm.—negligible. *Tests*: 1. Aqueous solution with ferric chloride T. S.—blue-black color. 2. Cold solution of .1 Gm. in 4 cc. of distilled water + 1 cc. of diluted hydrochloric acid, + platinic chloride T. S.—no precipitate (abs. of many foreign alkaloids). 3. Dissolve .5 Gm. in sodium hydroxide T. S., shake with 4 successive portions of chloroform, 10, 5, 5, 5 cc., acidulate combined solutions with .1 cc. of hydrochloric acid, evaporate to apparent dryness, dissolve residue in 5 cc. alcohol, evaporate, dry 1 hour—residue not less than 20 p. c. Should be kept dark, in small, well-closed containers. Dose, gr. 3–8 (.2–.5 Gm.) in ℥j (30 cc.) of water.

PREPARATIONS.—1. *Fluidextractum Granati.* Fluidextract of Pomegranate. (Syn., Fldext. Granat., Fluid Extract of Pomegranate; Fr. Extrait fluide d'Écorce de (Grenadier) Balaustier; Ger. Granatrinde-fluidextrakt.)

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

Unoff. Preps.: *Decoction*, 20 p. c., ℥ss–2 (15–60 cc.). *Rind*, gr. 15–30 (1–2 Gm.).

PROPERTIES.—Anthelmintic, tenifuge, astringent.

USES.—The ancients knew its value as a vermifuge (Celsus, Dioscorides, Pliny). In Hindustan, Mohammedan physicians used it in tenia, one of whom made public the secret in 1804; French physicians prefer the wild-grown plant. Externally and internally astringent; large doses occasion vomiting, purging, cramps, numbness in the legs, giddiness, dim vision, increased urine. The rind is also astringent in diarrhea, leucorrhæa, hemorrhage, cancerous and other ulcers of uterus and rectum; intermittent fever. For tape-worm take decoction made by boiling bark ℥ij (60 Gm.) + water Ojss (.7 L.) down to Oj (.5 L.); give this in 3 divided doses at hour intervals in the morning on empty stomach. It is well, a couple of hours after administration, to follow with castor oil ℥j (30 cc.) or compound tincture of jalap ℥j (30 cc.). The worm should be passed sitting in a tepid sitz-bath, thus preventing the expelled portion tearing from the head by its weight; it passes usually in a knotted mass. Pomegranate may also be used for tanning, dyeing; the fruit as a refreshing, cooling article of food.

Pyrola

Pyrola rotundifolia, Round-leaved Wintergreen; *P. elliptica*. Shin-leaf, and *P. chlorantha*, Greenish-flowered Wintergreen.—These three have racemes of nodding wax-like flowers; leaves resembling and containing same as *Chimaphila umbellata*, and used similarly.

Quercus alba

Quercus alba, *Quercus*, White (Tanner's) Oak Bark, N.F.—The dried inner bark of the trunk and branches with not more than 2 p. c. of outer bark or wood or other foreign organic matter; N. America. Stately tree 18–25 M. (60–80°) high, 1–2.5 M. (3–8°) thick, branched; leaves large, 4–6-lobed, petiolate, smooth, light green, glaucous with prominent veins beneath, brownish when dry; flowers monœcious—staminate, catkins; pistillate, followed by 1-seeded ovoid fruit (nut, acorn), base in cupule. Bark, flat pieces, 2–10 Mm. ($\frac{1}{2}$ – $\frac{3}{4}$ ') thick, light brown, rough-fibrous, fracture uneven, coarsely fibrous; odor distinct; taste strongly astringent; does not tinge saliva yellow when



Quercus alba: a, staminate catkins; b, magnified staminate flower; c, pistillate flower with stigmas magnified; d, acorn in embryo; e, section of young acorn; f, cotyledon with radicle.

chewed; solvents: alcohol, water; contains tannin 6–11 p. c., oak-red, quercin, resin, fat, quercite. Astringent, tonic, hemostatic, similar to tannin; diarrhea, dysentery, cholera infantum, hemoptysis, hemorrhages, leucorrhæa, gonorrhæa, intermittents, phthisis, relaxed parts, ulcers; gargle—prolapsed uvula, etc.; poultice—gangrene, etc.; powder—tooth powders and washes; tanning leather; wood durable, valuable. Dose, gr. 15–60 (1–4 Gm.); decoction, 5 p. c., ℥ss–1 (15–30 cc.); extract, gr. 2–10 (.13–.6 Gm.); fluidextract (alcohol 50, water 40, glycerin 10), ℥xv–60 (1–4 cc.).



Quercus alba: bark, cross-section, magnified 10 diam.; p, cork; m, outer bark; i, inner bark; sz, group of stone cells; bb, bast-fiber; n, longitudinal fiber.

Quercus infectoria, Olivier, } The gall from the young twigs.
and other allied species.

Habitat. Mediterranean Basin, eastward; Greece, Persia, Asia Minor, Syria.

Syn. Gall, Aleppo Galls, Smyrna Galls, Turkey or Mecca Galls, Galls, Oak Warts, Mad-, Oak-, or Dead Sea-Apple, Apple of Sodom, Dyers' Oak, Galla Halepense-, Turcica-, Levantica-, Tinctoria-, Quercina; Fr. Galle d'Alep—de Chêne, Noix de Galle; Ger. Gallæ, Galläpfel, Gallen.

Quercus. L. oak, fr. Celtic *quer*, fine + *cuez*, a tree—fine, stately tree; or fr. Gr. χοίπος, a pig—i. e., pigs love and feed on the acorns.

In-fec-to'ri-a. L. *infectorius*, dyeing, staining; *in*, in + *facere*, to do, make, taint—i. e., species easily infected or stung, thereby yielding dyeing product.

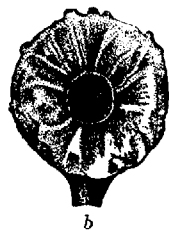
Galla. L. for *gall*, fr. Eng. *gallen*, galled = chafed, as a horse, or from its gallish taste.

PLANT.—Polymorphous shrub, 1.3–2 M. (4–6°) high; leaves obovate, shallow rounded lobed, 5–7.5 Cm. (2–3') long; flowers May, catkins; fruit Sept., acorn, 2.5–4 Cm. (1–1½') long. **NUTGALL** (excrescence) nearly globular, .8–2.5 Cm. (⅓–1') broad, heavy, mostly sinking in water, olive-green, dark grayish, tuberculated above; basal portion smooth, contracted to short stalk; fracture short, horny; internally grayish, dark brown, with a central radiate portion, occasionally a central cavity connected by narrow radial canal to exterior, odor slight taste strongly and persistently astringent. **POWDER**, brownish-yellow—starch grains up to .03 Mm. (⅓ 1/100'), few stone cells with narrow cavities and branched pore-canals; occasionally reticulate tracheæ, tannin masses, calcium oxalate prisms and rosettes. *Solvents:* alcohol; water. Dose, gr. 5–30 (3–2 Gm.).

Commercial.—Plant differs from *Q. alba*, *N.F.*, in seldom being tree-like, in having less indented leaves, larger acorns, and dissimilar cupules. The leaf-buds and tender bark of shoots are stung (punctured) easily by the horny ovipositors of the female hymenopterous insects (*Cyn'ips tinctoria*) which deposit one or more eggs in such galled places (wounds), and thereby establishes morbid growth that quickly leads



a



b

Galla: a, entire; b, vertical section.

to the formation of a small tumor of hypertrophied tissue enclosing the egg; upon the gall reaching full development the egg hatches into a larva or grub that at once begins feeding on juices of the central cavity, which, never larger than the larva, soon becomes lined with a wall of hard cells that gradually extend to the periphery, causing the gall to harden. The grub when grown passes into the pupa (chrysalis) stage,

thence into a 4-winged fly, 6 Mm. (¼') long, that must either die or cut itself out with its mandibles, thus making a small round opening midway the gall; should this not be accomplished the insect remains will be revealed upon cracking open the unpunctured gall. Color is the guide to quality—the whitish, light, and spongy being rejected. There are several varieties: 1, *Aleppo* (*Syrian*), best, bluish, usually collected before the fly escapes; 2, *Smyrna*, grayish-olive, intermixed with white galls (least valuable, generally with large perforation); 3, *Sorian*, blackish, size of a pea; all three varieties exported from Trebizond, Smyrna, Bassora, Calcutta, Bombay; 4, *European*, light-color, more spongy, produced by a different cynipis; much tannin; 5, *American*: (a) *Q. alba*, light, spongy; little tannin; (b) *Q. virginiana* (*virens*), Texas—resembles Aleppo but not tuberculated; tannin 40 p. c.; (c) *Q. lobata*, California, 5 Cm. (2') broad, orange-brown, glossy, soft, spongy interior; much tannin.

CONSTITUENTS.—Tannin 50–60 p. c. (white galls 20–30 p. c.), Gallic acid 2–3 p. c., mucilage, sugar, fat, resin; in the nucleus starch.

Acidum Tannicum. **Tannic Acid**, $HC_{14}H_6O_9$, *U.S.P.*—(Syn., Acid. Tan., Gallo-tannic Acid, Tannin, Digallic Acid; Fr. Tannin officinal, Acide tannique; Ger. Gerbsäure.) Obtained by exhausting powdered nutgall with warm water, cooling, agitating the filtrate with one-fourth volume of ether; the emulsion separates in 10 days, yielding an upper ethereal layer (coloring matter, fat, resin, gallic and ellagic acids), which is discarded, and a lower aqueous fluid, containing tannin, which under reduced pressure, is concentrated in a still to syrupy consistence, cooled, and spread on thin glass plates to dry—these being placed on a steam table and covered over to produce puffy, spongy character. It is a yellowish-white, light brown amorphous powder, glistening scales, spongy masses, darker on exposure to air and light, odorless, faint characteristic odor; strongly astringent taste, acid reaction; soluble in water, acetone, alcohol, diluted alcohol, slightly in dehydrated alcohol, glycerin (1) heated, almost insoluble in ether, chloroform, benzene, petroleum benzine; owing to weak combination with variable proportions of glucose once considered a glucoside. *Tests:* 1. Aqueous solution + ferric chloride T. S.—bluish-black color or precipitate. 2. Aqueous solution precipitates nearly all alkaloids, glucosides, solutions of gelatin, albumin, starch (dist. from gallic acid). 3. On drying—loses 12 p. c.; incinerate—ash .5 p. c. *Impurities:* Gum, dextrin, resinous substances. *Incompatibles:* Alkalies, alkaloids, emulsions, gelatin, ferric salts, mineral acids, salts of antimony, lead and silver. Should be kept cool, dark, in well-closed containers. Dose, gr. 1–20 (.06–1.3 Gm.).

Acidum Gallicum. **Gallic Acid**, $HC_7H_5O_6 \cdot H_2O$.—This organic acid is prepared usually from tannic acid by boiling 15 minutes 1 part (or 2 parts nutgall) with sulphuric acid (1) and water (5); strain while hot, set aside for crystallization; a once popular method consisted in exposing to the air a mixture of nutgall and distilled water in a thin paste for a month, adding water occasionally to keep semi-fluid, expressing, rejecting liquid, boiling residue with distilled water, filtering hot through animal charcoal, setting aside to crystallize. It is in white, pale fawn-colored, silky, interlaced needles or triclinic prisms;

odorless; astringent, slightly acidulous taste; permanent, soluble in water (87), boiling water (3), alcohol (4.6), glycerin (10), ether (100), almost insoluble in chloroform; on drying loses 12 p. c.; saturated aqueous solution—acid; incinerate—ash .1 p. c. *Tests*: 1. Neutralize saturated aqueous solution with few drops of sodium hydroxide T. S.—gradually a deep green, changing to reddish by acids. 2. With ferrous solutions—neither colors nor precipitates; with ferric solutions—bluish-black precipitate. 3. Cold, saturated aqueous solution with alkaloids, glucosides, albumin, gelatin T. S., starch T. S.—no precipitate (abs. of tannic acid). It is the hydride of tannic acid, the latter being the anhydride of gallic acid, a relationship and convertibility shown by the equations: (1) $2\text{HC}_7\text{H}_5\text{O}_5 - \text{H}_2\text{O} = \text{HC}_{14}\text{H}_9\text{O}_9$. (2) $\text{HC}_{14}\text{H}_9\text{O}_9 + \text{H}_2\text{O} = 2\text{HC}_7\text{H}_5\text{O}_5$. *Impurities*: Tannic acid, etc. *Incompatibles*: Ferric and other heavy metallic salts, spirit of ethyl nitrite. Dose, gr. 5–20 (.3–1.3 Gm.).

PREPARATIONS.—1. **NUTGALL.** 1. *Unguentum Gallæ.* Nutgall Ointment. (Syn., Ung. Gall., Ointment of Galls; Fr. Pommade de Noix de Galle; Ger. Gällapfelsalbe.)

Manufacture: 20 p. c. Rub nutgall 20 Gm. with ointment 80 Gm., gradually added, until thoroughly mixed, avoiding iron utensils; externally.

2. *Tinctura Gallæ, N. F.*, 20 p. c. (alcohol 9 + glycerin 1. Dose, ʒss–2 (2–8 cc.).

Unoff. Preps.: *Fluidextract*, m̄v–30 (.3–2 cc.). *Infusion*, 5 p. c., ʒj–2 (30–60 cc.). *Unguentum Gallæ cum Opio* (Br., nutgall 18 p. c., + opium 7.5 p. c.).

II. **TANNIC ACID.**—1. *Glyceritum Acidi Tannici.* Glycerite of Tannic Acid. (Syn., Glycer. Acid. Tan., Glycerite of Tannin; Fr. Glycéré de Tannin, Glycérine tannique; Ger. Tanninglycerit (glycerol.)

Manufacture: 20 p. c. Weigh glycerin 79 Gm. into tared, wide-mouthed bottle, suspend tannic acid 20, + sodium citrate 1, in gauze bag, in the glycerin; heat in water-bath until dissolved, stirring mixture occasionally. Dose, m̄x–30 (.6–2 cc.); externally.

2. *Trochisci Acidi Tannici.* Troches of Tannic Acid. (Syn., Troch. Acid. Tan.; Fr. Tablettes (Pastilles) de Tannin; Ger. Tanninpastillen.)

Manufacture: Rub together until thoroughly mixed tannic acid 6 Gm., sucrose 65, tragacanth 2, form mass with orange flower water q. s., divide into 100 troches. Dose, 1–3 troches.

3. *Unguentum Acidi Tannici.* Ointment of Tannic Acid. (Syn., Ung. Acid. Tan.; Fr. Pommade de Tannin; Ger. Tanninsalbe.)

Manufacture: 20 p. c. Dissolve tannic acid 20 Gm. in glycerin 20 Gm., with gentle heat, mix solution thoroughly with ointment 60 Gm., avoiding iron utensils.

4. *Collodium Stypticum, N. F.*, 16 p. c., + flexible collodion q. s. 100.

5. *Syrupus Iodotannicus, N. F.*, .54 p. c., + iodine .27 p. c.

Unoff. Prep.: *Suppositoria Acidi Tannici* (Br., each 3 gr. (.2 Gm.).)

III. **GALLIC ACID.**—1. *Pyrogallol.* *Pyrogallol*, $\text{C}_6\text{H}_3(\text{OH})_3$, U.S.P. (Syn., Pyrogall., Pyrogallic Acid, Acidum Pyrogallicum; Fr. Acide pyrogalique; Ger. Pyrogallolum, Pyrogallussäure.) This trihydroxybenzene

(triatomic phenol) is obtained by heating gallic acid for half an hour under pressure with water (3), boiling with animal charcoal, filtering, evaporating— $\text{HC}_7\text{H}_5\text{O}_5 + \text{heat} = \text{C}_6\text{H}_3(\text{OH})_3 + \text{CO}_2$; yield 75 p. c. It is in light, white, nearly white leaflets, fine needles, odorless, bitter taste, acquiring grayish tint on exposure, soluble in water (1.7), alcohol (1.3), ether (1.6), melts at 131° C. (268° F.). *Tests*: 1. Aqueous solution (1 in 10) reduces solutions of silver, gold and mercury salts, even in the cold; incinerate—ash .1 p. c. 2. Aqueous solution (1 in 20) neutral, slightly acid, colorless, yellowish, brown on exposure from absorbing oxygen; with a few drops of ferric chloride T. S.—brownish-red; with fresh ferrous sulphate T. S.—blue color. Should be kept dark, in well-closed containers.

PROPERTIES.—1. **NUTGALL**: Astringent, tonic; constricts muscular tissue, thus checking secretions, hemorrhages, local inflammations, etc.

II. **TANNIC ACID**: Local astringent. Internally—contracts blood-vessels, restrains peristalsis (constipates), coagulates mucous secretions, prevents secretion of gastric and intestinal juices, precipitates pepsin, etc.; it is converted into gallic acid in the intestines, and until this change is effected it cannot become absorbed to act as a remote or systemic astringent, simply being able to control locally gastric and intestinal bleeding. Externally—astrigent, coagulates blood (forming a clot), albumin, and gelatin (tans tissues), is hemostatic, antiseptic, depressant, irritant; the salts have no astringency.

III. **GALLIC ACID**: Mild astringent, does not coagulate blood, hence recognized only as remote astringent, but not to raw and bleeding surfaces; internally—controls systemic hemorrhages (contracts blood-vessels), decreases secretion of urine and sweat; does not constipate like tannic acid, and is eliminated by the kidneys unchanged.

IV. **PYROGALLOL**: Violent irritant, depressing poison (large quantities); causes vomiting, purging, abdominal pain, quick pulse, low temperature, cyanosis (lips), convulsions, coma, death; urine dark (albumin, methemoglobin), blood chocolate colored, red corpuscles disorganized, liver changed as by phosphorus.

USES.—I. **NUTGALL**: Chronic diarrhea, dysentery, gleet, leucorrhea, antidote to tartar emetic and alkaloids (emetine, morphine, colchicine, strychnine, etc.), constricts the stomach, thus delaying absorption, forming of the alkaloids insoluble tannates. In cases of poisoning give infusion freely. Locally infusion as gargle for relaxed mucous membrane of mouth, throat, vagina, rectum; ointment with 5–10 p. c. opium, good in hemorrhoids after inflammatory stage. Chiefly used for obtaining tannic and gallic acids, for ink, dyeing, tanning.

II. **TANNIC ACID**: Hemorrhages (epistaxis, uterine, etc.), diarrhea, dyspepsia, cholera, relaxed uvula, coryza, inflamed fauces, diphtheria, toothache, aphtha, excessive salivation, leucorrhea, chapped nipples, gleet, gonorrhoea, ulcers, piles, chilblains, chronic bronchitis, whooping-cough, phthisis, influenza, ozena, fissures, hemorrhoids, prolapsus ani and uteri, vesical catarrh, hemorrhage after extracting teeth, spongy gums (contracts vessels, checks absorption, hence loosening of teeth), obtunds sensitive dentine, either alone or combined with morphine and creosote, to toughen mucous membranes, skin around nipples, conjunc-

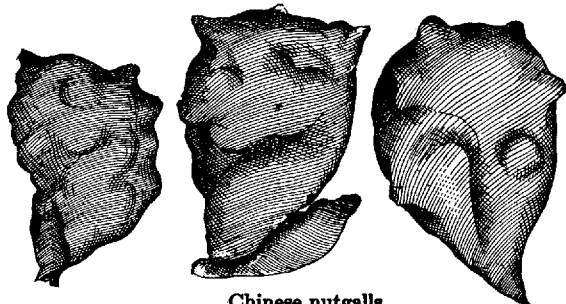
tivitis, erectile tumors, ingrowing toe-nails; aqueous solutions (1 to 50) may be injected into urethra and bladder, but should never be used hypodermically.

III. GALLIC ACID: Menorrhagia, purpura, epistaxis, hemoptysis, hematemesis, hemorrhage of stomach, intestines, lungs, kidneys, night-sweats, polyuria, Bright's disease, dyspepsia, bronchitis, hemorrhoids, chronic ulcers, pyrosis, alopecia.

IV. PYROGALLOL: Psoriasis, syphilitic ulcers, lupus, epithelioma, parasiticide for ringworm. Should not be applied over extensive surface, as absorption may poison; not used internally; ointment 1-5-10 p. c.

Allied Products:

1. *Chinese Nutgalls* (*Rhus semialata*) by sting of *A'phis s(ch)inen'sis*.—Galls 4-5 Cm. (1½-2') long, ovate, irregular, tuberculate, grayish-downy, hollow; shell thin, fragile, containing many insect-remains.



Chinese nutgalls.

2. *Japanese Nutgalls* (*R. semialata* or *R. japonica*) resemble Chinese.—The tannic acid of these differs from that of official galls.

3. *Vallonea*, *Acorn Cups* of many *Quercus* species (*Q. Robur*, *Q. Vallo'nea*, *Q. Æ'gilops*), 2.5 Cm. (1') in diameter, with thick, spreading scales, strongly astringent taste, largely used in tanning.

4. *Tamarisk Galls* (*Tam'arix articula'ta (orienta'lis)*, *T. africa'na. T. gal'lica*).—Asia, Africa, 3-12 Mm. (¼-½') thick, subglobular, knotty, contain tannin 40-50 p. c.

5. *American Nutgalls* (*Q. alba*, *Q. virginiana (virens)*, *Q. lobata*), first poor in tannin; second (Texas) like Aleppo, but not tuberculate, tannin 40 p. c.; third (California), 5 Cm. (2') thick, glossy, orange-brown, rich in tannin.

Quercus misc.

Quercus veluti'na (coccin'ea var. tincto'ria), *Black (Scarlet) Oak (Quercitron)*.—The (inner) bark, U.S.P. 1820-1870. Trees 24-30 M. (80-100°) high, 1-1.2 M. (3-4°) thick, leaves oblong, lobed, 15-20 Cm. (6-8') long, mucronate; fruit, acorns, 12-18 Mm. (½-¾') long, 12 Mm. (½') thick, cupule thick, shallow; bark resembles the preceding, only reddish-brown, gives saliva brownish-yellow color; contains tannin 6-12 p. c., quercitrin (red-brown coloring matter, dyeing yellow wool, silks, etc.), $C_{36}H_{38}O_{20}$, with diluted acids yields isodulcitol, $C_6H_{14}O_6$, and yellow quercetin, $C_{24}H_{16}O_{11}$. In the South barks of *Q. nigra* and *Q. digitata (falca'ta)*, used for this, although these have a much coarser texture and a deep reddish-brown color.

Quercus Ro'bur, *Common European or English Oak*.—Tall tree, 24-30 M. (80-100°) high, having 3 forms: (a) *Q. pubes'cens* (old leaves hairy); (b) *Q. peduncula'ta* (leaves smooth, pistillate flowers, and fruit on peduncles); (c) *Q. sessiliflo'ra* (leaves smooth, flowers and fruit sessile, petioles long). These have many varieties, all resembling *Q. alba*.

Quercus digita'ta (falca'ta, L. falcatus—i. e., leaf-lobes scythe-shaped), *Spanish or Red Spanish Oak*.—Maryland-Florida. Tree 18-21 M. (60-70°) high, leaves grayish, 3-5-lobed, finger- or scythe-shaped. Bark rich in tannin, wood reddish, coarse-grained; used in tanning, sometimes called quercitron.

Quercus marylan'dica (ni'gra, ferrugin'ea), *Black, Barren, or Iron Oak (Black Jack)*.—Southern States. Tree 9-12 M. (30-40°) high, leaves cuneate, 3-5-lobed, rusty, pubescent beneath, shining above. Of little value.

Quercus virginia'na (vi'rens, L. vireo, green, fresh, flourishing), *Live Oak*.—Maryland-Florida. Tree 12-18 M. (40-60°) high. Bark rich in tannin, wood fine-grained; used in shipbuilding.

Quercus su'ber, Cork Oak, Alcornoque (Savanna Bark).—Mediterranean Basin, S. United States. Small tree, 9-15 M. (30-50°) high, leaves toothed, ovate; bark with an elastic suberous layer 2.5-5 Cm. (1-2') thick, collected every 8-10 years, and constitutes our cork of commerce. When finely powdered, sold as suberin for absorbent purposes, which name is applied to one of its constituents (fat). There are about 80 species of *Quercus*, ranging from shrubs to trees; one-half of these grow in the United States, and may, with their acorns, be used similarly. Acorns sometimes are roasted = *semen quercus tostum*, and used as a substitute for coffee; contain fixed oil, starch, citric acid, uncrystallized and quercite sugars.

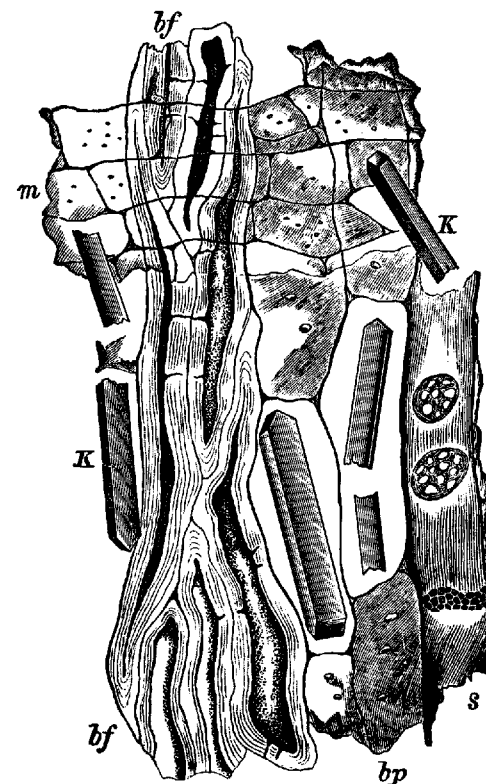
Quillaja

Quilla'ja Sapon'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

late 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, ζ ss–1 (2–4 cc.); 2. *Liquor Picis Carbonis*, 10 p. c. Fluidextract, \mathfrak{m} v–15 (.3–1 cc.).



Quillaja Saponaria.



Quillaja Saponaria, longitudinal section: bf, bast-fiber; bp, sieve-parenchyma; s, sieve-tube; m, medullary ray; K, crystal.



Ranunculus in bloom.

Ranunculus

Ranun'culus bulbo'sus, Bulbous Buttercup.—The corm and herb, U.S.P. 1820–1870, Europe, N. America. Plant hairy, 15–45 Cm. (6–18') high, bulb at stem base, flowers May, yellow, 5's; contains volatile oil (anemonin + anemonic acid). Irritant, diuretic, narcotic; externally—bronchitis, rheumatism, sciatica; in decoction, infusion. Dose, ζ ss–1 (2–4 Gm.).



Ranunculus in bloom.

Ranunculus

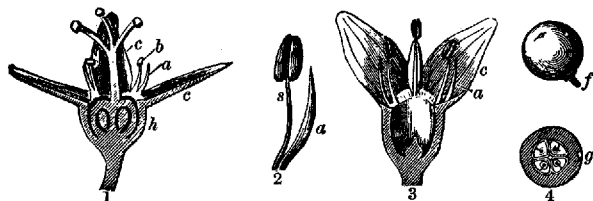
Ranunculus bulbosus, *Bulbous Buttercup*.—The corm and herb, U.S.P. 1820–1870, Europe, N. America. Plant hairy, 15–45 Cm. (6–18') high, bulb at stem base, flowers May, yellow, 5's; contains volatile oil (anemonin + anemonic acid). Irritant, diuretic, narcotic; externally—bronchitis, rheumatism, sciatica; in decoction, infusion. Dose, \mathfrak{zss} –1 (2–4 Gm.).

Raphanus sativus

Raphanus Raphanistrum, *Wild Radish*, *Jointed Charlock*, and *R. sativus*, *Garden Radish*.—Both contain a fixed oil resembling that from mustard, but the sulphuretted volatile oil of the latter differs in some respects.

Rhamnus cathartica

R. cathartica, *Buckthorn Berries*, *Bacca Spinæ Cervinæ*, N.F.—The dried ripe fruit with not more than 5 p. c. of unripe fruit or other foreign organic matter; Europe, N. Asia—naturalized in N. America. Small tree 3–4.5 M. (10–15°) high, short branches, thorny; leaves 2.5–5 Cm. (1–2') long, 2.5 Cm. (1') broad; flowers greenish. Fruit, Sept., size of a pea, flattened, globose, 4–8 Mm. ($\frac{1}{8}$ – $\frac{1}{5}$ ') broad, purplish-black, wrinkled, 3–4-celled, each cell with a brown seed-like nutlet—pedicel lacking; odor faint, unpleasant; taste sweetish, then nauseating, bitter; colors saliva—purplish-red; unripe fruit—discarded, greenish-brown, firm, furrowed, pedicel attached, very bitter. Powder, dark brown—epidermal cells, parenchyma—some with an amorphous substance, calcium oxalate rosettes, sarcocarp cells, some with yellow oily content; stone cells, calcium oxalate prisms, fixed oil, aleurone grains; solvent: diluted alcohol; contains emodin-autranol, gesterin, rhamno-



Rhamnus cathartica: 1–3, the imperfect pistillate and staminate flowers; 2, stamens—s, fertile, a, sterile; 4, f, fruit; g, cross-section of fruit.

cathartin (a glucoside of emodin)—emodin, rhamnonigrin, resin (containing emodin), rhamnose, glucose, fixed oil, quercetin and rhamn

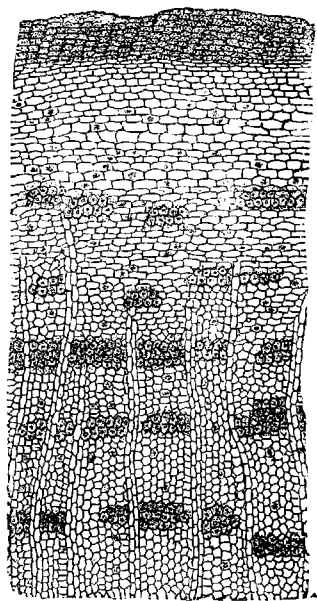
(yellow coloring matter), ash 5 p. c. Cathartic—similar to cascara sagrada; chiefly in veterinary practice. Dose, \mathfrak{zss} –1 (2–4 Gm.); 1. *Fluidextractum Rhamni Catharticae* (diluted alcohol), dose, \mathfrak{zss} –1 (2–4 cc.): Prep.: 1. *Syrupus Rhamni Catharticae*, 20 p. c., + ol. fœnic., $\frac{1}{8}$, ol. cinnam. $\frac{1}{8}$, syrup q. s. 100, dose, \mathfrak{zj} –3 (4–12 cc.). Decoction, 5 p. c.—expressed juice made into syrup. Fresh juice with alum or lime yields the pigment—*sap green*. *R. caroliniana*, *Carolina (Southern) Buckthorn*, New York-Texas, is a shrub or small tree; leaves oblong, serrate; flowers short-peduncled; fruit purple, 3-seeded.



Rhamnus Frangula: bark, natural size.

Rhamnus frangula

Rhamnus Frangula, *Frangula*, *Buckthorn Bark*, N.F.—The dried bark with not more than 2 p. c. of foreign organic matter; Europe, N. Asia—hedgcs. Slender straggling bush, 3–4.5 M. (10–15°) high, non-thorny; leaves oval, entire; flowers whitish; fruit (berry) size of a pea; green, white, yellow, pink, red, finally black; 2–3-seeded. Bark, varying length quills, frequently flattened, crushed, .5–1 Mm. ($\frac{1}{10}$ – $\frac{1}{5}$ ') thick, purplish-black, numerous light-colored transverse lenticels, occasional lichens; inner surface smooth, brownish, purplish blotches, striate—red with solution of alkalies; fracture short, inner layer fibrous; odor distinctive; taste slightly bitter. Powder, yellowish-brown—cork and parenchyma tissue, calcium oxalate rosettes, bast-fibers with yellowish lignified walls, crystal-fibers with calcium oxalate prismatic crystals, starch grains; no stone cells (dist. from *R. Purshiana*); solvent: diluted alcohol; contains frangulin, $C_{21}H_{20}O_9$ (rhamnoxanthin) .04 p. c.—by hydrolysis yields emodin and rhamnose, $C_6H_{12}O_6$, while emodin, $C_{15}H_{10}O_5$, + rhamnose = frangulin + water; also emodin 1–3.8 p. c., isoemodin, frangulic acid, chrysophan, resin, tannin, ash 5–6 p. c. Purgative, tonic, diuretic—when fresh emetic, severe intestinal irritant causing much pain, when modified by age resembles rhubarb, senna, although milder; dropsy, costiveness, constipation of pregnancy (fldext. \mathfrak{Mxx} 1.3 cc.) ter die); parasitic skin affection—itch, etc. (ointment of fresh bark). Dose, \mathfrak{zss} –1 (2–4 Gm.); 1. *Fluidextractum Frangulae* (exhaust with boiling water, add one-fourth alcohol—preservative), dose, \mathfrak{zss} –1 (2–4 cc.): Prep.: 1. *Elixir Catharticum Compositum*, 12.5 p. c., + fldext. senn. 10, fldext. rhei 6.2, liq. pot. hydrox. .45, sp. menth. pip. 1.4, elix. arom. q. s. 100, dose, \mathfrak{zj} –4 (4–15 cc.). Decoction, 5 p. c., \mathfrak{zss} –1 (15–30 cc.); Extract, gr. 2–8 (.13–.5 Gm.).



Frangula bark: transverse section, magnified 80 diam.

Rhamnus purshiana

CASCARA SAGRADA. CASCARA SAGRADA, U.S.P.

Rhamnus Purshiana,
De Candolle, { The dried bark, collected at least one year
before being used for making medicinal
preparations.

Habitat. N. Idaho, west to the Pacific (N. California).

Syn. Casc. Sagr., *Rhamnus Purshiana*, U. S. P., 1900, Chittam Bark, Sacred-, Persian-, Persiana or Purchiana Bark, Bearberry, Bear (Shittim) Wood; Rhamni Purshiani Cortex.

Rhamnus. L. see etymology, above, of Rhamnaceae.

Purshiana. L. of Pursh, after Frederick Pursh (L. *Purshia*), author of *Flora Americae Septentrionalis*, 1817.

Cascara Sagrada. L. Sp. *cascara*, bark, + *sagrada*, sacred—holy bark—*i. e.*, so considered by many natives, on account of its medicinal properties.

PLANT.—Small tree, 4.5–6 M. (15–20°) high; twigs pubescent; leaves 5–15 Cm. (2–6') long, 2.5–7.5 Cm. (1–3') wide, thin, elliptic, apex obtuse, base rounded, pubescent beneath, dull green, dentate, petioles short, downy; flowers large, umbellate cymes; fruit drupe, black, obovoid, 8 Mm. ($\frac{1}{3}$ ') long, 3-lobed, 3-seeded. **BARK**, usually flattened, transversely curved pieces, occasionally quills, 1–5 Mm. ($\frac{1}{2}$ – $\frac{1}{3}$ ') thick; dark brown, brownish-red, longitudinally ridged, grayish or whitish lichen patches, sometimes numerous lenticels, occasionally moss; inner surface longitudinally striate, light yellow, dark reddish-brown, dark brown (old matured bark); fracture short with projections of bast-bundles in inner bark; odor distinct; taste bitter, slightly acrid. **POWDER**, light brown, olive-brown—broken bast-bundles, crystal-fibers containing calcium oxalate monoclinic prisms; stone cells, more

or less adhering; fragments reddish-brown cork; masses of parenchyma and medullary ray cells, red upon addition of alkali; starch grains spheroidal, .003–.008 Mm. ($\frac{1}{8325}$ – $\frac{1}{3125}$ ') broad. *Tests*: 1. Shake .1 Gm. + hot water (10) occasionally until cold, filtrate + ammonia T. S. (10)—orange-yellow. 2. Macerate .1 Gm. + alcohol (10 drops), boil with water (10 cc.), cool, filter; shake filtrate + ether (10 cc.)—yellow ethereal layer separates; of this shake 3 cc. + ammonia T.S. 3 cc.—separated ammoniacal solution + water (20 cc.)—retains distinct yellowish-red. *Solvent*: diluted alcohol. *Dose*, gr. 15–60 (1–4 Gm.).



Rhamnus Purshiana (Cascara Sagrada): A, B, flowering branches; 1, flower cluster; 2, flower, vertical section, magnified; 3, fruit.

ADULTERATIONS.—Barks of allied species: Formerly the smaller quills of *R. californica*, with medullary rays irregularly curved and grouped; in powder often find *R. Frangula*, which, owing to absence of stone cells and its longer bast-fibers, may be recognized; to this latter ammonia imparts deeper color.

Commercial.—Obtain bark in the spring from young trunks and large branches, dry carefully; should not be taken from old trunks, as that has different taste and characteristics. The emetic action of green bark is due to a hydrolytic ferment, which is destroyed either by aging or moderately heating (38° C.; 100° F.) for 48 hours.

CONSTITUENTS.—Emodin (non-laxative), isoemodin, resin, tannin 2 p. c., glucose, volatile oil (yellowish-green, odorous), fixed oil (rhamnol arachidate, glycerides of linolic and myristic acids) 2 p. c., rhamnol (alcohol identical with quebrachol), C₂₀H₃₄O, hydrolytic ferment (non-gripping), syringic acid (not preëxisting in the bark, but from a substance of unknown nature by the action of acids), ash 6–8 p. c. The active principle, undetermined chemically, but possibly a glucosidal derivative, is obtained by precipitating aqueous solution of the alcoholic

extract with lead subacetate, treating precipitate with ethyl-acetate, thereby yielding a non-crystalline, sticky mass containing laxative constituent. The "cascarin" and "purshianin" of previous investigators are regarded now simply as emodin with impurities, these latter constituting the medicinal entity, as purshianin gr. $\frac{1}{4}$ (.013 Gm.) is purgative. The constituents of fresh (1-year) and matured (3-year) bark seem not to differ.

PREPARATIONS.—1. *Extractum Cascaræ Sagradæ*. Extract of Cascara Sagrada. (Syn., Ext. Casc. Sagr., Extract of Rhamnus Purshiana, Powdered Extract of Cascara Sagrada; Br. Extractum Cascaræ Sagradæ Siccum; Fr. Extrait de Cascara Sagrada; Ger. Amerikanisch Faulbaumrindenextrakt.)

Manufacture: Macerate 3 hours 90 Gm. with boiling water 400 cc., percolate until exhausted (500 cc.), evaporate to dryness, pulverize, add dried starch q. s. 30 Gm. (to preserve powdered condition); mix powders thoroughly, pass through fine sieve and transfer it to small, wide-mouthed bottles and stopper them tightly. Dose, gr. 2-8 (.13-.5 Gm.).

2. *Fluidextractum Cascaræ Sagradæ*. Fluidextract of Cascara Sagrada. (Syn., Fldext. Casc. Sagr., Fluidextract of Rhamnus Purshiana; Br. Extractum Cascaræ Sagradæ Liquidum; Fr. Extrait fluide de Cascara Sagrada; Ger. Cascara Sagradafluidextrakt.)

Manufacture: Similar to Fluidextractum Glycyrrhizæ, page 317; evaporate to 75 cc., cool, add gradually alcohol 25 cc., and, if necessary, water q. s. 100 cc. Dose, ℥x-30 (.6-2 cc.).

3. *Fluidextractum Cascaræ Sagradæ Aromaticum*. Aromatic Fluidextract of Cascara Sagrada. (Syn., Fldext. Casc. Sagr. Arom., Aromatic (Tasteless) Fluidextract of Rhamnus Purshiana; Fr. Extrait fluide aromatique de Cascara Sagrada; Ger. Bitterloses Cascara Sagradafluidextrakt.)

Manufacture: Slake lime 6 Gm. with water q. s., mix it with cascara sagrada 100 Gm. + magnesium oxide 6 Gm. (to remove bitterness), moisten uniformly with boiling water 200 cc., macerate in shallow dish for 48 hours, percolate with boiling water until exhausted, evaporate to 50 cc.; while warm dissolve in it pure extract of glycyrrhiza 4 Gm., cool, add glycerin 20 cc., alcohol 20 cc. in which have been dissolved gluside .1 Gm., oil of anise .25 cc., oil of cinnamon .02 cc., oil of coriander .01 cc., methyl salicylate .02 cc., and water q. s. 100 cc. Here the magnesium oxide forms with the bitter principle (acid resin) a magnesium salt, insoluble in the menstruum, while the oxymethyl-anthraquinone is soluble. Dose, ℥x-30 (.6-2 cc.).

Preps.: 1. *Elixir Cascaræ Sagradæ*, N.F., 50 p. c., + elix. glycyrrh. aq. 50. 2. *Elixir Cascaræ Sagradæ Compositum*, N.F., 12.5 p. c., + fldext. senn. 7.5, fldext. jugland. 6.5, elix. arom. q. s. 100. Dose, each, ʒj-2 (4-8 cc.).

4. *Fluidglyceratum Cascaræ Sagradæ*, N.F., 100 p. c. Dose, ℥xv-30 (1-2 cc.). 5. *Fluidglyceratum Cascaræ Sagradæ Aromaticum*, N.F., 75 p. c., + fldglycer. glycyrrhiz. 25, lime 2, mag. oxid. pond. 2, +. Dose, ℥xv-30 (1-2 cc.).

Unoff. Preps.: *Aromatic Syrup of Cascara* (Br.), 40 p. c., ʒss-2 (2-8 cc.), *Cordial*, ʒj-2 (4-8 cc.), *Tincture*, 15 p. c., ʒss-2 (2-8 cc.).



Rhamnus Purshiana: transverse section, magnified 10 diam.

PROPERTIES.—Purgative, tonic, febrifuge, increases secretions of stomach, liver, pancreas; not usually given as a single cathartic, but where frequent repetition is required; it operates in 6-10 hours, and wears well, as generally increased quantities are not needed

when habitually used; it regulates action of the bowels, and acts best when given on empty stomach in concentrated form. Fresh bark nauseates and gripes, owing to a ferment which in time changes, so that matured official bark and its preparations should be without these properties. The purgative action is claimed by some to be due largely to resins, tonic to bitter principle.

USES.—Habitual constipation due to torpor of the colon, dyspepsia, hemorrhoids.

Rheum

RHEUM. RHUBARB, U.S.P.

Rheum { **officinale**, *Baillon*,
palmatum, *Linné*, and var.,
or other species grown in
China and Thibet. } The dried rhizome and roots
deprived of periderm tissues,
yielding not less than 30 p. c.
of diluted alcohol-soluble ex-
tractive.

Habitat. W. and C. China, Thibet, Chinese Tartary; mountains, southern exposure—light, loose, sandy and rich black forest soil.

Syn. Turkey or China Rhubarb; Br. Rhei Rhizoma; Fr. Rhubarbe de Chine; Ger. Rhizoma Rhei, Rhabarber.

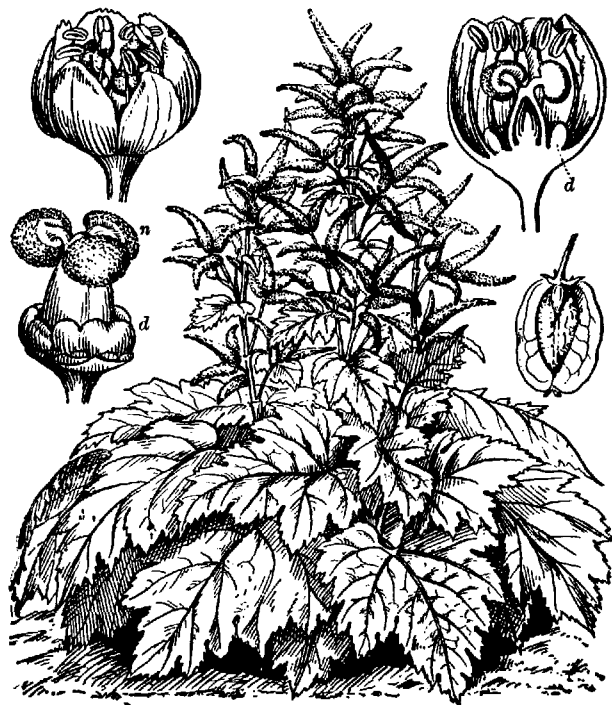
Rheum. L. Rha, the river Volga, upon whose banks it grows and was first found, fr. Gr. ῥῆον, ῥεῖν, to flow—*i. e.*, it causes purgation.

Of-fi-ci-na'le. L. officina, workshop; opus, work, + facere, to do—*i. e.*, used in or belonging to the shop or store.

Pal-ma'tum. L. palmatus, fr. palma, palm of the hand—*i. e.*, the much divided leaves.

Rhubarb, contraction of *rheubarbarum*—*rheum* + *barbarum*—*i. e.*, barbarian plant from the Rha (Volga), whence name *rha Ponticum*—*Pontic-rha*, *R. rhaponticum*, fr. Pontic or Euxine Sea.

PLANTS.—Large compact perennial herbs; aërial stem persisting through the winter, after a few years 30 Cm. (1°) high, 10-15 Cm. (4-6') thick, branches 25-37.5 Cm. (10-15') long, blunt summit, brown coat from withered scales (ocreas) and leaf-bases; internally fleshy (semi-pulpy) with yellowish juice; leaves very large, petiole 3-5 M. (12-18') long, 2.5-4 Cm. (1-1½') thick, solid; lamina .6-1.3 M. (2-4°) long and broad, suborbicular, palmately-veined, 5-7-lobed, reticulate, pubescent, pale green; stipules very large; flowering branches (stems) several, 1.5-3 M. (5-10°) high, hollow, thick, green, striate, smoothish; flowers May-June, 6 Mm. (¼') long, clusters of 7-10, catkin-like compound panicles, greenish-white; fruit August, small clusters, 12 Mm. (½') long, 6 Mm. (¼') broad, triangular, wing at each angle, crimson-red; seed solitary. **RHIZOME**, subcylindrical, barrel-shaped, conical, *rounds*, or flattened pieces, *flats*, frequently with a perforation; hard, moderately heavy, 5-17 Cm. (2-7') long, 4-10 Cm. (1½-4') thick, or cut into variable shape and size; yellowish-brown, with lighter stria-



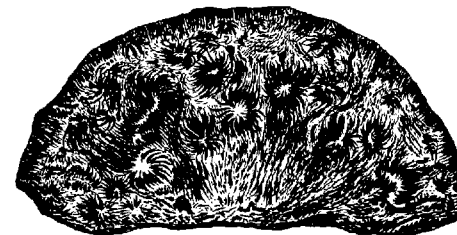
Rheum officinale: n, pistils and stigmas; d, nectar tubes.

tions and occasional small patches of brown cork, more or less covered with yellowish-brown powder; fracture uneven, stellate vascular bundles, granular yellowish mottled surface; odor aromatic, agreeable; taste bitter, astringent, gritty when chewed, tingeing saliva yellow. POWDER, yellowish-brown—calcium oxalate rosette aggregates, starch grains .004-.025 Mm. ($\frac{1}{8250}$ — $\frac{1}{10000}$) broad, few tracheæ, reticulate and spiral. *Tests*: 1. Boil 1 Gm. with aqueous solution of potassium hydroxide (1 in 100) 10 cc., cool, acidulate filtrate with hydrochloric acid, shake with ether 10 cc.; ethereal layer (yellow on standing) shaken with ammonia T. S. 5 cc.—ammonia layer cherry-red color (pres. of emodin), ethereal layer remains yellow (pres. of chrysophanic acid). 2. Boil 1 Gm. + diluted alcohol 50 cc. for 15 minutes under a reflux condenser, filter, evaporate to 10 cc., cool, shake with ether 15 cc., set aside for 24 hours—yellowish prismatic crystals should not form (abs. of rhapontic rhubarb). *Solvents*: alcohol; water. Dose, gr. 5-30 (.3-2 Gm.).

ADULTERATIONS.—Irrespective of variety, rhubarb should be moderately heavy, compact, bright color, brittle, broken edges with fresh appearance, red and yellow veins intermingled with white, decidedly aromatic odor, bitter, astringent, slightly gritty, non-mucilaginous, staining saliva yellow; pieces that are porous, mucilaginous taste, dark brown interior should be rejected. Turmeric sometimes added to the powder and also rubbed over unsightly pieces—recognized by its starch grains, as well as by adding to 5 gr. (.3 Gm.) of suspected rhubarb a few drops of chloroform on white paper, when Chinese

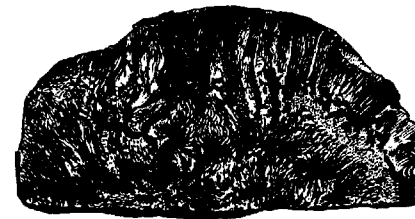
slightly stains the paper, while the European, or dark-colored Chinese, imparts a deep yellow stain; now on adding a few grains of borax + a drop of hydrochloric acid, if pure rhubarb—stain not changed, if tumeric present—get a distinct red.

Commercial.—Plants, resembling our garden rhubarb—pie-plant, grow wild and largely under cultivation in Chinese Empire, where a number of species, chiefly the two recognized, furnish the official product. Rhizome, when 8-10 years old, is dug in the autumn (Tartary, spring, China, Sept.-Oct.), and, after removing roots and corky layer, is divided into segments (to aid drying), perforated, strung on cords, and suspended in the shade or under cover (house roofs and eaves) to be cured by circulating air, a process that often requires a year and a loss of 80 p. c.; frequently that dried by the sun, heated stones, stoves, ovens, kilns, or brushwood fires, *high dried* (usually having broad ridges, blackish grooves, heavy disagreeable odor) and the larger roots, *tails*, are included, but both are more or less inferior. Variety and quality are distinguished, in experienced hands, by odor (bouquet), while all kinds are subject to insect attack, which is prevented best by keeping in tightly-closed containers having a tuft of cotton saturated with chloroform or carbon tetrachloride. Most of our supply comes from Hankow, on the Upper Yang-tse, that from Hsining (Tze-chuen and Shensi products) commanding the highest price. There are three varieties: 1, *Russian* (*Turkish, Crown*—*R. palmatum*), no longer on the market, but consisted of the best rhizome,



Russian rhubarb: transverse section.

from Chinese Tartary via Siberia, trimmed to beneath the cambium, perforated with large conical hole (for easy examination), inspected rigorously at Kiachta, refuse burned, the reserve sewed in linen sacks, covered with hide, and sent to Leningrad (Petrograd St. Petersburg); Turkish ports once supplied it (hence name), being brought from Tartary by caravans through Persia and Anatolia; 2, *Chinese* (*E. Indian*—*R. officinale*, *R. palmatum*, var. *tanguticum*, etc.), our official rhizome, having inner bark, and sometimes patches of rough corky layer and twine fibers; color less bright and odor less aromatic than Russian; flourishes best at



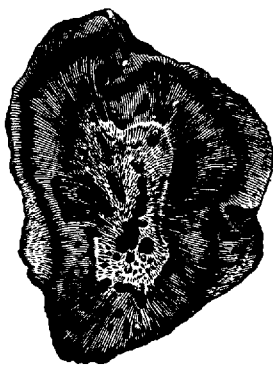
Chinese rhubarb: transverse section.

2,400–3,000 M. (8,000–10,000°) elevation in the Himalaya and other mountains, on the shady side of damp ravines, with northern exposure; distinguished natively as “northern” and “southern,” also as “Shensi” (best, most expensive—orange color, agreeable odor), “Canton” (smoky odor, bitter, ochre-yellow), “Shanghai” (smoky odor, light yellow; exported chiefly from Canton, occasionally via India; 3, *European* (*Rhaponticum*—*R. palmatum*, *R. rhaponticum*, *R. compactum*, *R. undulatum*, *R. Emodi* +), cultivated in England, France, Austria (Moravia), the rhizome being cut to resemble the Chinese, but differing in having the outside nearly or entirely without white meshes, the medullary rays interrupted, narrow, nearly straight, with paler color, weaker odor, and less gritty but more mucilaginous taste; rarely imported.

CONSTITUENTS.—Resin, Aloe-emodin, Chrysophanic acid, rhein, emodin, emodin monomethyl ether, rheinolic acid (new anthraquinone derivative), volatile oil, rheotannic acid, gallic acid, cinnamic acid, palmitic acid, stearic acid, oleic acid, linolic acid, verosterol (phytosterol), dextrose, levulose, calcium oxalate 2–40 p. c. (the greater the amount, the greater the activity of the drug, the two going hand in hand); starch, ash 12–13 p. c.—very inferior 35–45 p. c.

Resin.—Chief purgative principle; amorphous, non-glucosidic—obtained from alcoholic extract, after removing volatile oil, by separating from greenish-yellow residue in still the dark aqueous liquid, extracting it with ether, then with amyl alcohol, evaporating to get brown tarry liquid and yellowish granules, crystals (aloe-emodin, chrysophanic acid, rhein, emodin, emodin monomethyl ether, rheinolic acid—all of which the resin yields upon hydrolysis); evaporate brown tarry filtrate, dissolve in alcohol and precipitate with equal quantity of chloroform.

Aloe-emodin and Chrysophanic Acid.—Both slightly purgative, obtained by concentrating above ethereal liquid, heating residue with ethyl acetate, adding petroleum, decanting from tarry precipitate, evaporating petroleum solution, dissolving in ether, extracting with 10 p. c. aqueous solution of sodium carbonate (aloe-emodin), or with 10 p. c. aqueous solution of potassium hydroxide (chrysophanic acid). Aloe-emodin is the rhabarberon and iso-emodin of some writers.



European rhubarb: transverse section.

PREPARATIONS.—1. *Extractum Rhei*. Extract of Rhubarb. (Syn., Ext. Rhei., Powdered Extract of Rhubarb, *Extractum Rhei Alcoholicum*; Fr. *Extrait de Rhubarbe*; Ger. *Rhabarberextrakt*.)

Manufacture: Macerate, percolate 100 Gm. with 80 p. c. alcohol until exhausted, reclaim alcohol, continue distillation until residue syrupy consistence, transfer to a dish, rinse still with little warm menstruum, which add to dish and evaporate to dryness at 70° C. (150° F.), stirring frequently; add dried starch enough for extract to weigh 50 Gm., pulverize, mix thoroughly, pass through fine sieve; 1 Gm. represents 2 Gm. of the drug. Should be kept in small, wide-mouthed, tightly-stoppered bottles. Dose, gr. 3–10 (.2–6 Gm.).

2. *Fluidextractum Rhei*. Fluidextract of Rhubarb. (Syn., *Fldext. Rhei*, Fluid Extract of Rhubarb; Fr. *Extrait fluide de Rhubarbe*; Ger. *Rhabarberfluidextrakt*.)

Manufacture: Similar to *Fluidextractum Sarsaparillæ*, page 126; menstruum: 80 p. c. alcohol. Dose, $\text{m}\nu$ –30 (.3–2 cc.).

Preps.: 1. *Syrupus Rhei*. Syrup of Rhubarb. (Syn., *Syr. Rhei*; Fr. *Sirop de Rhubarbe*; Ger. *Rhabarbersirup* (saft).)

Manufacture: 10 p. c. Mix fluidextract of rhubarb 10 cc., spirit of cinnamon .4 cc., add potassium carbonate 1 Gm., dissolved in water 5 cc., and to this mixture add syrup q. s. 100 cc. Dose, ʒj –4 (4–15 cc.).

2. *Mistura Rhei Alkalina*, Neutralizing Cordial, *N. F.*, 1.6 p. c.

3. *Mistura Rhei Composita*, Mixture of Rhubarb and Soda, *N. F.*, 1.5 p. c. 4. *Elixir Catharticum Compositum*, *N. F.*, 6.2 p. c.

3. *Pulvis Rhei Compositus*. Compound Powder of Rhubarb. (Syn., *Pulv. Rhei Co.*, Gregory's Powder, Powder Magnesia and Rhubarb, *Pulvis* (Infantum) *Antacidus*; Fr. *Poudre de Rhubarbe composée*; Ger. *Pulvis Magnesiæ cum Rheo*, *Kinderpulver*.)

Manufacture: 25 p. c. Triturate together rhubarb 25 Gm., ginger 10, add gradually magnesium oxide 65; mix thoroughly, pass through No. 60 sieve. It is pinkish-white, mobile, darker on exposure to moisture; it exhibits fine particles of magnesium oxide, numerous elliptical starch grains (ginger), .005–.06 Mm. ($\frac{1}{8000}$ – $\frac{1}{1600}$) broad, and fragments of vegetable tissues; polygonal starch grains (rhubarb), .002–.02 Mm. ($\frac{1}{2500}$ – $\frac{1}{500}$) broad. Dose, ʒss –1 (2–4 Gm.).

4. *Tinctura Rhei*. Tincture of Rhubarb. (Syn., *Tr. Rhei*; Fr. *Teinture de Rhubarbe*; Ger. *Rhabarbertinktur*.)

Manufacture: 20 p. c. Similar to *Tinctura Veratri Viridis*, page 104; 1st menstruum: glycerin 10 cc., alcohol 50, water 40, 2d: diluted alcohol q. s. 100 cc. Dose ʒss –4 (2–15 cc.): Prep.: 1. *Mistura Opii et Rhei Composita*, *N. F.*, 10 p. c.

5. *Tinctura Rhei Aromatica*. Aromatic Tincture of Rhubarb. (Syn., *Tr. Rhei Arom.*; Fr. *Teinture de Rhubarbe aromatique*; Ger. *Aromatische Rhabarbertinktur*.)

Manufacture: 20 p. c. Similar to *Tinctura Veratri Viridis*, page 104—using rhubarb 20 Gm., cinnamon 4, clove 4, myristica 2; 1st menstruum: glycerin 10 cc., alcohol 50, water 40, 2d: diluted alcohol q. s. 100 cc. Dose, ʒss –4 (2–15 cc.).

Prep.: 1. *Syrupus Rhei Aromaticus*. Aromatic Syrup of Rhubarb.

(Syn., Syr. Rhei. Arom., Spiced Syrup of Rhubarb; Fr. Sirop de Rhubarbe aromatique; Ger. Gewürtzer Rhabarbersirup (saft).)
Manufacture: 3 p. c. Dissolve potassium carbonate .1 Gm. in aromatic tincture of rhubarb 15 cc., to this add syrup q. s. 100 cc. Mix thoroughly. Dose, for a child with diarrhea, ʒj-2 (4-8 cc.).

6. *Fluidglyceratum Rhei, N.F.* 7. *Pilulæ Rhei, N.F.*, 3 gr. 8. *Pilulæ Rhei Compositæ, N.F.*, 2 gr. 9. *Pulvis Rhei et Magnesiae Anisatus, Compound Anise Powder, N.F.*, 35 p. c. 10. *Tinctura Rhei Aquosa, N.F.*, 10 p. c. (11 p. c. alcohol). 11. *Tinctura Rhei Dulcis, N.F.*, 10 p. c., 1st menstruum: glycerin 10, alcohol 50, water 40, 2d: diluted alcohol. 12. *Tinctura Rhei et Gentianæ, N.F.*, 7 p. c., + gentian 1.75 p. c. (diluted alcohol). 13. *Pilulæ Antiperiodicæ, N.F.*, ½ gr. 14. *Syrupus Sennæ Aromaticus, N.F.*, 1.75 p. c. 15. *Tinctura Antiperiodica, N.F.*, ⅔ p. c. Dose, each, ʒss-2 (2-8 cc.).

Unoff. Preps.: *Aromatic Fluidextract*, m̄xv-60 (1-4 cc.). *Infusum Rhei* (Br.), 5 p. c., ʒiv-8 (15-30 cc.). *Liquor Rhei Concentratus*, 50 p. c., ʒss-1 (2-4 cc.). *Vinum Rhei Compositum*, 8 p. c., +, ʒj-4 (4-15 cc.). *Torrefied Rhubarb.*—By roasting, the cathartic principle is volatilized and the full astringency left behind; long boiling will effect the same result.

PROPERTIES.—Aperient, purgative, astringent, stomachic, tonic. It increases saliva, gastric juice, bile, peristalsis, vascularity, and absorption. The cathartic effect comes first (4-8 hours), due to resins (mainly pheoretin), emodin, etc.; then follows astringency from rheo-tannic acid; both actions being chiefly on the duodenum. The milk, urine, and sweat become colored, the first also acquiring bitterness and purgative properties. Purgation may result from its application to ulcers, abraded skin, or in poultices to abdomen.

USES.—Diarrhea, hemorrhoids, cholera infantum, chronic dysentery, dyspepsia, thread worms. With calomel good in bilious fevers; with magnesium oxide for stomach and bowel disorders. By association with other cathartics both rendered more efficient; sometimes used with opium.

Allied Plants:

1. *Rheum rhaponticum.* Asia Minor, Siberia, Russia. This is cultivated as pie-plant, the leaf-petioles being used, as they possess pleasant acidulous properties; this species is the source of the cultivated European rhizome, and that of Moravia (Austria), Hungary, England, and Banbury, which is usually less than half the size of official rhubarb, conical, harder, lighter color, more bitter and astringent, less gritty; contains rhapontin, C₂₂H₂O₉. *R. undulatum*, *R. compactum*, *R. Emodi*, *R. australe*, *R. hybridum.*—All produce handsome, but smaller, less valuable, and lighter-colored rhizomes.

Rhus aromatica

Rhus aromatica, Fragrant (Sweet-scented) Sumac(h), 1.5-2.5 M. (5-8°) high; given in extract, fluidextract (alcoholic), tincture, and for hematuria, leucorrhea, but mainly for incontinence of urine (enuresis). Dose, gr. 10-30 (.6-2 Gm.). *R. copalli'na, Black, Dwarf, Mountain Sumac(h)*, 1-2.5 M. (3-8°) high; downy branches; leaflets entire; excels all in yield of tannin. *R. hirta (typhi'na), Staghorn Sumac(h)*, 4.5-9 M. (15-30°) high; hairy; leaflets serrate. All three indigenous to

N. America. *R. Coriaria, European Sumac(h)*, Mediterranean Basin; leaflets elliptic, woolly, serrate. *R. semialata* and *R. japon'ica*, China, Japan; these furnish galls which are used in Germany largely for obtaining tannic and gallic acid (see pages 157, 160). The fruits of all these are red, hairy, and acidulous, while the leaves are astringent.

Rhus glabra

RHUS GLABRA. RHUS GLABRA, U.S.P.

Rhus glabra, { The dried ripe fruit with not more than 5 p. c. stems or Linné. other foreign organic matter.

Habitat. N. America, west to California, Idaho; on barren or rocky soil.

Syn. Rhus Glab., Sumac Berries, Sumach, Mountain-, Dwarf-, Slek-, Smooth-, Upland-, Scarlet, or Pennsylvania Sumach, Indian salt (powder on the berries); Fr. Sumach, Sumac; Ger. Sumach.

Rhus. L. fr. Gr. ῥῶς; Celtic *rhudd*, red—i. e., color of the fruit, also the leaves of the same species in autumn.

Glabra. L. fr. *glaber*, smooth, hairless—i. e., its leaves and branches.

Su'mac. L. fr. Ar. *summaq*—i. e., their native name for the plant.

PLANT.—Woody shrub 1.5-4.6 M. (5-15°) high; stem more or less bent, dividing into many straggling branches, pith large, wood thin, white; bark smooth, grayish or reddish, with small scattered warts; leaves imparipinnate; leaflets 11-31, lanceolate, acuminate, serrate, whitish beneath, changing to a beautiful red in autumn; flowers June-July, greenish-red, terminal panicles. **FRUIT**, Sept., drupes in small clusters, flattened ovoid, nearly globular, somewhat reniform; 3.5-5.5 Mm. (¼-¼') long, nearly as broad, usually somewhat less; apex with raised scar, five-parted calyx occasionally with short pedicel at base; dark red, velvety with short hairs; endocarp smooth, shiny, crimson-yellowish-red; 1-locular, 1-seeded; seed brown, very hard; inodorous; taste acidulous, astringent. **POWDER**, brownish-red—numerous non-glandular hairs, usually several celled, uniseriate, filled with pink or red dried sap, occasionally rod-shaped crystals; few slender 1-celled, colorless, non-glandular hairs; numerous brownish glandular hairs, fragments red-celled epicarp with adhering mesocarp having spiral tracheæ; stone cells of endocarp small, fragments of embryo with cells having aleurone grains and fixed oil. **Solvent:** diluted alcohol. Dose, ʒss-1 (2-4 Gm.).

ADULTERATIONS.—Fruits of allied species—*R. hirta (typhina)*—shaggy coating of long, straight hair), *R. aromatica* (smaller, less compressed, nearly spherical), *R. Coriaria* (rougher, hispid).

Commercial.—Sumac grows in waste fields, along fences, woods, etc., the bark, galls, and leaves are very astringent, being collected during summer or fall for use in tanning and dyeing, while from these an extract is made containing 25-30 p. c. tannin, and this is its most convenient form for all trade and chemical purposes. For this extract sumac is cultivated in Virginia and other States.

CONSTITUENTS.—**FRUIT:** Acid calcium and potassium malates, tannin (gallo-tannic acid) 2 p. c., gallic acid, coloring matter. **SEED:** Fixed oil. **GALLS:** Tannin 60-70 p. c.

PREPARATIONS.—1. *Fluidextractum Rhois Glabræ.* Fluidextract of Rhus Glabra. (Syn., Fldext. Rhois Glab., Extractum Rhois Glabræ Fluidum, U.S.P. 1890; Fr. Extrait liquide de Sumac; Ger. Flüssiges Sumachextrakt.)

Manufacture: Similar to Fluidextractum Ergotæ, page 63—macerate, percolate 100 Gm. with 1st menstruum: glycerin 10 cc., alcohol 50, water 40; finish with 2d: diluted alcohol. Dose, ℥ss-1 (2-4 cc.).

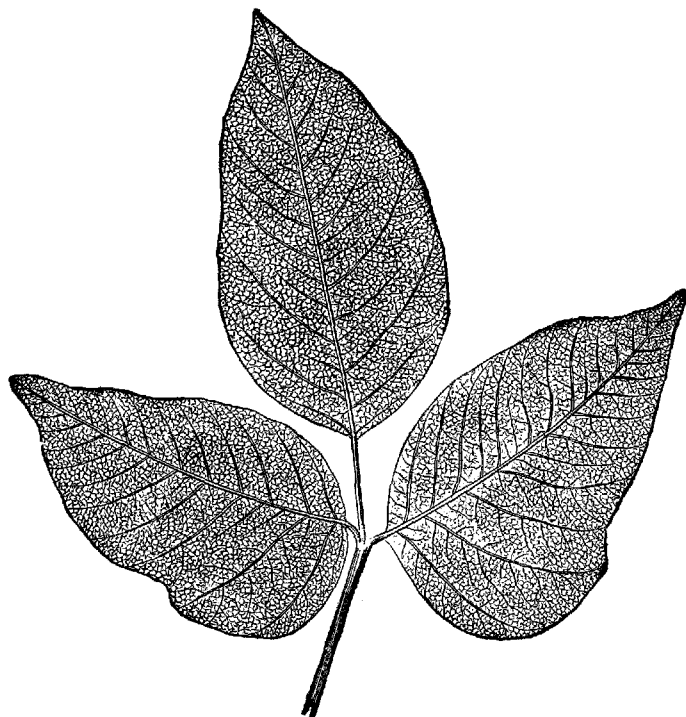
Unoff. Preps.: Decoction, 5 p. c., ℥j-2 (30-60 cc.). Infusion, 5 p. c., ℥j-2 (30-60 cc.).

PROPERTIES.—Astringent, refrigerant, diuretic; resembles tannin.

USES.—Catarrhal affections of stomach and bowels, pharyngitis, tonsillitis, mercurial aphthæ, spongy gums, and other mouth affections (as a gargle), ulcers, wounds, etc. (as a wash).

Rhus tox

R. radicans, *Rhus Toxicodendron*, *Poison Ivy*.—The fresh leaflets, U.S.P. 1870-1890; N. America. Climbing plant over fences, rocks, trees, etc.; flowers small; fruit smooth drupe. Leaflets, collected May-June, trifoliate, petiolate, entire, glabrous, the 2 lateral nearly sessile, 10 Cm. (4') long, obliquely ovate and pointed; when dry brittle, inodorous, astringent, when fresh with acrid juice blackening on exposure, applied to skin produces swelling, inflammation, etc.—hence should not handle ungloved or confound with the harmless *Ptelea trifoliata*, *Three-leaved Hoptree*, whose leaflets are sessile, thicker, paler green; contains toxicodendrol 3.3 p. c., tannin, acetic acid (formerly considered toxicodendric acid); toxicodendrol, the active,



Rhus radicans: leaf one-half natural size.

irritating, poisonous principle, is a viscid, non-volatile oil (or freed fat acid, or complex glucoside), agreeably odorous, soluble in alcohol, benzene, ether, chloroform, decomposed by heat. Irritant, rubefacient, narcotic, poisonous; internally produces gastro-intestinal inflammation, vertigo, nausea, muscular debility, delirium, mydriasis, convulsions, death. *Poisoning:* The fresh leaves, juice or flying pollen produce external itching, burning, redness, tumefaction, vesication, desquamation, lasting 1-2 weeks. Apply at once soap and water with scrubbing-brush, lead water and laudanum, alkaline solutions (sodium bicarbonate—8 p. c. solution 3-4 times daily, sulphite, chlorinated, thio-sulphate, diluted ammonia, soapsuds, alum curd), or hot aqueous saturated solution of magnesium sulphate (frequently), or fresh bruised leaves of either fire weed (*Erechtites hieracifolia*), touch-me-not (*Impatiens aurea, biflora*) or burdock (*Arctium Lappa*), or solution of sodium salicylate (2), + fldext. hydrastis (1) + water (5), or tincture or infusion of lobelia, grindelia, or sassafras, cocaine solution 4-8 p. c. (to relieve burning and itching), aristol, glycerite of phenol, opium—no oils, vaselin, alcohol, these being solvents of poison serve to disseminate it, low diet, saline purgatives, quietness. Used in chronic eczema, skin diseases, erysipelas, rheumatism, incontinence of urine, etc. Dose, gr. 2-5-15 (.13-3-1 Gm.); tincture (fresh leaves bruised and macerated with equal weight of alcohol), ℥ $\frac{1}{6}$ -1 (.006-.06 cc.); juice (expressed from leaves and preserved with alcohol) is soluble in ether and possesses all the virtues of the plant; fluidextract, ℥v-30 (.3-2 cc.). *R. Toxicodendron*, properly more or less shrubby, .6-1 M. (2-3°) high, erect, leaflets crenately lobed, pubescent, called also Poison Ivy (Oak)—merely a variety of *R. radicans*. *R. diversiloba*, Pacific coast; leaves with 3-5-lobed, pinnatifid leaflets. *R. Vernix* (*venenata*), Canada, United States, swamps, 3-6 M. (10-20°) high; leaves of 7-13 entire leaflets; fruit yellow; called poison-sumac(h), -dogwood, -elder, and yields most toxicodendrol. *R. pu'mila*, S. Carolina, procumbent shrub; leaves pinnate with 11 toothed acuminate leaflets; fruit red, hairy. All of these are poisonous, but *R. Vernix* the most so, as when in flower it so taints the surrounding air that sensitive persons become poisoned by simple exposure to the effluvium.

Ricinus

RICINUS. CASTOR OIL PLANT.

Oleum Ricini. Castor Oil, U.S.P.

Ricinus communis, } A fixed oil obtained from the seeds.
Linné.

Habitat. India; cultivated in tropics; India, Italy, Spain, Sicily, United States.
Syn. Palma Christi, Castor Bean, Mexico Seed, Oil Plant, Oil Seed (Nut); Fr. Ricin (Graine); Ger. Wunderbaum; Ol. Ricin., Oleum Palmæ Christi; Fr. Oleum e Semini Ricini, Huile de Ricin; Ger. Rizinusöl.

Ric'i-nus. L. a bug, dog-tick—*i. e.*, from the resemblance of the seed.

Com-mu'nis. L. common, general—*i. e.*, it is the ordinary common species.

PLANT.—This is quite variable in habit and appearance—in tropics a tree 9-12 M. (30-40°) high, in warm or temperate regions a woody



Ricinus communis: a, stamen; b, anther; c, stigmas; d, transverse section of capsule; e, seed; f, embryo.

bush 3.6–4.5 M. (12–15°) high; in Middle United States with herbaceous stems 1.6–3 M. (5–10°) high, hollow, smooth, glaucous, purplish bloom above; leaves with blade 15–20 Cm. (6–8') broad, palmately divided ($\frac{3}{4}$ depth) into 7–11 lanceolate, serrate segments, smooth, bluish-green, paler beneath, on long, curved, cylindrical, purplish petioles; flowers July, monœcious, large, apetalous, racemes, staminate below, pistillate above; fruit tricoccos capsule 2.5 Cm. (1') long, blunt, greenish, deeply grooved, sometimes smooth, usually spinescent on the 3 projecting sides, 3-celled, each cell 1-seeded, which is expelled in Aug.-Sept. by capsule dehiscing into 6 valves. Seed 12 Mm. ($\frac{1}{2}$ ') long, 6 Mm. ($\frac{1}{4}$ ') broad, 3 Mm. ($\frac{1}{8}$ ') thick, size of a coffee grain, with caruncle, raised raphe, grayish, marbled with blackish spots or bands of various tints and shapes, smooth, shining.

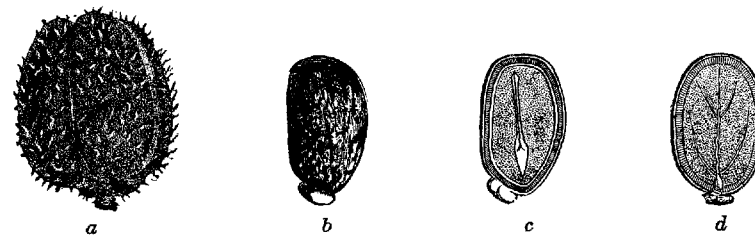
CONSTITUENTS.—Seeds (testa 23.82 p. c., kernel 69.09 p. c.) yield fixed oil 35–45 p. c., gum (mucilage) 2.4 p. c., starch and lignin 20 p. c., albumin 5 p. c., ricinine, proteins (emulsin), sugar, ash (testa 10 p. c., kernel 4 p. c.). The poisonous principle, ricin, is an albuminoid, soluble in a 10 p. c. solution of sodium chloride, precipitated by acids, coagulated by heat; harmless to chickens.

Oleum Ricini. Castor Oil.—This fixed oil, obtained from the seed chiefly by expression, is a pale, almost colorless, transparent, viscid

liquid, faint, mild odor, bland, slightly acrid, usually nauseating taste, miscible with dehydrated alcohol or glacial acetic acid; sp. gr. 0.955; at 0° C. (32° F.) separates into crystalline flakes, at –18° C. (–4° F.) congeals into yellow mass; contains mostly triricinolein (the glyceride of ricinoleic acid), $C_3H_5(C_{18}H_{35}O_2)_3$, also palmitin, ricinoleic acid (ricinic acid), $C_{18}H_{34}O_2$, which is a viscid oil readily converted by nitrous acid into ricinelaidic acid, crystalline, melting at 50° C. (122° F.). **Tests:** 1. Only partly soluble in petroleum benzin (dif. from most other fixed oils). 2. Soluble (clear) in an equal volume of alcohol (abs. of foreign fixed oils). Should be kept in well-closed containers. Dose, ʒj–8 (4–30 cc.).

ADULTERATIONS.—Rare: Cottonseed, rapeseed, sesame, and mineral oils—detected by decreased solubility in alcohol and preceding tests.

Commercial.—Plant, called Palma Christe from supposed shape of leaves resembling Christ's hand, is cultivated extensively in the United States for the oil which is extracted from the seed by: 1, Expression; 2, Decoction; 3, Solution (benzin, carbon disulphide, chloroform, ether). The first method is preferred, and consists in crushing and freeing seed of the integuments, dark skin, etc., and expressing at 60° C. (140° F.), or in heating clean seed in shallow tanks short of scorching, 65° C. (150° F.), to render oil more fluid, and expressing them hydraulically in hempen bags between hot iron plates; while this affords the greatest yield of oil it is of inferior quality, the best being from hand-screw presses. This white oil now is run into iron vats with water, boiled to separate impurities (albumin being coagulated and removed by skimming, mucilage and starch being dissolved in water), strained, reboiled (to destroy acidity), strained, and, if opaque, treated with fuller's earth, or magnesium oxide (1 p. c.) and animal charcoal (2.5 p. c.), filtered through paper and felt, and put into cans or barrels, constituting as such *cold-pressed castor oil*; by grinding marc with water and expressing may obtain 6–8 p. c. additional good oil; the yield by cold expression is 25–30 p. c., with heat 35–45 p. c. The method by decoction, owing to water dissolving poisonous ricin and heat increasing



a, Ricinus fruit; b, seed; c and d, longitudinal sections.

oil's acidity, is not so desirable, consisting in crushing the seed after removing husks (testa), boiling with water (oil floating on surface), straining, reboiling to dissipate acrid principle, straining, filtering; this oil usually is brownish, acrid, irritating, and comes from E. and W. Indies. The method by solution causes the oil to turn rancid quicker, in spite of which it is preferred in France and Italy, being