Contributed and Selected

UNITED STATES PHARMACOPŒIA.

NINTH REVISION.

ABSTRACT OF PROPOSED CHANGES WITH NEW STANDARDS AND DESCRIPTIONS.

PART II—FIRST PROOF.

A second installment of the abstract of proposed new descriptions and standards, and of changes in descriptions and standards is herewith submitted.

This abstract embraces most of the drugs of vegetable and animal origin. Many descriptions have been amplified or added and it has been found necessary to present these in full.

Where no reference is made to definitions and descriptions it is understood that the material facts remain the same as in the United States Pharmacopœia, Eighth Revision.

Other abstracts will be submitted later. Comments should be sent to the Chairman of the Revision Committee, Joseph P. Remington, 1832 Pine street, Philadelphia, before May 1, 1914.

Acacia.—The air-dried gummy exudation of Acacia Senegal Willdenow, and other African species of Acacia. In ovoid, more or less spheroidal tears or in broken, angular fragments from 2 to 30 mm. in diameter, varying from whitish, yellowish-white to light amber-colored. Slowly and almost completely soluble in twice its weight of water, the solution having a slight, characteristic odor. The requirement that it should not reduce alkaline cupric tartrate V. S. is omitted. Powder: Not more than 1 percent. should be insoluble in water (limit of plant tissues, sand, and dirt). The powder should contain not more than 15 percent. of moisture.

Aconitum.—Not more than 5 percent. of stem-bases or other foreign matter should be present. More or less conical or fusiform, from 4 to 10 cm. in length, from 1 to 2 cm. in diameter at the crown; externally dark brown or grayish-brown, smooth or longitudinally wrinkled, the upper end with a bud, remains of bud-scales or stem-scars, the other portions with numerous root-scars or short rootlets; fracture short, horny or somewhat mealy; internally, bark light or dark brown, 1 to 2 mm. in thickness, cambium zone usually 5- to 8-angled, with a small fibro-vascular bundle in each angle, pith whitish or light brown, 2 to 7 mm. in diameter; odor very slight; taste sweetish, soon becoming acrid and developing

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a tingling sensation, followed by numbness. Under the microscope transverse sections made near the middle of the tuberous root of Aconite show an epidermis replaced by a layer consisting of one or more rows of cells with blackish-brown walls; a primary cortex of 8 to 15 rows of parenchyma and characteristic stone cells, occurring either singly or in small groups; a more or less modified endodermis; a secondary cortex, consisting chiefly of starch-bearing parenchyma and interspersed with a few small fibro-vascular bundles; a more or less star-shaped and characteristic cambium with from 5 to 12 collateral fibro-vascular bundles; and a pith composed of large parenchyma cells filled with starch. Powder: Grayish-brown; starch grains numerous, spherical, somewhat plano-convex, single or 2- to 5-compound, the individual grains from 0.003 to 0.015 mm. in diameter and frequently with a central cleft; tracheæ mostly with slit-like, simple pores, sometimes with spiral or reticulate thickenings or with bordered pores; stone cells single, tabular, irregular in shape or elongated to fibers from 0.100 to 0.400 mm. in length, walls from 0.008 to 0.025 mm. in thickness, strongly lignified and having large simple pores; fragments of cork few, yellowish-brown; fragments of parenchyma numerous, the cells being filled with starch grains; bast-fibers from stems few, very long, with lignified walls about 0.005 mm. thick, and marked by transverse or oblique, slit-like pores. Ash not exceeding 6 percent.

Agar-Agar.—The dried mucilaginous substance extracted from Gracilaria (Sphaerococcus) lichenoides Greville and other marine algæ growing along the eastern coast of Asia, particularly several species of Gelidium or Gloiopeltis (Class Rhodophyceæ. Mostly in bundles from 4 to 6 dm. in length, consisting of thin, translucent, membraneous, agglutinated pieces from 4 to 8 mm. in width; externally yellowish-white or brownish-white, shiny; tough when damp, brittle when dry; odor slight; taste mucilaginous. A fragment mounted in water and examined under the microscope gradually becomes more transparent, showing a granular structure and a few diatoms, notably the frustules of Arachnoidiscus Ehrenbergii Baillon, which are disk-shaped, from 0.100 to 0.200 mm. in diameter, and also fragments of the spiculæ of sponges; upon the addition of iodine some of the granules or hyphal-like portions are colored bluish-black. Insoluble in cold water, slowly soluble in hot water. A solution made by boiling 0.100 Gm. of Agar-agar in 100 Cc. of water, upon cooling, should yield no precipitate upon the addition of tannic acid T. S. (gelatin) and should not produce a blue color upon the addition of iodine T. S. (starch). One part of Agar-agar boiled for about ten minutes with 100 parts of water, and replacing the water lost by evaporation, should yield a stiff jelly upon cooling. Powder: Pale buff; when mounted in water and examined under the microscope it shows transparent, more or less granular, striated angular fragments. In some mounts occasional frustules of diatoms are present; with iodine T. S., fragments for the most part are colored bright red, certain more or less definite areas being stained bluish-black. Ash not exceeding 5 percent.

Aloe.—Definition: The inspissated juice of the leaves of Aloe Perryi Baker, yielding Socotrine Aloes; or Aloe vera (Linné) Webb, yielding Curaçao Aloes; or of Aloe ferox Miller, yielding Cape Aloes (Fam. Liliaceæ). Socotrine Aloes: In yellowish-brown to blackish-brown, opaque, or smooth and glassy masses; fractured surface somewhat conchoidal; sometimes soft or semi-liquid;

odor aromatic or saffron-like, never fetid or putrid; taste nauseous, bitter. Not less than 50 percent. of Socotrine Aloes should be soluble in cold water, the solution being of a yellowish color. Powder: Very dark brown; when mounted in one of the fixed oils and examined under the microscope it shows yellowish or reddish-brown, irregular, or angular fragments. Upon the addition of nitric acid, it yields a yellowish or reddish-brown solution. Curaçao Aloes: In orange to blackish-brown, opaque masses; fractured surface uneven, waxy, somewhat resinous; odor characteristic but not aromatic as in Socotrine Aloes. Not less than 60 percent. of Curaçao Aloes should be soluble in cold water, the solution being of a purplish-red color. Powder: Deep reddish-brown; when mounted in one of the fixed oils, and examined under the microscope it shows numerous blackish-brown or reddish-brown, irregular angular, more or less opaque fragments. Upon the addition of nitric acid it yields immediately a deep red solution. Cape Aloes: In reddish-brown or olive-black masses, usually covered with a yellowish powder; in thin, transparent fragments, of a reddish-brown color; fracture smooth and glassy; odor characteristic. Not less than 60 percent. of Cape Aloes is soluble in cold water, the solution being of a pale yellow color. Powder: Greenish-yellow changing to light brown on aging; when mounted in one of the fixed oils and examined under the microscope it shows numerous, distinctly angular, bright yellow fragments. Upon the addition of nitric acid it yields a solution that is colored reddish-brown, changing to purplish-brown and finally greenish. The tests which follow apply to Socotrine, Curaçao and Cape Aloes: Aloes should contain not more than 10 percent. of moisture. If to 1 Gm. of Aloes 50 Cc. of alcohol be added, the mixture first gently heated and then cooled, a nearly clear solution should be obtained (gum and inorganic impurities). Intimately mix 1 Gm. of Aloes with 10 Cc. of hot water and dilute 1 Cc. of this mixture with 100 Cc. of water; a green fluorescence should be produced upon the addition of a 5 percent. solution of sodium borate. Dilute 1 Cc. of the original aqueous mixture of Aloes with 100 Cc. of water, shake it with 10 Cc. of benzene; upon separating the benzene solution and adding to it 5 Cc. of ammonia water, a deep rose color, which is permanent, should be produced in the lower layer. Ash not exceeding 4 percent.

Althæa.—The root of Althæa officinalis Linné (Fam. Malvaceæ) deprived of the brown, corky layer and small roots, and carefully dried. Root: Usually cut into small pieces about 5 mm. in diameter, of a uniform grayish-white color and otherwise having the characters of entire roots; occasionally entire, slenderly tapering, attaining a length of 30 cm. and a thickness of 2 cm.; externally whitish, longitudinally furrowed, frequently spirally twisted and covered with the somewhat loosened bast-fibers; fracture of bark fibrous, of wood short and granular; internally yellowish-white, bark from 1 to 2 mm. thick, porous, due to mucilage cells, and separated from the slightly radiating wood by a distinct, grayish, cambium zone; odor slight; taste sweetish, mucilaginous. Powder: Whitish; starch grains, numerous, from 0.005 to 0.020 mm. in diameter, usually with a long cleft at the point of origin of growth; sclerenchymatous fibers in groups, the walls being quite thick and more or less lignified; tracheæ with scalariform thickenings or with bordered pores; calcium oxalate crystals few, in rosette aggregates, 0.020 mm. to 0.030 mm. in diameter. Add 1 Gm. of Althæa

Root to 10 Cc. of cold water, allow it to stand with occasional stirring, and filter it through cotton; a pale yellow colored mucilage should be obtained, which should be neutral to litmus, and colored a deep yellow on the addition of a few drops of potassium hydroxide T. S. The mucilage should not have a sour or ammoniacal odor. Ash not exceeding 8 percent.

Amygdala Dulcis.—Powder: Creamy-white, exhibiting numerous very small oil globules, 0.001 mm. or less in diameter, larger oil globules and crystalloids, the latter sometimes with adhering globoids; fragments of parenchyma of endosperm, containing oil globules and aleurone grains; also occasional fragments of seed-coat with characteristic, more or less scattered, large elliptical, thin-walled, strongly lignified epidermal cells and narrow, closely spiral tracheæ. Starch grains are absent. Ash not exceeding 4 percent.

Amylum.—Taste slight, characteristic. Residue on incineration changed from "not more than 1 percent." to "not more than 0.5 percent."

Anisum.—Definition requires the dried ripe fruit with not more than 3 percent. of foreign seeds and other vegetable matter. Fruit: The cremocarp broadly ovoid or pyriform, laterally compressed, 3 to 6 mm. in length, 2 to 3 mm. in breadth; mericarps usually cohering and attached to a slender pedicel 2 to 12 mm. in length, summit with a ring-like disk and 2 projecting, diverging styles; externally grayish or greenish-gray, seldom grayish-brown, slightly pubescent; each with five light brown, filiform ridges and in cross-section with from 15 to 45 vittæ or oil tubes; odor and taste agreeable and aromatic. Under the microscope transverse sections of Anise show an epidermal layer with numerous papillæ and short, one-celled, non-glandular hairs having very thick, papillose walls; primary ribs each with a small, fibro-vascular bundle, surrounded by a few sclerenchymatous fibers; vittæ or oil tubes, 13 to 56 in number, extending as a more or less interrupted circle in the tissues of the mesocarp on the dorsal side of each mericarp; 2 large vittæ on the commissural surface, each separated from the other tissues of the mericarp by a large cavity due to shrinkage of the seed-coat; inner epidermis of pericarp consisting of a layer of narrow tangentially elongated cells closely united with the seed-coat, the inner walls of which are yellowish-brown and considerably thickened; endosperm of polygonal, thick-walled cells, filled with spherical or ellipsoidal aleurone grains, each containing a small rosette aggregate of calcium oxalate; the aleurone grains surrounded with an oily protoplasm, the oil of which is liberated upon mounting sections in hydrated chloral T. S., and appearing in the form of small globules; epidermal layer near the middle of the commissural surface composed of 2 or 3 rows of cells with thick, porous walls, and beneath which occur small groups of thick-walled cells resembling stone cells. Powder: Yellowish-brown, consisting of numerous irregular fragments of pericarp showing portions of the yellowish vittæ, fragments with tracheæ and sclerenchymatous fibers of carpophore; cells of endosperm filled with aleurone grains, 0.006 mm. in diameter, each usually enclosing a rosette aggregate crystal of calcium oxalate 0.002 mm. in diameter; non-glandular hairs 1-celled, from 0.025 to 0.200 mm. in length, either straight or curved and with numerous, slight, centrifugal projections on the outer surface. Ash not exceeding 10 percent.

Apocynum.—The dried rhizome and roots of Apocynum cannabinum Linné

(Fam. Apocynaceæ), with not more than 5 percent. of stems and other foreign matter. Cylindrical, somewhat branched, of varying length, from 3 to 10 mm. in thickness; externally reddish-brown to grayish-brown, longitudinally wrinkled and occasionally with transverse fissures, having vertical sides, extending through the bark; fracture short; internally, bark light brown, 1.5 to 3 mm. in thickness, wood faintly radiate and with large tracheæ, a small pith occurring in pieces of the rhizome; almost inodorous, taste starchy, afterwards becoming bitter and somewhat acrid. Under the microscope sections of Apocynum show numerous laticiferous vessels in both the bark and pith. Stems of Apocynum have a comparatively thin fibrous bark, a light brown porous wood and a large, hollow pith. Powder: Light brown, starch grains numerous, from 0.003 to 0.015 mm. in diameter, spherical, ellipsoidal, ovate, pyriform or more or less irregular, sometimes more or less altered, swollen, and with a hyaline central cleft; numerous fragments of strongly lignified wood-fibers, associated with tracheæ mostly having bordered pores, occasionally with spiral thickenings; fragments of cork layer few, the walls being of a reddish-brown color; an occasional fragment with laticiferous tissues; stone cells few or absent. (Apocynum androsæmifolium Linné.)

Arnica.—Florets: Consisting chiefly of the tubular and ligulate flowers, occasionally with the involucre and receptacle present; involucral bracts narrowly lanceolate, about 1 cm. in length, dark green and pubescent; receptacle slightly convex, deeply pitted and densely short-hairy; ray flowers bright yellow, the ligulate portion, 2 cm. in length, more or less folded lengthwise, 3-toothed, 7- to 12-veined, pistillate; tubular flowers perfect, reddish-yellow, stamens without a tail-like appendage (distinguished from anthers in flowers of Inula Helenium Linné, which have two bristles or long tails at the base); the achenes spindle-shaped, 5 to 7 mm. in length, dark brown, finely striate, glandular-pubescent and surmounted by a pappus a little longer than the achene and composed of a single circle of nearly white barbellate bristles; odor characteristic and agreeable; taste bitter and acrid. Powder: Yellowish-brown, pollen grains numerous, from 0.025 to 0.035 mm. in diameter, spherical, triangular in section and spinose; non-glandular hairs of three kinds, either unicellular, 4- to 6-celled, or consisting of a pair of united unicellular hairs with numerous pores in the dividing wall; glandular hairs of three kinds, either with a large unicellular stalk and a unicellular, glandular head or with a 4-celled stalk and a unicellular glandular head, or a stalk of a double row of 5 cells and a 2-celled glandular head; pappus consisting of a multicellular axis with unicellular branches. Ash not exceeding 9 percent.

Asafœtida.—The gum-resin, obtained by incising the rhizomes and roots of Ferula Asafœtida Linné and Ferula fœtida Regel and of other species of Ferula (Fam. Umbelliferæ) indigenous to Persia and adjacent countries, yielding not less than 60 percent. of alcohol-soluble constituents. A soft, putty-like mass, sometimes almost semi-liquid, or in irregular, more or less pliable hard masses composed of agglutinated tears of variable size embedded in a yellowish-brown or dark brown matrix, or in loose, ovoid tears, from 1 to 4 cm. in diameter, the surface being sometimes streaked a violet, yellowish-red or brownish-red and with a few vegetable fragments; when fresh the mass is either soft or tough, becoming hard and occasionally even brittle on drying; the surface of the freshly fractured tears is milky-white and opaque, changing gradually to a

pinkish or reddish-purple or even reddish-brown on exposure; on moistening with water, the tears become milky-white; odor persistent, alliaceous; taste bitter, alliaceous and acrid. Triturate one part of Asafœtida with three parts of water; it should form a milk-white emulsion which should become yellowish on the addition of alkalies. Heat a fragment of one of the tears of Asafetida with sulphuric acid; a reddish-brown solution should be formed; greatly dilute the latter with water, filter, and add an excess of any of the alkalies, the solution should acquire a blue fluorescence, becoming more pronounced upon the addition of a slight excess of ammonia water. An alcoholic solution of the tears, on the addition of a few drops of phloroglucinol T. S. and a few drops of hydrochloric acid should become of a cherry-red color. Add a few drops of ferric chloride T. S. to a portion of the alcoholic solution of Asafetida, obtained in the assay process given below; an olive-green color should be produced (most foreign resins). Add hydrochloric acid to another portion of the same alcoholic solution until a faint turbidity results; a bluish-green color should be developed, which fades on standing (galbanum). Evaporate enough of the same alcoholic solution, representing 5 Gm. of Asafetida, to 25 Cc., mix it with 25 Cc. of purified petroleum benzin in a separatory funnel and afterwards add twice its volume of water; the mixture and the petroleum benzin layer, after washing with water and subsequent separation, should exhibit no green color when shaken with 30 Cc. of a freshly made aqueous solution of copper acetate (1 in 20) (rosin). Mix 2 Cc. of emulsion of Asafetida with 5 Cc. of water and add 5 Cc. of sodium hypobromite T. S., so as to form a separate layer; a red color should not be produced (ammoniac). Ash of the gum-resin not exceeding 15 percent.. Powder: Powdered Asafetida may be prepared by drying the gum-resin over freshly burnt lime or by exposing it to currents of warm air until it ceases to lose weight, and then reducing it to a powder at a low temperature. Diluents of starch or magnesium carbonate may be added in order to maintain the powdered form. The color of powdered Asafetida is light brown. Not less than 50 percent. should be soluble in alcohol. Ash of the powder not exceeding 30 percent. Assay: Place about 10 Gm. of Asafetida in a tared, 250 Cc. Erlenmeyer flask, determine the exact weight of the drug, add 100 Cc. of alcohol, and, having connected the flask with an upright condenser, boil the mixture in the flask during one hour or until the drug is disintegrated completely. Then transfer the contents of the flask to two counterpoised, plainly folded filters, one within the other, so that the triple fold of the inner filter is laid against the single side of the outer, and wash the flask and filter with consecutive, small portions of boiling alcohol until the washings no longer produce a cloudiness when dropped into water. Collect and reserve the mixed alcoholic solutions and dry the filters and flask to a constant weight at a temperature of about 115° C. Now determine the weight of the residue on the filter and in the flask and calculate its percentage from the amount of Asafetida originally taken. This percentage of alcohol-insoluble material, when subtracted from 100, will give the percentage of alcohol-soluble constituents contained in the Asafetida.

Aspidium.—The "uncomminuted rhizome and stipes" should be collected in the autumn, freed from the roots and dead portions of rhizome and stipes and dried at a temperature not exceeding 70° C. Usually with the blackish-brown

outer layers removed; rhizome 1 to 3 cm. in thickness, cylindraceous and nearly straight, or curved and tapering toward one end, usually split longitudinally, roughly scarred with remains of the stipe-bases, or bearing several coarse longitudinal ridges and grooves, stipes cylindrical, 3 to 5 cm. in length, about 6 mm. in thickness, nearly straight, or somewhat curved, tapering toward one end, and with occasional elongated patches of the still-adhering, blackish-brown outer-layers; fracture short, pale green in the inner half, the texture rather spongy, and exhibiting in an interrupted circle from 6 to 12 vascular bundles, each surrounded with an endodermis; odor slight; taste sweetish, astringent, bitter and acrid. Ash not exceeding 3 percent.

Aurantii Amari Cortex.—Rind from "unripe" fruit of Citrus Aurantium amara Linné. In narrow, thin bands (ribbons), or more often elliptical, flattened, more or less curved pieces (quarters), varying from 3 to 6 cm. in length; outer surface convex; varying from reddish-brown (ribbons) to greenish-brown (quarters), coarsely reticulate and with the edges recurved; inner surface concave, whitish, with numerous conical projections and yellowish-white, linear, more or less anastomosing, fibro-vascular bundles; fracture hard; cross section light brown, somewhat spongy, outer layer with 1 or 2 rows of oil reservoirs; odor fragrant; taste aromatic and bitter. Powder: Yellowish-white or light brown; fragments of parenchyma cells numerous, the walls from 0.004 to 0.012 mm. in thickness; few fragments of tracheæ with close spiral markings or simple pores; occasional membrane crystals of calcium oxalate in monoclinic prisms, from 0.020 to 0.035 mm. in diameter. Powdered Bitter Orange Peel should be colored yellowish upon the addition of potassium hydroxide T. S. Ash not exceeding 7 percent.

Aurantii Dulcis Cortex.—The outer rind of the fresh, ripe fruit of Citrus Aurantium sinensis Gallesio (Fam. Rutaceæ). The outer, orange-yellow layer recently separated by grating or paring and consisting of epidermal cells, parenchyma cells of the sarcocarp, with chromoplastids, oil reservoirs and globules of volatile oil; odor highly fragrant; taste pungently aromatic.

Belladonnæ Folia.—The dried leaves and tops with not more than 10 percent. of stems; usually much twisted and matted together; leaves much crumpled, when soaked in water and spread out, from 6 to 20 cm. in length, 4 to 12 cm. in breadth, broadly ovate, summits acute, margins entire, narrowed into the long petioles; upper surfaces brownish-green; lower surfaces grayish-green, epidermis more or less papillose and slightly hairy; flowers with yellowish-purple, campanulate corollas; fruits globular; fruits dark green or greenish-brown, subtended by a dark green calyx, and with numerous small seeds; odor distinct, heavy, especially on moistening; taste somewhat bitter and acrid. Stems of variable length, not exceeding 7 mm. in diameter, longitudinally wrinkled, older parts smooth and usually hollow, younger parts flattened and finely hairy. Powder: Dark green, consisting of irregular fragments of leaf tissues and woody elements, calcium oxalate in sphenoidal micro-crystals; hairs few, the non-glandular being simple 2- to 5-celled, and the glandular with stalks of 1 to 3 cells; tracheæ with annular, spiral, scalariform or reticulate thickenings and with bordered pores; starch grains and pollen grains few; occasional fragments of the stems of Belladonna with long, thin-walled and slightly lignified bast-fibers.

Raphides should not be present (leaves and stems of Phytolacca decandra Linné). Ash not exceeding 20 percent.

Belladonnæ Radix.—The dried root with not more than 10 percent. of its stem-bases; cylindrical or somewhat tapering, usually split into longitudinal pieces, of 0.5 to 2.5 cm. in thickness; externally pale brownish-gray, longitudinally wrinkled, outer layers of the periderm rather soft, frequently abraded, and thus showing lighter patches; fracture nearly smooth, mealy, and emitting a characteristic puff of dust consisting chiefly of starch grains; internally whitish, with a distinct cambium zone and yellowish wood wedges; nearly inodorous; taste sweetish, afterwards bitterish and strongly acrid. Transverse sections of Belladonna Root, when moistened with iodine T. S., should be colored bluish-black and by transmitted light should show an imperfectly radiate structure within and near a conspicuous cambium line. Under the microscope sections exhibit a bark and wood composed mainly of parenchyma, the cells being filled with starch grains, single and 2- to 6- or more compound, the individual grains being somewhat spherical and from 0.003 to 0.030 mm. in diameter. A section cleared with hydrated chloral T. S. should show occasional cells of parenchyma filled with sphenoidal micro-crystals of calcium oxalate in both bark and wood; bark free from bast-fibers; wood containing scattered groups of large tracheæ with simple and bordered pores or reticulated thickenings, and associated in older roots with wood-fibers. Stem fragments of Atropa Belladonna occur either separate or attached to the roots, light brown or greenish-brown, finely, longitudinally wrinkled, with transverse leaf-scars, pith frequently hollow. Under the microscope sections of Belladonna stem show an outer epidermis with slightly cuticularized walls; a primary cortex of parenchyma, the cells being separated by large, intercellular spaces; an endodermis, beneath which occur in an interrupted circle bast-fibers either singly or in small groups, the walls of which are relatively thin and slightly lignified; a few layers of sieve; a central cylinder of a few tracheæ with numerous wood-fibers; an internal phloem with isolated, small groups of bast-fibers similar to those found in the inner bark; pith, if present, with large irregular parenchyma cells. Powder: Light-brown; starch grains numerous, from 0.003 to 0.030 mm. in diameter, spherical, plano-convex, polygonal, and 2- to 6- or more compound; sphenoidal micro-crystals numerous, from 0.003 to 0.010 mm. in length; fragments of cork cells and tracheæ with wood-fibers few. Occasional fragments of stems of Belladonna showing long thin-walled and slightly lignified bast-fibers. Ash not exceeding 7 percent.

Benzoinum.—A balsamic resin obtained from Styrax Benzoin Dryander, and other species of Stryax (Fam. Styraceæ) growing in the East Indies, and known in commerce as Sumatra Benzoin and Siam Benzoin. Sumatra Benzoin: In blocks or lumps of varying size, made up of tears, compacted together with a reddish-brown, reddish-gray, or grayish-brown resinous mass; tears externally yellowish or rusty-brown, milky-white on fresh fracture; very hard, becoming soft on warming; odor aromatic, upon digesting with boiling water, suggesting the odor of cinnamic acid or storax; taste aromatic and slightly acrid, the resin gritty on chewing. Heat a few fragments of Sumatra Benzoin in a test-tube; a sublimate should be formed consisting of plates and small, rod-like crystals that strongly polarize light. Add carefully an ethereal solution of Sumatra Benzoin

to a small quantity of sulphuric acid contained in a porcelain dish; the solution should be colored a brownish-red. Not less than 75 percent. of Sumatra Benzoin should dissolve in alcohol; the alcoholic solution, upon the addition of water, should become milky and give an acid reaction to litmus. Ash not exceeding 2.5 percent. Siam Benzoin: In pebble-like tears of variable size, compressed, yellowish-brown to rusty-brown externally, milky-white on fracture, separate or very slightly agglutinated; fracture short; odor agreeable, balsamic, vanilla-like; taste slightly acrid, the resin becoming plastic on chewing. Heat a few fragments of Siam Benzoin in a test-tube; a sublimate should be formed directly above the melted mass consisting of numerous, long, rod-shaped crystals, which do not strongly polarize light. Add carefully an ethereal solution of Siam Benzoin to a small quantity of sulphuric acid contained in a porcelain dish; the solution should be colored purplish-red. Not less than 90 percent. of Siam Benzoin should dissolve in alcohol; the alcoholic solution upon the addition of water should become milky and give an acid reaction to litmus. Ash not exceeding 2 percent. The tests which follow apply to both Sumatra and Siam Benzoin: Heat gently 1 to 2 Gm. of either Sumatra or Siam Benzoin with 15 Cc. of petroleum benzin, and after cooling transfer the supernatant liquid to a separator. Wash with 10 Cc. of a saturated aqueous solution of sodium bicarbonate, draw off and discard the aqueous layer and then wash the mixture in the separator with water until it is free from bicarbonate. On adding 20 Cc. of an aqueous solution of copper acetate (1 in 200) and vigorously shaking the mixture, no green color should be observed in the petroleum benzin layer (rosin and foreign resins). Treat 1 Gm. of powdered Benzoin with 15 Cc. of warm carbon disulphide, filter the solution, wash the filter with an additional 5 Cc. of carbon disulphide and allow the mixed liquids to evaporate spontaneously. A residue, weighing not less than 0.125 Gm. and corresponding to the identification tests under Acidum Benzoicum, should remain.

Buchu.—The dried leaves of Barosma betulina (Thunberg) Bartling and Wendland, known in commerce as Short Buchu; or of Barosma serratifolia (Curtis) Willdenow, known in commerce as Long Buchu (Fam. Rutaceæ), with not more than 10 percent. of stems and other foreign matter. Short Buchu: Rhomboidally oval or obovate; from 9 to 25 mm. in length and 4 to 13 mm. in breadth; summit obtuse, and recurved; margin somewhat serrate or finely dentate with an oil gland at the base of each tooth; the base more or less wedge-shaped; yellowish-green, some being light brown; glandular punctate; both surfaces papillose, under surface longitudinally striate; petiole 1 mm. in length; texture coriaceous; odor and taste characteristic, aromatic and mint-like. Long Buchu: Linear-lanceolate, 2.5 to 4 cm. in length, 4 to 6 mm. in breadth, summit somewhat rounded or truncate with an oil gland at the apex; margin sharply serrate and glandular, otherwise resembling Short Buchu. Stems in both Short and Long Buchu about 1 mm. in diameter, yellowish-green or brownish-red, cylindrical, longitudinally furrowed, with prominent leaf-scars nearly opposite to each other and giving the stems a jointed character. Ash not exceeding 4 percent.

Calumba.—In circular or oval disks attaining a diameter of 9 cm. and seldom exceeding 22 mm. in thickness, or in longitudinal or oblique slices attaining a length of 30 cm., a breadth of 35 mm. and a thickness of 16 mm.; externally brown and roughly wrinkled; cut surface varying from yellowish-brown to gray-

ish-yellow, with a few interrupted circles of fibro-vascular bundles, the transverse slices distinctly radiate in the outer portion and with a dark cambium, central portion often depressed; fracture short, mealy; odor slight; taste slightly aromatic, very bitter. Powder: Greenish-brown to grayish-yellow; starch grains numerous, mostly single, occasionally 2- to 3-compound, the individual grains from 0.003 to 0.085 mm. in the long diameter, ovoid, ellipsoidal, frequently very irregular, slightly lamellated, with an excentral, linear, x-shaped or branching cleft; stone cells few with irregularly thickened, strongly lignified, coarsely porous walls and containing one or more prisms of calcium oxalate 0.010 to 0.030 mm. in length or numerous sphenoidal micro-crystals; fragments with tracheæ few, the latter with reticulate thickenings, or bordered pores, and associated with wood-fibers having long, oblique, slit-like pores. Ash not exceeding 8 percent.

Cambogia.—When rubbed with water it should yield a yellow emulsion becoming darker and almost transparent upon the addition of ammonia water. The emulsion should not turn green upon the addition of iodine T. S. (starch). Powder: Bright yellow, containing few or no starch grains. When mounted in hydrated chloral T. S. and examined under the microscope, the particles, for the most part, should slowly dissolve, leaving scattered fragments of vegetable tissues. Not less than 65 percent. soluble in alcohol. Ash not exceeding 2 percent.

Cannabis.—The dried flowering tops of the pistillate plants of Cannabis sativa Linné, or of the variety indica Lamarck, (Fam. Moraceæ), freed from the thicker stems and large foliage leaves and with not more than 10 percent. of mature fruits (seeds). In dark green, more or less brownish, compressed, and more or less agglutinated, resinous fragments, consisting of the short stems with their leaf-like bracts and pistillate flowers, a few of the latter being sometimes replaced with more or less developed fruits; stems cylindrical, of varying length, not more than 3 mm. in diameter; longitudinally furrowed, light green to light brown, strigose-pubescent; leaves digitately compound; leaflets, when soaked in water and spread out, linear-lanceolate, nearly sessile, margin deeply serrate; bracts ovate, pubescent, each enclosing 1 or 2 pistillate flowers, or more or less developed fruits; calyx dark green, pubescent and somewhat folded around the ovary or fruit; styles 2, filiform and pubescent; ovary with a single campylotropous ovule; fruit light green to light brown, broadly ellipsoidal, about 3.5 mm. in length; finely wrinkled and slightly reticulated; odor agreeably aromatic; taste characteristic. Powder: Dark green, giving a strong effervescence on the addition of dilute hydrochloric acid; numerous sharp-pointed fragments of upper portion of non-glandular hairs; fragments of bracts and leaves showing yellowish-brown laticiferous vessels, rosette aggregates of calcium oxalate and bases of non-glandular hairs; rosette aggregates of calcium oxalate from 0.005 to 0.025 mm. in diameter; non-glandular hairs, unicellular with a very slender pointed apex and a considerably enlarged base containing, usually in the lumen, some calcium carbonate; glandular hairs of two kinds, one with a short one-celled stalk and the other with a multicellular, long, tongue-shaped stalk, the glandular portion being globular and consisting of from 8 to 16 cells; fragments of fruits with palisade-like, non-lignified sclerenchymatous cells, walls yellowish-brown, finely porous and lumina usually containing air; tissues of embryo and endosperm with numer-

ous oil globules and aleurone grains, the latter from 0.005 to 0.010 mm. in diameter and consisting of large crystalloids and globoids. Alcoholic extractive not less than 8 percent.; alcoholic solution bright green in color. Ash not exceeding 15 percent.

Cantharis.—From 15 to 25 mm. in length, 5 to 8 mm. in breadth, oblong, somewhat compressed above; of a brilliant green or bluish-green, metallic luster, changing in different parts, especially beneath, to a golden-green; head triangular, separated into two lateral lobes by a faint median line; mandibles stout and partly concealed; antennæ filiform, of 11 conical joints, the upper ones being black; eyes comparatively small; prothorax angulate; legs with five tarsal joints; wings membraneous and brownish; elytra or wing sheaths each with 2 parallel lines and finely wrinkled; odor strong, disagreeable; taste slight, afterwards acrid. Powder: Grayish-brown, with shining green particles and a number of long, pointed, 1-celled hairs about 0.5 mm. in length and 0.002 mm. in width. Moisture not more than 10 percent. Ash not exceeding 9 percent.

Capsicum.—The fruit may include not more than 2 percent. of stems, calyxes and other foreign matter. Oblong-conical, from 8 to 20 mm. in length and from 2 to 15 mm. in diameter; pericarp brownish-red or orange, shining, membraneous and translucent; 2- or 3-locular, united below, and containing 6 to 17 flat, reniform, yellowish seeds attached to the placenta or frequently separated from it; calyx light greenish-brown, inferior, inconspicuous, 5-toothed, usually attached to a long, straight peduncle; odor characteristic; sternutatory; taste intensely pungent. Powder: Yellowish-brown; mounts made with hydrated chloral T. S. and examined under the microscope show yellowish-red oil globules; stone cells of two kinds, those of endocarp being more or less elongated, walls yellowish, uniformly and moderately thickened, wavy in outline, porous and slightly lignified, those of the seed coat being yellowish, irregularly and strongly thickened, wavy in outline and strongly lignified. Non-volatile ether-extract not less than 15 percent. Total ash not exceeding 7 percent. Ash insoluble in hydrochloric acid, not exceeding 1 percent.

Cardamomi Semen.—The dried seeds of Elettaria Cardamomum White et Maton (Fam. Zingiberaceæ), which should be kept in the capsules until wanted for use. Mostly agglutinated in groups of from 2 to 7, the individual seeds, oblong-ovoid in outline, 3- or irregularly 4-sided, convex on the dorsal surface, strongly longitudinally grooved on one side, from 3 to 4 mm. in length; externally reddish-gray-brown, coarsely tubercled, and with more or less adhering portions of the membraneous aril, moderately hard but easily crushed; in section showing a thin reddish-brown seed coat, a large white perisperm and a central greenish endosperm enclosing a small straight embryo; odor aromatic; taste aromatic, pungent. Capsules broadly or narrowly ellipsoidal, occasionally ovoid, more or less triangular in transverse section, from 10 to 20 mm. in length; externally usually of a pale buff color or whitish or greenish-brown; longitudinally striate; 3-locular; pericarp thin; leathery, and nearly tasteless, enclosing from 10 to 20 seeds. Powder: Greenish-brown; consisting chiefly of coarse, angular fragments of cells of the reserve layers and seed-coat; cells of endosperm and perisperm filled with compound starch grains, the individual grains from 0.001 to 0.004 mm. in diameter; fragments of seed-coat with dark brown stone cells, which are

polygonal in surface view and about 0.020 mm. in diameter; in mounts made with hydrated chloral T. S. single prisms or crystals in rosette aggregates may separate in the cells of the endosperm and perisperm; fragments of spiral tracheæ with accompanying slightly lignified bast-fibers, relatively few. Ash not exceeding 8 percent.

Carum.—Mericarps usually separated, crescent-shaped, from 3 to 7 mm. in length, about 1.5 mm. in diameter; externally dark brown with 5 yellowish filiform ribs; in transverse section nearly equilaterally pentagonal, the commissural surface with two vittæ, the dorsal surface with a vitta between each of the primary ribs; oily endosperm large, enclosing a small embryo; odor and taste agreeably aromatic. Under the microscope transverse sections show an epidermal layer of slightly tangentially elongated cells with thick outer walls; a layer of several rows of tangentially elongated parenchyma cells, frequently more or less collapsed; a single, large, elliptical, brown, vitta or oil-tube between each of the ribs and surrounded by small epithelial or secretion cells; in each of the ribs a single fibro-vascular bundle surrounded by a layer of thick-walled sclerenchymatous fibers; inner epidermis of broadly elongated cells with very thin side-walls being very frequently broken and closely coherent with the more or less brownish, collapsed cells of the seed-coat; commissural surface with 2 large vittæ and at the middle portion 2 large transverse hollow spaces formed by the separation of the tissues of the seed-coat on one side and the pericarp on the other, otherwise the cells resemble those on the dorsal surface; endosperm large, cells polygonal with thick walls and containing a fixed oil and aleurone grains, the latter not infrequently containing a small rosette aggregate or prism of calcium oxalate. Powder: Yellowish-brown, mostly of irregular, angular fragments; cells of endosperm with aleurone grains each usually containing a rosette aggregate of calcium oxalate about 0.001 mm. in diameter; fragments with light yellow vittæ, together with nearly isodiametric or polygonal, yellowish-brown, inner epidermal cells of pericarp; fragments with tracheæ and sclerenchymatous fibers, the latter about 0.010 mm. in width, slightly lignified and with numerous oblique pores. Ash not exceeding 8 percent.

Caryophyllus.—The dried flower-bud of Eugenia aromatica (Linné) O. Kuntze, (Jambosa Caryophyllus) (Sprengel) Niedenzu, (Fam. Myrtaceæ), with not more than 5 percent. of the peduncles, stems and other foreign matter. From 10 to 17.5 mm. in length, of a dark brown or brownish-black color, consisting of a stem-like, solid, inferior ovary, obscurely four-angled or somewhat compressed, terminated by four calyx teeth, and surmounted by a nearly globular head, consisting of four petals, which enclose numerous curved stamens and one style; odor strongly aromatic; taste pungent and aromatic, followed by slight numbness. On pressure Clove emits a volatile oil. Stems either separate or attached to the flower-buds; sub-cylindrical or four-angled, attaining a length of 25 mm., a diameter of 4 mm.; either simple or branching, distinctly jointed and less aromatic than the flower-buds. Powder: Varying from dark brown to reddish-brown; consisting chiefly of cellular fragments showing the large oil reservoirs, spiral tracheæ and a few, somewhat thick-walled, slightly lignified, spindle-shaped bast-fibers; calcium oxalate in rosette aggregates, from 0.010 to 0.015 mm. in diameter; pollen grains numerous, tetrahedral, somewhat ellipsoidal, from 0.015

to 0.020 mm. in diameter. The presence of stems in the powder is shown by stone cells of irregular, polygonal shape, about 0.070 mm. in diameter, with thick porous walls and large lumina, the latter frequently filled with a yellowish-brown amorphous substance. Volatile ether-extract not less than 10 percent. Total ash not exceeding 8 percent. Ash insoluble in hydrochloric acid not exceeding 0.5 percent.

Chondrus.—The dried plant of Chondrus crispus (Linné) Stackhouse and Gigartina mamillosa (Goodenough et Woodward) J. Agardh (Fam. Gigartinaceæ). Entire plants more or less matted together, consisting of a slender stalk from which arises a series of dichotomously branching, more or less flattened segments, emarginate or deeply cleft at the tips; 5 to 15 cm. in length, segments 1 to 10 mm. in width; yellowish-white, translucent, frequently coated with a calareous organic deposit which effervesces with hydrochloric acid; sometimes with fruit bodies or sporangia embedded near the apex of the segments in C. crispus or with sporangia borne on short, tuberculated projections or stalks, more or less scattered over the upper portion of the segments in G. mamillosa, somewhat cartilaginous; odor slight; taste mucilaginous, saline. Boil one part of Chondrus for about ten minutes with 30 parts of water and replace the water lost by evaporation; the solutions should form a thick jelly upon cooling. When softened in cold water Chondrus should become gelatinous, and transparent, the thallus remaining nearly smooth and uniform and not swollen except slightly at the tips; a solution made by boiling 0.300 Gm. in 100 Cc. of water and filtering gives no precipitate on the addition of tannic acid T. S. (gelatin), and does not give a blue color when cold, upon the addition of iodine T. S. (starch).

Cimicifuga.—The drug may include not more than 2 percent. of stems and foreign matter. Rhizome horizontal, more or less branching, from 2 to 12 cm. in length, from 1 to 2.5 cm. in thickness; externally dark brown, slightly annulate from circular scars of bud-scale leaves, the upper surface with numerous stout, erect or somewhat curved branches terminated by deep cup-shaped scars each of which usually shows a distinct radiate structure; interior and lateral portions with numerous root-scars and a few short roots; fracture horny; internally whitish and mealy or dark brown and waxy, bark thin, wood distinctly radiate and of about the same thickness as the pith; odor slight; taste bitter and acrid. Roots somewhat cylindrical or obtusely quadrangular, 1 to 3 mm. in thickness, externally dark brown, longitudinally wrinkled, fracture short; internally, bark dark brown, wood yellowish, 4- to 6-rayed. Under the microscope sections of the rhizome show a yellowish-brown suberized epidermis, a cortex made up of about 30 layers of starch-bearing parenchyma cells; fibro-vascular bundles, collateral, the xylem consisting of tracheæ, with bordered pores, and resembling tracheids in that the ends are rather acute; wood-fibers numerous, thin-walled, strongly lignified and with simple, oblique pores; the bundles separated by starch-bearing parenchyma strands from 5 to 30 cells wide; pith cells numerous, resembling those of the cortex. Under the microscope sections of the roots show a hairy epidermis, which becomes suberized in older roots; the cortex shows about 12 rows of starch-bearing parenchyma cells; endodermis distinct; fibro-vascular bundles 4 to 6, showing in older roots as separate collateral bundles. Powder: Light to dark brown; starch grains numerous, single or compound, the individual grains spherical or more or less polygonal, each with a somewhat central cleft, from

0.003 to 0.015 mm. in diameter; fragments showing tracheæ with bordered pores and lignified wood-fibers; irregular, yellowish-brown fragments of suberized epidermis made up of more or less tabular cells, sometimes elongated and considerably thickened. Ash not exceeding 10 percent.

Cinchona.—Added to the former description: Externally the bark usually shows patches of foliaceous lichens with their small, brownish-black apothecia. Powder: Reddish-brown; bast-fibers spindle-shaped, yellowish, 0.300 to 1.350 mm. in length, with thick, strongly lignified, lamellated walls having slit-like, oblique pores; starch grains single, 2- to 5-compound, the individual grains spherical or plano-convex and from 0.003 to 0.015 mm. in diameter; sphenoidal micro-crystals of calcium oxalate numerous. Heat 1 Gm. of powdered Cinchona in a dry test-tube; a tarry distillate should form, having a purplish-red color and a somewhat granular appearance.

Cinchona Rubra.—In quills or curved pieces of variable length, bark from 2 to 4 mm. in thickness; or in small broken fragments or in transversely curved pieces from 3 to 7 mm. in thickness; externally gray or grayish-brown, more or less rough from corky protuberances, sometimes with transverse fissures, rarely numerous or much intersected, and having their sides sloping and with occasional patches of foliaceous lichens; inner surface reddish- or orange-brown, distinctly striate; fracture short and granular in the outer bark, shortly and rather coarsely splintery in the inner bark; slightly odorous; taste very bitter and astringent. Powder: Light brown; bast-fibers and sphenoidal micro-crystals of calcium oxalate resembling those in Cinchona; starch grains resembling those of Cinchona, relatively few, from 0.003 to 0.010 mm. in diameter. Heat 1 Gm. of powdered Red Cinchona in a dry test-tube; a tarry distillate should form, having a bright red color.

Cinnamomum Saigonicum.—In quills attaining a length of 30 cm. and from 3 to 30 mm. in diameter; the bark from 0.5 to 3 mm. in thickness; outer surface light brown to dark purplish-brown with grayish patches of foliaceous lichens, numerous bud-scars, finely wrinkled, especially the bark of younger twigs, otherwise more or less rough from corky patches surrounding the lenticels; inner surface reddish-brown to dark brown, granular, and slightly striate; fracture short; inner bark porous, owing to the presence of large oil cells; and separated by a continuous layer of stone cells from the outer bark. Odor aromatic; taste sweetish, aromatic and pungent. Under the microscope sections of the older bark show a thin layer of more or less lignified cork cells; a narrow layer of starch-bearing parenchyma with scattered stone cells; a nearly continuous zone, several layers wide, of stone cells, among which should be small groups of bast-fibers with thickened and slightly lignified walls; a wide inner bark with medullary rays 1 to 3 cells in width, isolated bast-fibers, mucilage cells, oil cells and parenchyma, the cells of the latter either filled with starch grains or containing very small raphides of calcium oxalate; the lumina of parenchyma cells, stone cells and bast-fibers frequently filled with an amorphous, reddish-brown substance, which should be for the most part insoluble in the ordinary reagents. In the bark of young twigs there should be an epidermal layer with a thick, yellowish cuticle, fewer stone cells in the zone associated with bast-fibers, and the inner bark should be narrower and with fewer secretion cells than in the older bark. Powder: Yellow-

ish- or reddish-brown; starch grains numerous, single or compound, the individual grains being somewhat ellipsoidal or polygonal and from 0.003 to 0.020 mm. in diameter; fragments, with colorless stone cells rather prominent, the cells being very irregular in shape and the lumina containing either air or a reddish-brown amorphous substance; bast-fibers from 0.300 to 1.500 mm. in length and usually in groups of from 2 to 20, with very thick and scarcely lignified walls; numerous cellular, reddish-brown fragments in which the oil cells are not readily distinguishable. Volatile ether-extract not less than 2 percent. Total ash not exceeding 6 percent. Ash insoluble in diluted hydrochloric acid not exceeding 2 percent.

Cinnamomum Zeylanicum.—The dried bark of cultivated trees of Cinnamomum zeylanicum Breyne (Fam. Lauraceæ) with not more than 3 percent. of the outer bark. In closely rolled double quills, composed of from 7 to 12 thin layers of separate pieces of bark, from 30 to 50 cm. in length and from 8 to 13 mm. in diameter; the bark attaining a thickness of 1 mm.; outer surface pale yellowish-brown, smooth, longitudinally striate with narrow yellowish groups of bast-fibers, and showing circular or irregular brownish patches, occasionally with perforations marking the nodes; inner surface light brown, with faint, longitudinal striations; fracture short with projecting bast-fibers; odor agreeably aromatic; taste sweetish and warmly aromatic. Under the microscope sections usually show no cork but an almost continuous outer layer of stone cells, among which are small groups of bast-fibers resembling those found in Saigon Cinnamon; in the inner bark occur numerous bast-fibers singly or in small groups, medullary rays 1 to 2 cells in width, usually with raphides of calcium oxalate; parenchyma with either reddish-brown contents or more or less filled with starch grains; scattered throughout the parenchyma occur oil-secretion cells and mucilage cells. Powder: Light brown or yellowish-brown; starch grains numerous, varying from spherical to polygonal, from 0.003 to 0.020 mm. in diameter, frequently in small aggregates; bast-fibers from 0.300 to 0.800 mm. in length, usually single, spindle-shaped with attenuated ends, the walls being very thick and but slightly lignified; colorless stone cells resembling those of Saigon Cinnamon; numerous cellular fragments with yellowish-brown walls or contents; cork cells few or none; calcium oxalate in raphides from 0.005 to 0.008 mm. in length. Volatile ether-extract not less than 0.5 percent. Total ash not exceeding 6 percent. Ash insoluble in diluted hydrochloric acid, not exceeding 2 percent.

Coccus.—The dried female insect enclosing her young larvæ, Coccus Cacti Linné (Fam. Coccidæ). Somewhat ovate in outline, convex above, concave beneath, from 3.5 to 5 mm. in length, consisting of from 9 to 12 segments; externally grayish-purple, or grayish; in the shell-like, somewhat horny abdomen lie numerous larvæ less than 1 mm. in size; the mature larvæ with antennæ consisting of eight parts, 3 pairs of legs, the lower being with 6 to 8 segments, and a characteristic beak or rostrum composed of 4 thread-like parts which pair off into two coils. Cochineal is easily pulverizable and yields a dark red powder; with a characteristic odor and slightly bitter taste. When masticated it colors the saliva red, due to the coloring principle, carminic acid, which is soluble in water, alcohol, or alkalies, and slightly soluble in ether, but insoluble in fixed and volatile oils. Alkalies should change the color of solutions of Cochineal to purple, while acids

should change the color to reddish-yellow. When macerated in water no insoluble powder should separate. Ash not exceeding 6 percent.

Colchici Cormus.—Usually in reniform transverse, or in ovate longitudinal slices; from 2 to 5 mm. in thickness; flat surfaces whitish, slightly roughened, and of a crystalline appearance under the hand lens; epidermal surface thin, light brown and finely wrinkled; fracture short and mealy, odor slight; taste bitter and acrid. Powder: Light brown or grayish-brown; starch grains numerous, single or 2- to 6- compound, the individual grains varying from spherical or ovoid to polygonal, and marked with a triangular or star-shaped, central cleft from 0.003 to 0.030 mm. in diameter, tracheæ few and with spiral or scalariform thickenings; occasional fragments of epidermal cells with thin, reddish-brown walls.

Colchici Semen.—The seeds should be dried; ovoid or irregularly globular, more or less pointed at the hilum, from 2 to 3 mm. in diameter; when fresh, several seeds cohering; externally dark brown, finely pitted; tough and of almost bony hardness; internally whitish or light brown; nearly inodorous; taste slightly bitter and somewhat acrid. Under the microscope transverse sections show a seed-coat of a few, more or less collapsed cells with thin reddish-brown walls; the endosperm, making up most of the seed, should consist of cells with rather thick, porous walls; and the lumina containing oil globules and aleurone grains, the latter being from 0.003 to 0.015 mm. in diameter; the embryo is small, the beaked portion, or caruncle, containing numerous, somewhat ovoid, ellipsoidal or polygonal starch grains, from 0.005 to 0.016 mm. in diameter. Ash not exceeding 8 percent.

Colocynthis.—The dried pulp of the fruit of Citrullus Colocynthis Schrader (Fam. Cucurbitaceæ), with not more than 5 percent. of seeds, nor more than 2 percent. of epicarp. Nearly globular, whole fruits from 4 to 7 cm. in diameter, usually more or less crushed and in broken pieces, with occasional patches of the nearly smooth epicarp; yellowish-white or brownish; light, spongy; separable longitudinally when entire into three carpels, each containing near the outer surface, the ovoid, compressed, yellowish seeds; odor slight; taste intensely bitter. Powder: In the preparation of the powder the fruit should be deprived of its seeds so that the finished product should contain not more than 5 percent. of seeds; yellowish-white or buff, consisting chiefly of fragments of parenchyma cells and an occasional fragment with tracheæ; very few lignified tissues of the seed-coat, showing the characteristic stone cells which are nearly isodiametric, irregular, with either straight or undulate walls that are strongly lignified and possess simple pores; globules of fixed oil and aleurone grains very few. The petroleum benzin extract from powdered Colocynth should yield not more than 2 percent. of fixed oil. Ash not exceeding 15 percent.

Condurango.—The dried bark of Marsdenia Condurango Reichenbach filius, (Fam. Asclepiadaceæ). In single quills or transversely curved pieces, usually from 4 to 13.5 cm. in length, bark from 1 to 6 mm. in thickness; outer surface light grayish-brown to dark brown, nearly smooth and with numerous lenticels, or more or less scaly and considerably roughened, the scales soft, occasionally with brownish-black apothecia of a fungus; inner surface grayish-white or light brown, longitudinally striate; fracture short and granular or short-fibrous; odor slightly aromatic, especially marked in the fresh drug; taste bitter and aromatic. Under

the microscope sections show a corky layer consisting of several rows of thin-walled cells, frequently with yellowish-brown contents; a layer of phelloderm of 8 to 10 rows of cells, containing either starch grains or membrane crystals of calcium oxalate, the latter in prisms from 0.010 to 0.035 mm. in length; a primary cortex of collenchyma containing chloroplasts, starch grains, or rosette aggregates of calcium oxalate from 0.015 to 0.040 mm. in diameter; a pericycle or pericambium of tangentially elongated parenchyma cells, with groups of bast-fibers and laticiferous vessels in an interrupted circle; middle bark with large groups of stone cells, varying from nearly isodiametric to elongated, sometimes very irregular in form; inner bark with medullary rays 1 to 2 cells wide, numerous laticiferous cells accompanied by small groups of sieve cells, parenchyma containing either starch grains or rosette aggregates of calcium oxalate, and an occasional isolated bast-fiber or small groups of stone cells. Powder: Light yellowish-brown; consisting chiefly of fragments of stone cells and parenchyma containing calcium oxalate crystals and starch grains; stone cells chiefly in large groups, the individual cells being more or less irregular in shape with very thick, porous walls, the lumina being usually filled with air; calcium oxalate chiefly in rosette aggregates, occasionally in single prisms, mostly from 0.015 to 0.020 mm. in diameter; starch grains mostly single, frequently 2- to 4-compound, the individual grains being from 0.003 to 0.015 mm. in diameter; bast-fibers non-lignified, very long and from 0.010 to 0.035 mm. in width; fragments of thin-walled latex tubes from 0.015 to 0.025 mm. in diameter and filled with a granular substance; fragments of cork grayish- or light yellowish-brown. Macerate 1 Gm. of the powdered bark in 5 Cc. of cold water, filter and heat the filtrate in a test-tube; it should become very cloudy but on cooling assumes its original transparency. Ash not exceeding 12 percent.

Convallaria.—Rhizome horizontal, elongated, usually branched, cylindrical, variable in length, from 1 to 3 mm. in diameter; externally yellowish-white or pale-brown, with a few circular stem-scars; from the under and side portions at the nodes usually arise from 3 to 5 thin, tortuous, dark brown, branching roots; fracture short or fibrous; internally whitish; odor faint; taste sweetish, becoming bitter and acrid. Under the microscope sections of the rhizome show an epidermal layer with a thick outer layer of cutin; a hypodermal layer of a single row of collenchyma; a cortex made up of about 20 rows of parenchyma cells some of which contain starch and raphides of calcium oxalate; a prominent endodermis, the radial and inner walls of which are strongly thickened and lignified; inside the endodermis is an interrupted circle of collateral fibro-vascular bundles, the woody portion of which should be in cross section the shape of the letter "V"; inside this circle of bundles is another interrupted circle of fibro-vascular bundles of the concentric type, the sieve tissue being surrounded by the xylem; the parenchyma cells of the pith are separated by large intercellular spaces. Under the microscope transverse sections of the root show a hairy epidermal layer, a hypodermis of a single row of cells, a cortex of about 6 rows of cells, some of which should contain starch, raphides and oil; the cells of the endodermal layer resemble those of the rhizome; fibro-vascular bundles mostly 5. Powder: Dark brown, tending to cake on standing, consisting chiefly of cellular fragments and a few starch grains and raphides of calcium oxalate; cells of endodermis quite long

with slightly oblique ends; the walls being considerably thickened, lignified and porous; fragments of tracheæ with spiral and scalariform thickenings or with porous walls; starch grains single or compound, mostly nearly spherical, and from 0.003 to 0.012 mm. in diameter; raphides of calcium oxalate few, from 0.020 to 0.045 mm. in length.

Coriandrum.—The fruit should contain not more than 5 percent. of other fruits, seeds and other foreign matter. Mericarps usually coherent; cremocarp nearly globular, from 3 to 5 mm. in diameter; externally light brown or rose colored; summit with 5 calyx teeth and a short stylopodium, each mericarp with 5 prominent, straight, longitudinal primary ribs and 4 indistinct, undulate, secondary ribs; mericarps easily separated, deeply concave on the inner or commissural surface and showing in transverse section 2 vittæ (oil-tubes) on the inner surface of each. Under the microscope sections show an epidermis of small cells with thick walls; a layer of several rows of thin-walled, more or less collapsed, parenchyma separated from a broad zone of strongly lignified sclerenchymatous fibers which extend as a continuous ring in the mesocarp of each of the mericarps; 2 or 3 layers of large, tangentially elongated, thin-walled, parenchyma cells, frequently with numerous, large, lysigenous, intercellular spaces; inner epidermis of large, tabular cells, the inner, yellowish walls being considerably thickened and closely coherent to the brownish cells of the seed-coat; commissural surface with 2 large elliptical vittæ, the cells of the pericarp separated from the seed-coat and forming a large elliptical cavity; endosperm distinctly reniform in outline and consisting of tabular or polygonal, thick-walled cells, containing numerous large aleurone grains each with a rosette aggregate or prism of calcium oxalate. Powder: Light brown, consisting chiefly of fragments of endosperm and lignified tissues of the pericarp; calcium oxalate crystals numerous, from 0.003 to 0.010 mm. in diameter, mostly in rosette aggregates, either isolated or in aleurone grains; sclerenchymatous fibers irregularly curved, having thick, yellowish, lignified walls and numerous simple pores; globules of fixed oil numerous; fragments of light-yellow vittæ few, associated with elongated, polygonal, epidermal cells. Volatile ether-extract not less than 0.5 percent. Ash not exceeding 7.5 percent.

Cubeba.—The dried, full grown, unripe fruits of Piper Cubeba Linné filius (Fam. Piperaceæ), with not more than 5 percent. of stems and other foreign matter. Upper portion globular, 3 to 6 mm. in diameter, with a straight, slender, stem-like portion from 5 to 7 mm. in length; pericarp externally grayish, brownish- or bluish-black; coarsely reticulate; about 0.3 mm. in thickness, easily cut, 1-locular, 1-seeded; the immature seed attached at the base of the pericarp; odor aromatic, distinct; taste strongly aromatic and pungent. Under the microscope sections show an epidermal layer of tabular cells with thickened, undulate outer walls, the contents being olive-green; 1 or 2 rows of parenchyma cells, the contents resembling those of the epidermal cells; a continuous layer of radiately elongated, thick-walled stone cells, having numerous pores; a few layers of collapsed cells near which may occur an occasional small group of bast-fibers; a middle layer of 10 rows of cells composed chiefly of parenchyma, scattered among which are numerous secretion cells containing a volatile oil and occasionally crystals in the form of short rods, the contents of the secretion cells being colored a deep crimson upon the addition of sulphuric acid; an endocarp of small, somewhat isodia-

metric or polygonal stone cells with very thick, porous walls; seed-coat of several rows of reddish-brown, tangentially elongated, more or less collapsed cells; perisperm of numerous, thin-walled parenchyma, the cells being more or less polygonal in shape and containing either small, compound starch grains, or globules of a fixed oil or occasionally a crystal of calcium oxalate. Powder: Light brown to blackish-brown, consisting of a more or less even distribution of starch-bearing cells of the perisperm, and fragments of the pericarp with stone cells; starch grains numerous, single or compound, from 0.002 to 0.012 mm. in diameter; stone cells numerous, in palisade-like groups, in surface view rounded or polygonal with rather prominent dark lumina and yellowish porous walls; secretion cells with a yellowish, oily content becoming reddish on the addition of sulphuric acid; fragments of stalk few, with spiral tracheæ and groups of sclerenchymatic fibers from 0.050 to 1.000 mm. in length with blunt, rounded, or very much attenuated ends, the walls strongly lignified and with numerous oblique pores. Volatile ether-extract not less than 10 percent. Total ash not exceeding 8 percent.

Digitalis.—The dried leaves of Digitalis purpurea Linné (Fam. Scrophulariaceæ) with not more than 2 percent. of stems, flowers, and other foreign matter; leaves when entire attaining a length of 30 cm. and a breadth of 15 cm., ovate to oval, abruptly contracted into winged petioles, the latter from 5 to 10 cm. in length, or, in the smaller leaves, nearly absent; margin crenate, irregular; the commercial article usually more or less crumpled and broken, thin, dull, pale green or gray and densely pubescent on the lower surfaces; upper surfaces wrinkled, sparsely hairy; the venation conspicuously reticulated; the midribs and principal veins broad and flat, often purplish, the lower veins continued into the wings of the petioles; odor slight, characteristic; taste strongly bitter. Powder: Dark green, with numerous fragments of non-glandular hairs consisting of from 2 to 8 cells (usually 2 to 5 cells), varying in length from 0.145 to 0.435 mm., some of the cells being frequently collapsed; glandular hairs few, small, with a 1- or 2-celled stalk and a 1- or 2-celled glandular head; numerous irregular fragments of lumina showing stomata and occasional water-pores and elongated fragments of veins and petioles showing fibro-vascular tissues. Ash not exceeding 10 percent.

Ergota.—The carefully dried sclerotium of Claviceps purpurea (Fries) Tulasne (Fam. Hypocreaceæ), replacing the grain of rye, Secale cereale Linné (Fam. Gramineæ), with not more than 5 percent. of harmless seeds, fruits and other foreign matter. Cylindraceous, obscurely three-angled, tapering towards both ends, obtuse, somewhat curved, from 1 to 4.5 cm. in length and 3 to 5 mm. in thickness; externally purplish-black, or brownish-black, longitudinally furrowed; fracture short, pinkish or reddish-white, sometimes whitish; odor peculiar, disagreeable; taste disagreeable, bitter. Pour hot water on bruised Ergot; no ammoniacal or rancid odor should be developed. Powder: Grayish-brown, consisting chiefly of whitish fragments composed of false parenchyma of compacted hyphæ and a few purplish colored fragments of the outer layer of the sclerotium; mounts made in hydrated chloral T. S. or in sulphuric acid show the separation of numerous globules of a fixed oil and many of the fragments should be colored yellowish, reddish or rose-purple. Ash not exceeding 5 percent.

Ergot should be dried at a temperature not exceeding 70° C. The drug deteriorates with age if improperly stored. It should be kept in tightly closed containers protected from the light and to which a few drops of chloroform should be added from time to time to prevent attack by insects. The powdered drug should not be kept longer than one year.

Eriodictyon.—The leaves may include not more than 5 percent. of stems or other foreign matter. Usually in fragments; when entire, laminae lanceolate, 5 to 15 cm. in length, 1 to 3 cm. in breadth; summits acute; bases slightly tapering into a short petiole; margins irregularly serrate or crenate-dentate; upper surfaces yellowish-brown, covered with a more or less shiny resin; under surfaces grayish or yellowish-white, conspicuously reticulate with greenish-yellow veins; minutely tomentose between the reticulations; coriaceous, brittle; odor aromatic; taste balsamic, bitter, becoming sweetish. Under the microscope transverse sections of the laminae of Eriodictyon show upon the upper surface large epidermal cells, the outer walls being very uneven owing to indentations which appear as striations in surface view; glandular hairs numerous, with short 1-celled stalks and 6- to 8-celled glandular heads; palisade cells very narrow, from 2 to 6 rows deep containing numerous chloroplastids; cells of dorsal-pneumatic tissue (loose mesophyll) very few; fibro-vascular tissues not strongly developed except in the mid-rib and more prominent veins; numerous, 1-celled, much twisted, thick-walled, non-glandular hairs on the lower surface between the veins. Under the microscope sections of the stems show the epidermis usually replaced by strongly lignified cork; cortex of from 10 to 20 rows of more or less rounded cells; bast-fibers deep-seated and with thick, more or less strongly lignified walls, occurring in small groups forming a more or less interrupted circle; sieve tissues in a narrow zone; wood wedges consisting of tracheæ with spiral thickenings, simple or bordered pores and numerous, strongly lignified wood-fibers, separated by medullary rays 1-cell in width; pith very large, the walls of the cells being strongly lignified and with numerous simple pores.

Eucalyptus.—The leaves may include not more than 3 percent. of the stems, fruits, and other foreign matter. Laminae lanceolately scythe-shaped, from 8 to 30 cm. in length, from 2 to 7.5 cm. in breadth; summits when present acute or acuminate; bases unequal, obtuse or more or less rounded and connected with twisted petioles from 5 to 35 mm. in length; margins slightly uneven, revolute; coriaceous; both surfaces varying from pale yellowish-green to grayish-green and more or less glaucous, glabrous, glandular-punctate and with numerous, small circular, brown dots of cork; veins of the first order anastomosing with each other and forming a line nearly parallel with the margin; odor slightly aromatic; taste aromatic, bitter, and cooling. Under the microscope sections show the upper and lower surfaces with nearly similar cells, the outer walls being strongly cuticularized; stomata occur on both surfaces; a region of palisade cells made up of from 3 to 4 rows of cells occurring beneath each surface; among the palisade cells occur large oil-secretion reservoirs, with a yellowish or orange colored oily content; calcium oxalate crystals in cells of the loose mesophyll in the form of rosette aggregates or monoclinic prisms varying from 0.015 to 0.025 mm. in diameter. At the periphery of the fibro-vascular

bundles of the mid-rib and petiole occurs a more or less interrupted circle of small groups of slightly lignified bast-fibers.

Euonymus.—The bark may include not more than 3 percent. of wood and other foreign matter. Usually in transversely curved pieces, occasionally in single quills 2 to 7 cm. in length; bark 1 to 2.5 mm. in thickness; very light in weight; outer surface grayish or light brown, somewhat wrinkled, occasionally transversely fissured from the lenticels and with scale-patches of soft cork; inner surface grayish-white, longitudinally striate and somewhat porous; fracture short with silky, projecting, bast-fibers; odor distinct; taste bitter and acrid. Powder: Light brown; starch grains numerous, nearly spherical, 0.003 to 0.012 mm. in diameter; fragments of cork with nearly colorless thin walls; secretion cells with yellowish or brownish amorphous contents; bast-fibers very long, with thin, non-lignified walls possessing numerous small, more or less oblique pores; numerous fragments of starch-bearing parenchyma; calcium oxalate in rosette aggregates from 0.015 to 0.035 mm. in diameter, the amount in different specimens showing some variation.

Fœniculum.—The dried ripe fruits of cultivated varieties of Fœniculum vulgare Miller (Fam. Umbelliferæ), with not more than 2 percent. of harmless foreign matter. Mericarps usually separate, each being broadly elliptical, more or less curved, from 4 to 10 mm. in length, from 1 to 3.5 mm. in breadth, some having a slender stalk from 2 to 10 mm. in length; dorsal surface convex, yellowish-green to grayish-brown, with three prominent, longitudinal primary ribs and at the summit a short, conical stylopodium; commissural surface with three narrow, light brown, longitudinal areas separated by two dark brown or brownish-black areas containing the vittæ or oil-tubes; odor and taste aromatic and distinct. Under the microscope transverse sections of Fennel show a pentagonal mericarp, 4 of the edges being nearly equal and slightly concaved, the other or commissural surface being much longer and more or less undulate; cells of the seed-coat closely united with those of the pericarp, giving the section two very distinct areas, the inner and larger portion more or less rounded-pentagonal and somewhat reniform, composed of polygonal cells, filled with aleurone grains containing rosette aggregates of calcium oxalate, and a thin protoplasmic layer enclosing a fixed oil; the outer or pericarp layer distinguished by large elliptical vittæ with thick, brown walls, occurring singly and alternating with the primary ribs, and two vittæ on the dorsal surface, making usually six vittæ in all, there sometimes being, however, one or two vittæ additional; in the central portion of each of the ribs occurs a nearly circular, fibro-vascular bundle with a few tracheæ and numerous, thin-walled, strongly lignified, sclerenchymatous fibers. Powder: Yellowish-brown consisting or irregular, angular fragments; tissues of endosperm, colorless, the cells filled with aleurone grains each containing a rosette aggregate of calcium oxalate, about 0.002 mm. in diameter; fragments containing yellowish-brown vittæ, from 0.100 to 0.200 mm. in width; sclerenchymatous fibers few, strongly lignified and with numerous, oblique, simple pores; parenchyma cells with more or less thick walls and simple pores and occasionally reticulately thickened; tracheæ few and either spiral or annular; in mounts made with hydrated chloral T. S. numerous globules of a fixed oil separate. Ash not exceeding 10 percent.

Frangula.—The dried bark of Rhamnus Frangula Linné (Fam. Rhamnaceæ). In quills varying in length, frequently flattened or crushed; from 0.5 to 1 mm. in thickness; outer surface grayish-brown or purplish-black, with numerous, prominent, lighter colored, transverse lenticels and occasional patches of foliaceous lichens bearing small, blackish apothecia; inner surface smooth, dark brown with occasional purplish blotches, longitudinally striate, becoming red when moistened with solutions of the alkalies; fracture short, slightly fibrous in the inner layer; odor distinct; taste slightly bitter. Under the microscope transverse sections show a distinctly undulate, corky layer, composed of about 12 rows of reddish-brown cells; parenchyma cells of the primary cortex with numerous rosette aggregates of calcium oxalate from 0.010 to 0.025 mm. in diameter; inner bark with bast-fibers in narrow, interrupted rows, the groups of fibers being separated radially by the medullary rays; bast-fibers with thick, strongly lignified, yellowish walls and narrow lumina and each group surrounded by a layer of crystal-fibers, the prismatic crystals of calcium oxalate, varying from 0.007 to 0.015 mm. in diameter; medullary rays 1 to 2 cells in width, occasionally 3; cells of the parenchyma and medullary rays with numerous starch grains about 0.003 mm. in diameter. Powder: Yellowish-brown; stone cells absent (distinguishing it from powder of Rhamnus Purshiana). Add 0.100 Gm. of powdered Frangula to 10 Cc. of hot water, shake the mixture occasionally until cold and filter it. On the addition of a few drops of ammonia water, the filtrate should be colored a deep red. Macerate 0.100 Gm. of powdered Frangula with 10 drops of alcohol; add 10 Cc. of water, boil the mixture and filter it when cold. Shake the filtrate with 10 Cc. of ether, separate the yellow, ethereal solution, and shake 3 Cc. of this ethereal liquid with 3 Cc. of ammonia water; the separated ammoniacal solution, on diluting with 20 Cc. of water, should still possess a distinct cherry-red color. Ash not exceeding 6 percent.

Galla.—An excrescence on the young twigs of Quercus infectoria Olivier and other allied species of Quercus (Fam. Fagaceæ), induced by the punctures on the leaf-buds and by the deposited ova of Cynips tinctoria Hartig (Fam. Hymenoptera). Nearly globular, from 0.8 to 2.2 cm. in diameter; externally blackish-olive-green or blackish-gray, more or less tuberculated on the upper portion, the basal portion being nearly smooth and contracted into a short stalk, heavy, sinking in water excepting the smaller galls which should not be present to a greater extent than 5 percent.; fracture short-horny, internally grayish or dark brown, consisting of a central portion slightly radiating and resinous, occasionally hollow and traversed by a narrow radial canal extending to the exterior as shown by the perforation in the whole gall; odor slight; taste strongly astringent. Powder: Numerous fragments of thick-walled, starch-bearing parenchyma; starch grains numerous, more or less free in the powder and varying in shape from spherical or ellipsoidal to polygonal, and from 0.005 to 0.030 mm. in diameter; stone cells few, resembling those found in fruits and seeds, varying considerably in shape and size, from 0.025 to 0.300 mm. in length; occasional fragments with spiral or reticulate tracheæ; fragments mounted in very dilute ferric chloride T. S. should become of a deep blue or greenish-blue color. Macerate 0.5 Gm. of powdered Nutgall with 2 Cc. of alcohol for a few minutes, add 500 Cc. of water, stir the mixture well for five minutes and filter. On adding a drop of ferric chloride

T. S. to 1 Cc. of this filtrate, diluted with 10 Cc. of distilled water, a distinct blue or violet-blue color should develop.

Gambir.—A dried extract prepared from decoctions of the leaves and twigs of Ourouparia Gambir (Hunter) Baillon (Fam. Rubiaceæ). Usually in cubical or rectangular pieces; from 20 to 30 mm. in diameter; externally pale grayish-brown to reddish-brown, more or less dull and porous; friable, internally of a light brown or dull earthy color; inodorous; taste bitterish and very astringent. Upon scraping a piece of Gambir and mounting the separated fragments in hydrated chloral T. S. and examining them under the microscope, numerous acicular crystals, from 0.010 to 0.030 mm. in length, should separate at the edges of the fragments which gradually dissolve leaving a few thick-walled, non-glandular hairs which, when entire, may be 0.350 mm. in length; a few fragments of leaves may also be present showing either epidermal cells or small narrow tracheæ with spiral or annular markings; a few starch grains either single or compound, of variable shape and from 0.005 to 0.015 mm. in diameter; a number of bacteria may also be present. Macerate 1 Gm. of Gambir with 50 Cc. of water and filter. Separate portions of this filtrate should give an intense, green color with dilute ferric chloride T. S. and no precipitate with copper sulphate T. S. Not less than 65 percent. of Gambir should be soluble in water and not less than 60 percent. should be soluble in alcohol. Ash changed from "not more than 5 percent." to "not exceeding 9 percent."

Gelsemium.—Rhizome, cylindrical, usually in pieces from 3 to 20 cm. in length, and from 3 to 30 mm. in diameter; externally light yellowish-brown, longitudinally wrinkled, with purplish-brown, longitudinal lines and transverse fissures; the upper surface with a few stem-scars, the under and side portions with numerous roots and root-scars; fracture tough, splintery; internally light brown or pale yellow, bark thin, wood distinctly radiate, excentral, pith disintegrated; odor slight; taste bitter. Roots, light brown; fracture one-half transverse, the other oblique or splintery. Under the microscope sections of the rhizome show a strong development of cork, the walls being grayish or yellowish-brown and more or less lignified; a cortex made up chiefly of parenchyma containing starch and having in the outer portion small scattered groups of stone cells or sclerenchymatous fibers, and in the inner portion, in the region of the medullary ray cells, prisms of calcium oxalate; woody portion made up of broad wedges consisting of large tracheæ and wood-fibers separated by starch-bearing medullary rays, the innermost cells, or those nearer the pith, being strongly lignified, while the outermost layers, or those nearer the cortex, are non-lignified and may contain prisms of calcium oxalate; an internal phloem or sieve, the cells forming distinct, more or less rounded groups, the latter being partly surrounded by a thin-walled, starch-bearing pith. Powder: Dark yellow, tracheæ with bordered pores, numerous and conspicuous, spiral tracheæ few; bast-fibers and tracheids long and narrow, strongly lignified; starch grains spherical, from 0.004 to 0.008 mm. in diameter; calcium oxalate in monoclinic prisms from 0.015 to 0.030 mm. in length; occasional groups of stone cells or sclerenchymatous fibers, the walls being very thick, porous and strongly lignified.

Gentiana.—In nearly cylindrical, sometimes branching pieces, of variable length, from 5 to 35 mm. in thickness; externally yellowish-brown, the rhizome

portion annulate, the roots longitudinally wrinkled; fracture short and uneven when dry, but tough and flexible when damp; internally yellowish-brown, the bark from 0.5 to 2 mm. in thickness, separated from the somewhat spongy, woody portion by a dark brown cambium zone; odor strong, characteristic; taste slightly sweetish, then strongly and persistently bitter. Powder: Light brown or yellowish-brown, consisting chiefly of parenchymatous cells with fragments of scalariform or reticulate tracheæ; starch grains few or none. Stone cells and sclerenchymatous fibers are absent (absence of endocarp of Olea Europea Linné). Ash not exceeding 6 percent.

Glycyrrhiza.—Botanical sources now given as Glycyrrhiza glabra Linné var. typica Regel et Herder, or Glycyrrhiza glabra Linné var. glandulifera Regel et Herder. Spanish Licorice: (also known as Italian, Levant, Turkish or Arabian Licorice). Nearly cylindrical, upper portion more or less knotty, usually in pieces from 14 to 20 cm. or more in length, and from 5 to 20 mm. in thickness; externally yellowish-brown or dark brown, longitudinally wrinkled, the thinner rhizomes being often with prominent alternate buds, the thicker rhizomes with distinct corky patches; fracture coarsely fibrous; internally lemon-yellow, radiate, bark 1 to 3 mm. in thickness; wood porous, in narrow wedges, rhizome with small pith; odor distinct; taste sweetish and slightly acrid. Under the microscope transverse sections of pieces of the older rhizome of Spanish Licorice show a periderm of numerous layers of yellowish-brown cork cells; a phellogen and one or more rows of cells of the phelloderm, the cells showing a tendency to collenchymatic thickenings and with occasional monoclinic prisms of calcium oxalate; a middle bark of starch-bearing parenchyma, and whitish groups of bast-fibers surrounded with crystal-fibers; inner bark with a very characteristic radial arrangement of phloem and medullary rays, the phloem consisting of wedges of small groups of bast-fibers and parenchyma, separated by an almost continuous, obliterated sieve tissue, the cells of the latter being very irregular in outline and with thick, highly refracting walls, medullary rays 1 to 8 cells wide; wood characterized by broad wedges consisting of large tracheæ with yellowish walls, small compact groups of wood-fibers and starch-bearing parenchyma alternating with the broad medullary rays; pith composed of parenchyma, the cells being large, more or less polygonal in outline and containing numerous starch grains, or prisms of calcium oxalate. In sections of roots the pith is wanting. Russian Licorice: Nearly cylindrical, somewhat tapering, sometimes split longitudinally, from 15 to 30 cm. in length, and from 1 to 5 cm. in diameter, when deprived of the outer corky layer it is externally pale lemon-yellow; fracture coarsely fibrous, internally lemon-yellow; wood radially cleft; odor distinct; taste sweetish. Under the microscope transverse sections of the rhizome and roots of Russian Licorice somewhat resemble those of Spanish Licorice but the cork cells are wanting. Powder: Pale brownish-yellow (Spanish Licorice) or pale yellow (Russian Licorice), starch grains numerous mostly single and elliptical or oval, and from 0.002 to 0.020 mm. in diameter; tracheæ mostly with bordered pores; wood- and bast-fibers numerous, strongly lignified, very long, very attenuated at the ends, and about 0.010 mm. in width; crystal-fibers with monoclinic prisms of calcium oxalate, the latter from 0.010 to 0.020 mm. in diameter; occasional fragments of reddish-brown cork cells occur in Spanish Licorice, but are practically want-

ing in the Russian Licorice. Add 10 Gm. of powdered Glycyrrhiza to 100 Cc. of distilled water, allow the mixture to macerate for 15 minutes with occasional stirring and then heat it for one-half hour on a water-bath and filter the mixture and add enough water to make the filtrate measure 100 Cc.; 10 Cc. of this filtrate when evaporated and dried at 100° C. should leave a residue of not less than 0.200 Gm. Ash not exceeding 7 percent.

Granatum.—The dried bark of the stem and root of Punica Granatum Linné (Fam. Punicaceæ) with not more than 2 percent. of wood and other foreign matter. Stem Bark: Mostly in somewhat flattened or transversely curved pieces, to some extent in quills, 2 to 8 cm. in length; bark 0.5 to 3.5 mm. in thickness; outer surface yellowish to grayish-brown, with grayish patches of foliaceous lichens with their brownish-black apothecia, longitudinally wrinkled, also marked with small broadly ellipitical lenticels and with more or less abraded patches of cork; inner surface light yellow or yellowish-brown, finely striate; fracture short, smooth, inner bark yellowish-green; odor slight; taste astringent, somewhat bitter and nauseous. Root Bark: In transversely curved pieces; externally brownish-yellow to dark brown and with irregular patches of cork; internally dark yellow, the medullary rays extending nearly to the outer surface. Powder: Yellowish-brown to dark brown; calcium oxalate crystals in rosette aggregates, monoclinic prisms or crystal-fibers, the individual crystals 0.010 to 0.018 mm. in diameter; starch grains numerous, spherical, ellipsoidal bi-convex, polygonal or irregular, and single or compound, from 0.002 to 0.010 mm. in diameter; fragments of whitish cork with strongly lignified walls; stone cells mostly single, occasionally in small groups, the individual cells 0.050 to 0.180 mm. in length, the walls being very thick and strongly lamellated; occasional fragments of wood with long wood-fibers from 0.015 to 0.020 mm. in width, the walls being slightly lignified and from 0.003 to 0.008 mm. in thickness, and associated with tracheæ possessing simple and bordered pores. Mix 1 Gm. of powdered Granatum with 100 Cc. of distilled water, macerate it with occasional agitation for about one hour and filter; a light yellow filtrate should be obtained. Upon the addition of a drop of ferric chloride T. S. to 10 Cc. of this filtrate a bluish-black precipitate should be produced. Upon the addition of from 40 to 50 Cc. of lime water to another portion of 10 Cc. of the filtrate, an orange-brown flocculent precipitate should be produced. Ash not exceeding 16 percent. Granatum should not be kept longer than one year.

Grindelia.—The dried leaves and flowering tops of Grindelia camporum, Greene, or Grindelia cuneifolia Nuttall, or Grindelia squarrosa (Pursh) Dunal (Fam. Compositæ), with not more than 10 percent. of stems and other foreign matter. Stems with attached branches and terminated with resinous flower-heads; stems cylindrical, not exceeding 2 mm. in diameter, light yellow or rose colored, with alternate leaf-scars, occasionally with basal portions of leaves, occasionally more or less irregularly flexuous and coated with resin especially at the nodes; leaves usually separate and more or less broken and varying in shape when entire from oblong and lanceolate to oblanceolate-spatulate and cuneate-spatulate, 1 to 7 cm. in length, mostly sessile or amplexicaule and more or less sharply serrate or evenly spinosely toothed, pale

yellow to yellowish-green, very resinous, somewhat coriaceous and brittle; bracts of flowering branches almost entire and usually more or less spreading; heads more or less resinous, viscid, many-flowered, either conical-urceolate or depressed-urceolate, involucres 5 to 20 mm. in breadth, composed of numerous imbricated bracts with more or less recurved tips; ray florets yellow, ligulate and pistillate; disk florets yellow, tubular and perfect; pappus of 2 or 3 mostly unequal, linear awns about the length of the disk florets; disk achenes more or less ovoid or oblong, more or less compressed or triquetrous, and either bi-auriculate or broadly unidentate or with a broad truncate, corky-thickened summit; odor balsamic; taste aromatic and bitter, resinous. Powder: Yellowish-brown; consisting of numerous fibrous fragments made up of tissues of the stem, the most prominent being the tracheæ with annular and spiral thickenings or marked with simple or bordered pores, associated with numerous narrow, strongly lignified wood-fibers; pith cells more or less tabular and containing a layer of protoplasm in which are embedded numerous spheroidal granules; fragments of epidermis of leaves very characteristic and showing more or less polygonal areas containing large chloroplastids, and the large colorless, basal cells of the multicellular, glandular hairs; pollen grains spherical 0.035 mm. in diameter, spinose, and in section showing three pores.

Guaiacum.—In irregular, or in large, nearly homogeneous masses, occasionally in more or less rounded or ovoid tears, enclosing fragments of vegetable tissues; externally greenish-gray-brown, the fractured surface having a glassy lustre, the thin pieces being translucent and varying in color from yellowish to reddish-brown; odor balsamic; taste slightly acrid. Guaiac should melt at from 80° to 90° C. It is readily soluble in alcohol, ether, chloroform, creosote, and in solutions of the alkalies or of hydrated chloral T. S. It is sparingly soluble in carbon disulphide or benzene.

Guarana.—Powder: Light pinkish-brown; consisting mostly of irregular masses of parenchyma containing more or less altered starch grains; unaltered starch grains occasional, varying from spherical and polygonal to ellipsiodal and broadly ovoid, from 0.010 to 0.025 mm. in diameter; occasional fragments with narrow elongated sclerenchymatous cells, the walls being thick, yellowish and non-lignified. Add 0.001 Gm. of powdered Guarana to a slide, upon which a drop of hydrochloric acid has previously been placed, add a drop of gold chloride T. S. and allow the mixture to stand for a few minutes. Beginning at the edge of the mount, crystals of caffeine gold chloride should be separate in the form of orthorhombic plates and needles, the latter usually occurring in spheroidal aggregates and finally forming branching groups.

Humulus.—Hops may include not more than 2 percent. of stems, leaves and other foreign matter. Scales "imbricated". Color described as strong and characteristic, becoming disagreeable and valerian-like on aging. Ash not exceeding 8 percent. Hops should be dried at a temperature not exceeding 70° C. and should be kept in air-tight containers protected from the light.

Hydrastis.—The drug may include not more than 2 percent. of stems, leaves and other foreign matter. Rhizome horizontal or oblique, sub-cylindrical

and usually more or less flexuous, 1 to 5 cm. in length and 2 to 7 mm. in diameter, occasionally with stem-bases; externally yellowish or grayish-brown, marked by numerous stem scars and more or less annulate from scars of bud-scales, otherwise deeply longitudinally wrinkled, and on the under and lateral portions arise numerous long, filiform roots which are easily detached; fracture short, waxy; internally of a deep yellow color and consisting mostly of parenchyma enclosing an interrupted circle of small fibro-vascular bundles; odor distinct; taste bitter. Powder: Brownish-yellow; starch grains numerous, from 0.002 to 0.015 mm. in diameter, being mostly single, nearly spherical, and either free or in the parenchyma cells; fragments with the tissues of the fibro-vascular bundles mostly associated with starch-bearing parenchyma; tracheæ, with simple and bordered pores and occasionally spiral thickenings, and associated with short sclerenchymatous fibers possessing thin walls with simple pores; occasional fragments of tabular cork cells with reddish-brown walls.

Hyoscyamus.—The dried leaves and flowering or fruiting tops of Hyoscyamus niger Linné (Fam. Solanaceæ). Usually much wrinkled, with numerous stems and with the flowering or fruiting tops intermixed; leaves when entire attaining a length of 25 cm. and a breadth of 10 cm., ovate or ovate-oblong, very inequilateral, the lower with short petioles, the upper sessile, summits acute, margins coarsely and angularly 1- to 4-toothed or lobed, grayish-green, glandular-hairy, particularly on the lower surfaces; flowers nearly sessile with an urn-shaped unequally 5-toothed calyx and a campanulate corolla which in the fresh state is of a yellowish color; fruit a 2-locular pyxis, and enclosed in a large urn-shaped calyx with 5 acute teeth; odor heavy, distinct; taste somewhat bitter and acrid. Stems from 3 to 7 cm. in length and from 2 to 5 mm. in thickness, nearly cylindrical or somewhat compressed, longitudinally wrinkled and hairy. Powder: Grayish-green; calcium oxalate crystals usually in the form of 4- to 6-sided, isolated prisms, sometimes in twins, from 0.015 to 0.025 mm. in length, also occurring in spherical aggregates either isolated or attached to the prismatic crystals, sometimes in rosette aggregates, 0.020 mm. in diameter, and occasionally in sphenoidal micro-crystals; hairs numerous, of two kinds; the non-glandular 2 to 10 cells in length, the glandular with a 1- to many-celled head and a 1- to 4-celled stalk; fragments of epidermis with broadly elliptical stomata, 0.030 to 0.035 mm. in length and with 3 to 4 neighboring cells; fragments of tracheæ with simple or bordered pores and spiral or reticulate thickenings, also associated with libriform sclerenchymatous fibers having thin, porous walls and showing little or no lignification. The presence of the leaves of Hyoscyamus muticus Linné in either the crude or powdered drug of Hyoscyamus may be determined by the characteristic branching non-glandular hairs occurring on both the stems and leaves of H. muticus. Ash not exceeding 30 percent.

Ipecacuanha.—Ipecac may contain not more than 10 percent. of stems. Rio Ipecac: In cylindrical pieces, curved and sharply flexuous, occasionally branched, from 3 to 15 cm. in length, and from 2.4 to 4 mm. in thickness; externally dark brown, closely annulated with thickened, incomplete rings, and usually exhibiting transverse fissures with vertical sides; fracture of bark short,

of wood tough, bark very thick, light brown, easily separable from the yellowish-white wood; odor very slight, peculiar, the dust sternutatory; taste bitter and nauseous, somewhat acrid. Stems cylindrical, attaining a lengh of 10 cm. and a thickness of 2 mm., dark brown, finely longitudinally wrinkled and with a few elliptical scars. Carthagena Ipecac: Cylindrical or slenderly fusiform, more or less tortuous, from 3 to 12 cm. in length, and from 4 to 6.5 mm. in thickness; externally grayish-brown, the annulations usually not so numerous as in Rio Ipecac, occasionally transversely fissured and with circular scars of roots; bark 2 mm. in thickness, dark brown, smooth, somewhat horny, and easily separable from the light brown wood. Stems attaining a length of 10 cm. and a thickness of from 2 to 3 mm., cylindrical, somewhat zigzag, due to the prominent nodes with their elliptical stem-scars, grayish or dark brown and longitudinally wrinkled; bark thin. Powder: Light brown; starch grains numerous, 1- to 4- or more compound, the individual grains spherical or polygonal, from 0.003 to 0.017 mm. in diameter; calcium oxalate in raphides from 0.015 to 0.040 mm. in length, few; tracheids with bordered pores and oblique slit-likes pores. The stem bark shows a few, slightly elongated stone cells, from 0.030 to 0.045 mm. in length, with thick lignified walls and simple, branching pores. Ash not less than 1.8 percent. nor more than 4.5 percent.

Jalapa.—Fusiform, irregularly ovoid or pyriform, upper end more or less rounded, lower end slightly tapering, the large roots often incised or cut into pieces; from 4 to 15 cm. in length, from 12 to 60 mm. in diameter; externally dark brown, longitudinally wrinkled or furrowed and with numerous lenticels; hard, compact, not fibrous; when broken internally, dark brown, mealy or waxy, bark 1 to 2 mm. in thickness, outer bundles separated from outer cortical layer by a distinct brown cambium zone; odor slight but peculiar, smoky and sweetish; taste sweetish and acrid. Powder: Light brown; starch grains numerous, single or 2- to 3-compound and more or less swollen, ellipsoidal or ovoid with concentric or excentral lamellæ and radiating clefts or fissures from 0.003 to 0.035 mm. in diameter, calcium oxalate in rosette aggregates from 0.010 to 0.035 mm. in diameter; tracheæ short, wide, with simple or bordered pores; laticiferous vessels with yellowish-brown, resinous masses. Ash not exceeding 6.5 percent.

Kino.—The spontaneously dried juice. In small, angular fragments, usually considerably less than 15 mm. in diameter, varying in color from a dark reddish-brown to reddish-black, brittle; when crushed upon a slide and examined under the microscope, the angular fragments are more or less translucent with a glass-like, conchoidal surface, the thinner pieces having a yellowish-red or deep brownish-red color, the pieces often being marked by nearly parallel, curved or straight lines; inodorous; taste very astringent, when masticated it colors the saliva pinkish. Powder: Of a dark brick-red or ochre color, upon the addition of water the sharp angular fragments should assume a deep, rich red color and become more or less rounded and separate into innumerable, small, granular particles among which are included a large number of rod-shaped bacteria. Upon mounting powdered Kino in alcohol, the fragments at first assume a deep red color, then mostly dissolve, leaving a number of small, colorless granules and indistinguishable, cellular fragments.

Kino is only partly soluble in cold water, and not less than 40 percent. should be soluble in boiling water, the latter upon cooling and filtering should show a faintly acid reaction, give a dark green precipitate with ferric chloride T. S., and a reddish-violet color with alkalies. Alcoholic extractive not less than 45 percent. Moisture content not more than 12 percent. Ash not exceeding 3 percent.

Krameria.—The drug may include not more than 5 percent. of stems. The family name changed from "Krameriaceæ" to Leguminosæ. Peruvian Rhatany: It consists of a knotty, several- to many-headed crown with numerous branching roots; the latter rarely attaining a length of 50 cm. and usually less than 1 cm. in thickness, cylindrical, somewhat tapering, flexuous or wavy and very flexible, externally light reddish-brown or brownish-red, more or less marked with dark, scaly cork, especially in the upper portion, otherwise nearly smooth, somewhat longitudinally wrinkled and devoid of transverse fissures; fracture of bark slightly fibrous, of wood tough and splintery, the pinkish-brown bark less than one-third of the radius, the wood yellowish or pinkish-white and finely radiate; inodorous; wood nearly tasteless, bark astringent. Savanilla Rhatany and Para Rhatany: Roots usually separate, less flexuous and tapering than those of Peruvian Rhatany, and usually not exceeding 12 mm. in thickness; externally purplish-brown or chocolate brown and marked with numerous fissures, fracture less tough than that of Peruvian Rhatany, internally the bark and wood darker, the bark about two-fifths or more of the radius and more astringent than that of Peruvian Rhatany. Powder: Reddish-brown; starch grains, single or 2- to 4-compound, the individual grains spherical, ellipsoidal, or plano-convex and sometimes with a central, radial or star-like cleft, from 0.003 to 0.035 mm. in diameter, bast-fibers more or less wavy in outline with very much attenuated ends and with non-lignified walls; tracheæ with simple or bordered pores associated with numerous wood-fibers which are narrow spindle-shaped and with thick, porous, slightly lignified walls; numerous cellular fragments with yellowish or reddish-brown walls; calcium oxalate in monoclinic prisms, 0.010 to 0.100 mm. in length, few, or frequently absent. Macerate 2 Gm. of powdered Rhatany with 10 Cc. of alcohol, with occasional stirring for one hour and filter it. The deep reddish colored filtrate obtained should yield a dark brownish-red precipitate and a deep orange-red filtrate upon the addition of an excess of alcoholic lead acetate T. S., this latter filtrate should yield no precipitate upon the further addition of a drop or two of alcoholic lead acetate T. S., and should give an olive-brown solution having a purplish fluorescence upon the addition of a drop or two of ferric chloride T. S. Aqueous extractive not less than 9 percent. Ash not exceeding 5 percent.

Lactucarium.—Treat Lactucarium with boiling water and filter; the filtrate should be clear while hot, but on cooling it should become turbid; the filtrate should not be colored blue by iodine T. S. (absence of starch) and should also become clear upon the addition of ammonia water or alcohol. An alcoholic solution of Lactucarium should give not more than a faint green color upon the addition of a drop of ferric chloride T. S. (absence of tannin). Powder: Grayish-brown to dark brown, consisting almost entirely of irregular fragments without any cellular structure; when mounted in hydrated chloral T. S.,

the fragments should become clear, showing a granular ground mass, and from this should separate numerous rod-shaped crystals and broad, monoclinic prisms as well as coarse, rosette-shaped, crystal-like masses, that polarize light. Dry the drug at a temperature not exceeding 70° C. for powdering. Ash not exceeding 10 percent.

Leptandra.—Leptandra may include not more than 5 percent. of stems and other foreign matter. Rhizome usually of horizontal growth nearly cylindrical, somewhat branched, from 4 to 10 cm. in length and from 4 to 13 mm. in diameter; externally grayish-brown to dark reddish-brown, annulate from circular scars of bud-scales, upper surface with short stem remnants; occasionally with buds, and numerous circular stem-scars, from the under and lateral portions arise numerous coarse roots; fracture very tough and woody, branches readily separable from the main rhizome; internally bark rather thin, dark brown and resinous, wood about the same thickness as the bark, light brown and porous, pith large, more or less hollow, the color being similar to that of the bark; nearly odorless, taste very bitter and acrid. Roots from 1 to 10 cm. in length and from 1 to 2 mm. in diameter; externally dark brown to purplish-brown, smooth and faintly longitudinally wrinkled: fracture short; internally with a thick brownish-black bark and small light brown central cylinder. Powder: Dark brown and yellowish white; odor strong, penetrating; containing numerous irregular fragments of vegetable tissue, many of them being colored pink or violet upon the addition of hydrated chloral T. S., starch grains numerous, to some extent isolated but mostly in the parenchymatous cells, the individual grains being nearly spherical or more or less polygonal and from 0.002 to 0.008 mm. in diameter; fragments of woody tissues with tracheæ and wood-fibers, tracheæ with spiral thickenings, or with simple or bordered pores, wood-fibers with thick lignified walls, with simple pores or with bordered pores, resembling tracheids; fragments of parenchyma containing a light brown or brownish-black resin, the latter frequently closely coherent with the starch grains in the cells thus preventing the separation of the individual starch grains; in hydrated chloral T. S. mounts, occasional elongated cells with a lemon-yellow oily substance may sometimes be seen.

Limonis Cortex.—The outer rind of the fresh ripe fruit of Citrus medica Limonum (Risso) Hooker filius (Fam. Rutaceæ). The outer, lemon-yellow or dark yellow layer recently separated by grating or paring and consisting of an epidermal layer, numerous parenchyma cells containing yellow chromoplastids and large oil-reservoirs with globules of the volatile oil; odor highly fragrant, distinct; taste pungently aromatic. Under the microscope sections of the fresh fruit when mounted in fixed oils, show an epidermal layer composed of small tabular cells, a hypodermal layer containing numerous plastids, a mesocarp with colorless, thin-walled parenchyma and large, elliptical oil reservoirs; parenchyma cells containing a layer of granular protoplasm adhering to the walls and occasionally membrane crystals of calcium oxalate, which are irregularly polygonal in shape, polarize light strongly and from 0.015 to 0.025 mm. in diameter.

Linum.—Flaxseed may include not more than 3 percent. of other harmless fruits, seeds and foreign matter. Ovate, or oblong-lanceolate, flattened,

obliquely pointed at one end, 3 to 5 mm. in length; externally chestnut-brown, very smooth and shiny, the raphe extending as a distinct, light yellow ridge along one edge; easily cut with the finger-nail, internally olive-green, oily; odor slight; taste mucilaginous and oily. Under the microscope transverse sections when mounted in hydrated chloral T. S. show an epidermis with a mucilaginous layer from 0.010 to 0.015 mm. in thickness, covered by a very thin layer of cutin which is often more or less broken; two layers of parenchyma which overlie a continuous ring of stone-cells having yellowish, porous walls and rather large lumina; a pigment layer, the cells having a reddish-brown content; an endosperm consisting of from 6 to 10 rows of cells, surrounding the two large plano-convex cotyledons; the cells of both the endosperm and the cotyledons contain a fixed oil and aleurone grains, the latter being from 0.003 to 0.020 mm. in diameter. Powder: Lemon-yellow and light brown, consisting chiefly of large, oily globules and irregular fragments of endosperm and seed-coat; the seed-coat is characterized by the tabular pigment cells filled with a reddish-brown, insoluble content and by the somewhat elongated stone cells with yellowish walls; mounts made from material from which the fixed oil has been removed, show aleurone grains from 0.003 to 0.020 mm. in diameter, both free and in the cells of the endosperm and embryo. Linseed or Flaxseed Meal: Light olive-brown with reddish-brown fragments; fragments very coarse and the cellular tissues are the same as those of the powder. Powdered Linseed or Flaxseed and Linseed Meal or Flaxseed Meal should be recently prepared and free from unpleasant or rancid odor, and should be kept in tightly closed containers, to which a few drops of carbon tetrachloride or chloroform should be added from time to time to prevent the attack by insects. Boil 1 Gm. of the fat-free Linseed or Flaxseed Powder or Meal, with 50 Cc. of water, cool and filter; the filtrate should show, on the addition of iodine T. S., not more than a faint blue color. The ground or powdered drug upon extraction with petroleum benzin should yield not less than 30 percent. of a fixed oil, 98 percent. of which should be saponifiable. Ash not exceeding 6 percent.

Lobelia.—Family name changed from "Campanulaceæ" to "Lobeliaceæ." Stems cylindrical, coarsely and irregularly furrowed, yellowish-green, occasionally purplish and with numerous spreading hairs; leaves alternate, usually more or less broken, when entire, laminæ ovate or oblong, 2 to 9 cm. in length, obtusely toothed or irregularly serrate-denticulate, the teeth with a yellowish-brown gland-like apex, pale green and with scattered, bristly hairs; petiole either wanting or 1 mm. in length; flowers in long racemes with short pedicels, calyx tube ovoid, 5-toothed, corolla tubular, 3 to 4 mm. in length, 5-parted, the upper 2-lobed portion cleft nearly to the base; stamens with anthers united above into a curved tube enclosing the bifid stigmas; capsules ovoid or ellipsoidal, 5 to 8 mm. in length, light brown, wholly inferior and enclosing numerous brownish, oblong and coarsely reticulate seeds; odor slight; taste strongly acrid. Powder: Dark green, odor irritating; fragments of seed-coat composed of more or less polygonal cells with thick, yellowish walls; isolated, non-glandular hairs elongated-conical, 0.300 to 0.600 mm. in length; fragments of stem with tracheæ showing annular or spiral thickenings or simple pores associated with narrow wood-fibers, the walls of the latter being rather thin, more or less lignified

and porous; fragments of epidermis of leaf with elliptical stomata, 0.025 mm. in length, and usually with 3 or 4 neighboring cells; pollen grains nearly spherical, 0.015 to 0.030 mm. in diameter. Ash not exceeding 8 percent.

Lupulinum.—A granular powder, bright yellowish-brown, having the characteristic odor and taste of hops; becoming darker in color, disagreeable and valerian-like in odor on aging, when it is unfit to use. Under the microscope the glandular trichomes are somewhat globular or ellipsoidal, 0.150 to 0.200 mm. in diameter, consisting of a single layer of secreting cells assuming the form of a shallow cup, from the inner surface of which the cuticle has been separated by the secreted yellowish-brown oleoresin. Ash changed from "not more than 10 percent." to "not exceeding 16 percent."

Lycopodium.—The spores of Lycopodium clavatum Linné (Fam. Lycopodiaceæ), with not more than 2 percent. of impurities. Under the microscope the spores are spherical tetrahedrons, 0.025 to 0.040 mm. in diameter; in section they vary from plano-convex to triangular, the outer wall or exosporium being extended in the form of slight, irregular projections, giving the edge a ciliate appearance, and the surface of the spore a reticulate appearance, the reticulations being polygonal and formed of straight sides; when viewed so that the rounded surface of the spore is on the under side, the upper surface is characterized by a distinct, triangular marking, being the edges of the three straight surfaces, extending from the center of the spore to near the outer edge. Lycopodium should show very few, if any, pollen grains of species of Pine, the latter being 0.040 to 0.070 mm. in diameter, and consisting of three parts, a central, convex, generative cell separating the two spherical cells or wings which are blackish, due to the inclusion of air. Ash changed from "not exceeding 5 percent." to "not exceeding 3 percent."

Matricaria.—The dried flower-heads of Matricaria Chamomilla Linné (Fam. Compositæ), with not more than 5 percent. of stems and foreign matter. Flower-heads composed of a few white ray florets and numerous yellow disk florets on a conical, more or less hollow receptacle, the latter being 3 to 10 mm. in breadth; disk flowers tubular, perfect, and without a pappus; ray flowers 10 to 20, pistillate, corolla white, 3-toothed, and 4-veined, usually reflexed, involucre hemispherical, composed of 20 to 30 imbricated, oblanceolate, and pubescent scales; peduncles light green to brownish-green, longitudinally furrowed, more or less twisted and attaining a length of 2.5 cm.; achenes somewhat obovoid and faintly 3- to 5-ribbed, pappus none or only a slight membraneous crown; odor pleasant, aromatic; taste aromatic and bitter. Ash not exceeding 13 percent.

Mentha Piperita.—Leaves more or less crumpled and frequently detached from the stems; stems quadrangular, 1 to 2 mm. in diameter, nearly glabrous except for a few scattered deflexed hairs; leaves when entire ovate-oblong to oblong-lanceolate, petioles 4 to 15 mm. in length, slightly pubescent, laminæ 1 to 9 cm. in length, acute and sharply serrate, light green to purplish-brown, upper surfaces nearly glabrous, lower surfaces glandular-hairy especially on the veins; flower-whorls in oblong or oval spikes which are usually compact, or somewhat interrupted at the base, 1 to 1.5 cm. in breadth, rounded at the summit, and in fruit attaining a length of 3 to 7 cm.; bracts oblong-lanceolate, very acuminate,

7 mm. in length; calyx tubular, equally 5-toothed, pubescent and glandular-punctate, often dark purplish in color; corolla tubular-campanulate, 4-cleft, 3 mm. in length and often light purple; stamens 4, short and equal; nutlets ellipsoidal, 0.5 mm. in diameter, blackish-brown; odor pungent, characteristic; taste aromatic, pungent, followed by a cooling sensation.

Mentha Viridis.—Leaves more or less crumpled and mixed with a large proportion of the light brown or purplish-colored stems occasionally with their characteristic opposite branches; stems distinctly quadrangular 1 to 3 mm. in width, nearly glabrous; leaves when entire oblong- or ovate-lanceolate, unequally serrate, nearly sessile or with a petiole less than 5 mm. in length, of a bright green color and somewhat glandular-hairy on the under surfaces; flowers in clusters arranged oppositely and in more or less interrupted or crowded, lanceolate, acute or acutish spikes; bracts subtending the flower clusters linear-lanceolate, subulate, 7 to 10 mm. in length; calyx tubular, 5-toothed, glandular-punctate and somewhat pubescent near the teeth; corolla whitish or light brown; stamens extending beyond the corolla tube; odor slightly pungent, characteristic; taste aromatic, characteristic but not followed by a cooling sensation.

Moschus.—Known in commerce as Tonquin or Tibetan Musk. Usually in small irregular granules, not more than 2 mm. in thickness, blackish, with a few light brown fragments and becoming somewhat grayish on aging; shiny and somewhat oily; odor peculiar, penetrating, powerful and persistent; taste aromatic and bitterish. Add a few granules of Musk to 2 Cc. of water in a watch crystal and stir with a glass rod, a light brown solution should be obtained. The undissolved portion should consist of irregular fragments containing a finely granular substance, numerous rod-like bacteria and occasionally the hyphæ of a fungus. Add a drop of iodine T. S. to a slide containing a few granules of Musk and examine under the microscope; none of the particles should be colored blue or bluish-black (absence of starch). Add a few granules of Musk to 2 Cc. of alcohol contained in a watch crystal; the grains should sink to the bottom, and upon stirring with a glass rod, a pale brown, slightly cloudy solution should be obtained, leaving a somewhat oily stain upon the upper portion of the watch crystal as the alcohol evaporates; the undissolved portion or residue should resemble that obtained with the aqueous mixture, except in that the particles should be less disintegrated. Add a few granules of Musk to 2 Cc. of chloroform in a watch crystal; the grains should float on the surface and upon stirring with a glass rod, the solution should remain nearly colorless, and as it evaporates there should separate around the particles a small quantity of a whitish oily or fatty substance. Not less than 50 percent. of Musk should be soluble in water, the solution being of a dark brown color with a strong, aromatic odor and a slightly acid reaction. Not less than 10 percent. of Musk should be soluble in alcohol, the solution being of a light yellowish-brown color becoming slightly turbid upon the addition of water. Musk, when dried to constant weight in a desiccator over sulphuric acid, should not lose more than 15 percent. of moisture.

Myristica.—Ovoid or ellipsoidal, 20 to 30 mm. in length and about 20 mm. in thickness; externally light brown to dark brown, consisting of the reticulately furrowed perisperm, the broad end with a large, circular, upraised scar from

which arises a furrow extending to the chalaza; easily cut, the surface having a waxy lustre and mottled by reason of the light brown perisperm penetrating into the yellowish-brown endosperm; a longitudinal section through the middle of the large scar shows a small irregular cavity with the more or less shrunken remains of the embryo, and usually containing a growth of mold; odor slightly aromatic, taste agreeably aromatic. Powder: Dark reddish-brown; consisting of irregular, yellowish-brown or brownish-black fragments; fragments of perisperm yellowish-brown with large, circular or elliptical oil reservoirs containing a volatile oil, small, thin-walled parenchyma cells and occasional spiral tracheæ; parenchyma cells of the endosperm more or less polygonal and filled with starch grains and aleurone grains; starch grains single or compound, the individual grains being spherical, plano-convex or polygonal, from 0.003 to 0.020 mm. in diameter and colored blue with iodine T. S. (distinction from starch grains in mace, which are colored yellowish-red; mounts in hydrated chloral T. S. show numerous globules of a fixed oil which later may separate in the form of rod-like crystals; mounts in any of the fixed oils show the separation of spheroidal aggregates of crystals of the fixed oil which polarize light strongly. The powder made from "limed" Nutmeg shows, under the microscope, upon the addition of water containing 25 percent. of sulphuric acid, the immediate separation of crystals of calcium sulphate in the form of small needles or short rods which do not polarize light. Ash not exceeding 5 percent. Broken and wormy kernels should be rejected.

Myrrha.—A gum-resin obtained from one or more species of Commiphora (Fam. Burseraceæ). Powder: Yellowish-brown; 0.001 Gm. of the powder, when added to a slide containing a drop of one of the fixed oils and examined under the microscope, shows numerous angular fragments varying in color from pale yellow to yellowish-brown; hydrated chloral T. S. produces an intensification in the color of the yellowish fragments; the addition of iodine T. S. to the powder previously mounted in hydrated chloral T. S. may show the presence of a few starch grains varying in shape from spherical, polygonal, and narrowly ellipsoidal to somewhat pear-shaped, from 0.010 to 0.035 mm. in diameter; when mounted in phloroglucinol T. S. and hydrochloric acid the powder may show a few fragments of lignified tissues consisting of either sclerenchymatous fibers, or of small groups of stone cells, the individual cells of the latter with very thick, porous walls and from 0.015 to 0.050 mm. in length. Statements about emulsion with water, its insolubility and non-swelling in water, and the nitric acid test on an alcoholic solution omitted. Not less than 35 percent. of Myrrh should be soluble in alcohol. Ash not exceeding 8.5 percent.

Nux Vomica.—Orbicular, nearly flat, occasionally irregularly bent, 10 to 30 mm. in diameter, 4 to 5 mm. in thickness; externally grayish or greenish-gray, covered with appressed hairs giving it a silky lustre, hilum indicated by a circular scar at the center of one of the flattened sides, and connected with the micropyle by a ridge; the micropyle very hard when dry; internally showing a thin and hairy seed-coat and a large grayish-white endosperm at one end of which is embedded a small embryo, with 2 broadly ovate 5- to 7-nerved cotyledons; inodorous; taste persistently bitter. Powder: Light gray; consisting chiefly of thick-walled, endosperm cells containing globules of a fixed oil and

a few small aleurone grains, and fragments of strongly lignified, non-glandular hairs, the walls of the latter possessing large, circular, or long, slit-like pores. In the tissues of the adhering pulp occur a few small, nearly spherical starch grains. The color test with potassium dichromate and sulphuric acid omitted. Ash not exceeding 3.5 percent.

Opii Pulvis.—Temperature for drying changed from "not exceeding 85° C." to "not exceeding 70° C." Light brown, consisting chiefly of yellowish-brown to brownish-red, more or less irregular and granular fragments varying from 0.015 to 0.150 mm. in diameter; a few fragments of strongly lignified thick-walled, 4- to 5-sided or narrowly elongated, epidermal cells of the poppy capsule; and very few fragments of tissues of poppy leaves, poppy capsules, and Rumex fruits.

Opium.—Obtained from Papaver somniferum Linné and its variety album De Candolle (Fam. Papaveraceæ) with not more than 5 percent. of the capsules and leaves of the poppy plant, Rumex fruits, and other foreign matter. In more or less rounded, mostly somewhat flattened masses of variable size, but usually about 8 to 15 cm. in diameter; externally grayish-brown, covered with fragments of poppy leaves and with some fruits of a species of Rumex, adhering from packing; more or less plastic when fresh, becoming hard and brittle on keeping; internally dark brown interspersed with lighter areas, somewhat lustrous; odor characteristic, narcotic; taste bitter, characteristic.

Pepo.—Defined as the "dried" seeds of cultivated varieties of Cucurbita Pepo Linné (Fam. Cucurbitaceæ), with not more than 5 percent. of other harmless seeds. Broadly elliptical or ovate, 15 to 23 mm. in length and 2 to 3 mm. in thickness; externally yellowish-white, very smooth, occasionally with thin,, transparent fragments of adhering pulp, and with a shallow groove parallel to and within 1 mm. of the margin; fracture short, seed coat consisting of a white coriaceous outer layer and a membraneous inner layer occasionally of a dark green color; embryo whitish, straight, with a small conical hypocotyl and two plano-convex cotyledons; slightly odorous when contused; taste bland and oily. Under the microscope sections show an outer epidermal layer consisting of palisade-like cells, the radial walls attaining a length of 1 mm.; the outer walls usually being torn off so that it appears as though the seeds were covered with very long hairs; a sub-epidermal layer consisting of 5 to 12 rows of cells with slightly thickened, lignified and porous walls; a layer of strongly lignified stone cells, elliptical in outline and about 0.075 mm. in length; a single layer of small cells resembling those of the sub-epidermal layer; several rows of spongy parenchyma cells with characteristic reticulate markings and separated from each other by large intercellular spaces; several layers of parenchyma cells, the inner layer being more or less collapsed and bounded on the inside by a single epidermal layer, the cells having rather thick walls; the perisperm cells are usually more or less collapsed and the endosperm consists of a single layer of cells filled with small aleurone grains; the cotyledons consist of thin-walled, isodiametric, elongated or palisade-like cells containing a fixed oil and numerous small aleurone grains.

Petroselini Fructus.—The dried ripe fruits of Petroselinum sativum Hoffmann (Fam. Umbelliferæ), with not more than 5 percent. of foreign seeds and other

vegetable matter. Mericarps usually separated, ovoid crescent shaped, 2 to 3 mm. in length, 1 mm. in diameter; externally grayish-brown becoming grayish- or brownish on aging, having 5 yellowish, filiform, prominent ribs, alternating with the coarsely roughened furrows; in transverse section nearly hemispherical, the commissural surface with 2 vittæ, or oil-tubes, the dorsal surface usually with a single vitta, occasionally 2 vittæ, in the grooves between the primary ribs; endosperm large, oily, enclosing a small embryo; odor and taste characteristic and distinctly aromatic, especially when bruised. Under the microscope sections show an epidermal layer with thick, cuticularized walls having numerous small centrifugal projections; several layers of small, thin-walled parenchyma cells, being usually considerably collapsed; a single large brown elliptical vittæ or oil-tube between each of the primary ribs and surrounded by a layer of comparatively large, yellowish-brown, tangentially elongated cells; a single fibro-vascular bundle more or less surrounded by a few or occasionally numerous, sclerenchymatous fibers; inner epidermis of narrow, thin-walled, elongated cells closely cohering with the brownish tabular cells of the seed-coat; commissural surface usually with 2 large vittæ, a very few stone cells and showing a slight separation of pericarp and seed-coat; endosperm of polygonal, thick-walled, parenchyma cells containing fixed oil and numerous small aleurone grains usually containing a small rosette aggregate of calcium oxalate. The vittæ usually contain yellowish oil globules or a resin-like mass adhering to the walls, and occasionally are divided by a radial wall. Powder: Grayish-brown, mostly of large, irregular fragments; cells of endosperm with aleurone grains, each usually containing a rosette aggregate of calcium oxalate, 0.003 to 0.007 mm. in diameter; fragments with light yellow vittæ and the yellowish-brown cells of the pericarp; fragments with narrow tracheæ and more or less lignified sclerenchymatous fibers.

Physostigma.—Defined as the "dried" seeds. Oblong or ellipsoidal, somewhat compressed reniform, 15 to 30 cm. in length, 10 to 15 mm. in thickness; externally reddish or chocolate brown, smooth, somewhat wrinkled near the brownish-black groove, the latter being 2 mm. in width and extending almost the entire length of the convex edge and in which is found frequently the remains of the white membraneous funiculus, the margins of the seed coat on both sides of the groove somewhat elevated, of a yellowish-red or brownish-red color and somewhat thickened; embryo large, white, with short hypocotyl and two concave-convex cotyledons; taste at first starchy, afterwards acrid. Powder: Grayish-white; starch grains numerous, from 0.005 to 0.150 mm. in diameter, ellipsoidal or somewhat reniform, and usually with a distinct cleft and frequently with radiating or irregular fissures; fragments of seed coat with very thick, reddish-brown cells being either palisade-like shaped, or very irregular and resembling stone cells, but the walls are not lignified; an occasional fragment with tracheæ showing reticulate thickenings. Ash not exceeding 3 percent.

Pilocarpus.—The dried leaflets of Pilocarpus Jaborandi Holmes, in commerce known as Pernambuco Jaborandi, or of Pilocarpus microphyllus, Stapf, known in commerce as Maranham Jaborandi, (Fam. Rutaceæ), with not more than 5 percent. of the rachis (stalks) bearing the leaflets and stems of the same plant. Pernambuco Jaborandi: Leaflets when entire, oval, oblong, or elliptical, 4

to 10.5 cm. in length and 2 to 4 cm. in breadth and with short, stout petiolules; summits more or less rounded or acute and emarginate; bases rounded or acute and mostly unequal; margins, entire and narrowly revolute; very smooth, shiny, coriaceous and glandular-punctate; upper surface grayish to brownish-green, mid-ribs mostly depressed, under surfaces yellowish- or greenish-brown and slightly pubescent on the prominent midvein; peculiarly aromatic when crushed; taste bitterish, becoming somewhat pungent and having a sialagogue effect. Maranham Jaborandi.—Leaflets rhomboidally oval to obovate or elliptical, 1.5 to 5 cm. in length and 1 to 3 cm. in breadth, the lateral ones nearly sessile, the terminal ones on margined petiolules, 0.5 to 1.5 cm. in length; of a nearly uniform grayish or yellowish-green color, rather thin but otherwise resembling Pernambuco Jaborandi. Under the microscope transverse sections show the upper epidermal cells with a yellowish layer of cutin, from 0.005 to 0.010 mm. in thickness; palisade cells, 1 to 3 rows deep, being filled with chloroplastids; among the palisade cells occur large, nearly circular, oil secretion reservoirs 0.080 to 0.150 mm. in diameter; the dorsal pneumatic layer, 10 to 20 rows in depth, the cells occasionally containing rosette aggregates of calcium oxalate from 0.010 to 0.025 mm. in diameter; distributed in the center of the leaf, are the collateral fibro-vascular bundles each surrounded by a more or less interrupted circle of several rows of thick-walled, slightly lignified bast-fibers; tracheæ associated with strongly lignified wood-fibers; among the cells of the lower epidermis occur numerous stomata. On surface view the stomata are broadly elliptical, 0.025 to 0.040 mm. in length, being uniformly smaller in Maranham Jaborandi. Upon both surfaces of Pernambuco Jaborandi occur a number of non-glandular, one-celled hairs, more or less bent or curved, from 0.080 to 0.500 mm. in length, thick-walled and with numerous, slight, centrifugal projections. Powder: Dark green or greenish-brown, epidermal cells on surface view 5- to 6-sided, stomata broadly elliptical, from 0.020 to 0.040 mm. in length, usually with four neighboring cells; fragments of fibro-vascular bundles showing tracheæ with simple or bordered pores or spiral thickenings, associated with thick-walled and strongly lignified wood-fibers; bast-fibers few, walls thick and only slightly lignified; calcium oxalate in rosette aggregates, 0.010 to 0.025 mm. in diameter; fragments of laminæ showing large, oil secretion reservoirs and usually containing one or more globules of an oily substance; non-glandular hairs, having thick walls usually more or less broken, are occasionally found. Ash not exceeding 7 percent.

Piper.—It may include not more than 2 percent. of stems and foreign matter. Nearly globular, 3.5 to 6 mm. in diameter, epicarp very thin, easily separable from the sarcocarp; externally blackish-brown or grayish-black, coarsely reticulate; 1-locular, 1-seeded; seed whitish, hollow, adhering to the pericarp; odor aromatic, slightly empyreumatic; taste aromatic and very pungent. Powder: A mixture of blackish-brown fragments of the pericarp and whitish fragments of the endosperm and embryo; starch grains spherical or somewhat angular, 0.001 to 0.003 mm. in diameter, mostly in the polygonal cells of the endosperm; stone cells of the epicarp varying from nearly isodiametric or palisade-like, to long tapering or somewhat shoe-shaped, with thick, porous walls and large lumina frequently containing a reddish-brown pigment; stone cells of the endocarp

unevenly thickened, the outer walls being usually rather thin, and the lumina usually filled with a reddish-brown substance; oil cells with suberized walls and containing a yellowish oil, in which occasionally separate monoclinic prisms of piperine. Non-volatile ether extract, not less than 6 percent; starch, not less than 25 percent. Ash not exceeding 7 percent. Ash insoluble in diluted hydrochloric acid, not exceeding 2 percent.

Podophyllum.—Defined as the 'dried rhizome and roots." Podophyllum should yield, by the method given under Resina Podophylli, not less than 3 percent. of resin which should conform to the requirements and tests for Resin of Podophyllum. Horizontal, nearly cylindrical, jointed, compressed on the upper and lower surfaces, sometimes branched; in pieces from 3 to 20 cm. in length, the internodes 2 to 9 mm. in diameter; externally dark brown, longitudinally wrinkled or nearly smooth with irregular, somewhat V-shaped scars of scale leaves, nodes annulate, upper portion marked with large, circular, depressed stem-scars and sometimes with buds or stem-bases; at or near the nodes on the lower portion, occur numerous root-scars or roots from 2 to 7 cm. in length and about 2 mm. in thickness; fracture short; internally, bark light brown, wood with small, yellowish, vascular bundles, pith large and white; odor slight; taste sweetish, disagreeably bitter and acrid. Under the microscope a transverse section shows an outer layer of one or two rows of reddish-brown cells; parenchyma of cortex and pith with numerous, single, spherical, polygonal, or 2- to 6-compound starch grains, or rosette aggregates of calcium oxalate; vascular bundles 24 to 34 arranged in a circle between cortex and pith. Powder: Light brown and with a pronounced and characteristic odor; starch grains numerous, spherical, polygonal or 2- to 6-compound, the individual grains from 0.003 to 0.015 mm. in diameter, calcium oxalate crystals few, in rosette aggregates from 0.050 to 0.080 mm. in diameter, and occasionally in raphides 0.030 to 0.090 mm. in length; tracheæ with simple pores or reticulate thickenings; fragments of starch-bearing parenchyma and reddish-brown cork cells. Ash not exceeding 3 percent.

Prunus Virginiana.—To consist of the "stem-bark." Usually in transversely curved pieces from 2.5 to 8 cm. in length and 0.5 to 4 mm. in thickness; outer surfaces light brown or greenish-brown, smooth, except for numerous lenticels from 3 to 4 mm. in length; inner surfaces light brown, longitudinally striate and occasionally fissured; fracture short, granular; odor distinct, bitter-almond-like, when macerated in water; taste astringent, aromatic, and agreeably bitter. Under the microscope sections show a tendency for the separation in radial segments or bands of the phloem tissues from the rather broad medullary rays; periderm usually of a few layers of cells; outer bark from young twigs with 1 or 2 nearly continuous layers of stone cells, the latter being of very irregular shape, often branching and with thick, lamellated, porous walls, medullary rays extending as more or less scythe-shaped groups from the cambium to the outer bark, from 1- to 10-cells in width, some of the cells occasionally being modified to stone cells; in between the medullary rays occur numerous small groups of stone cells, resembling those of the outer bark and occasionally modified to sclerenchymatous fibers; calcium oxalate mostly in crystal-fibers consisting of monoclinic prisms, 0.015 to 0.040 mm. in diameter, also in rosette aggregates,

0.010 to 0.020 mm. in diameter; starch grains numerous, occurring in the medullary rays and parenchyma. Powder: Light brown; bast-fibers and stone cells with thick, strongly lignified walls; crystal-fibers with monoclinic prisms and rosette aggregates of calcium oxalate, from 0.020 to 0.040 mm. in diameter; starch grains nearly spherical, from 0.003 to 0.004 mm. in diameter.

Pyrethrum.—Defined as the "dried" root. Nearly cylindrical, slightly tapering, usually in pieces, 2.5 to 10 cm. in length, 5 to 20 mm. in diameter; externally dark brown, deeply longitudinally furrowed and somewhat wrinkled, occasionally bearing short, tough, hair-like rootlets, crown more or less annulate and occasionally tufted with coarse fibers or with long, soft-woolly nearly straight, 1-celled hairs; fracture short; bark dark brown with 1 or 2 circular rows of resin ducts, closely adhering to the light yellow, radiate, porous wood, in the medullary rays of which occur 1 to 3 rows of resin ducts; odor distinct; taste sweetish, pungent, very acrid, tingling and producing a strong sialagogue effect. Powder: Light to dark brown; consisting of numerous spherical or irregular masses of inulin, the nature of which is especially seen with polarized light, and lignified fragments of the woody tissues and stone cells associated with cork; inulin in spherical granules or irregular masses, 0.010 to 0.100 mm. in diameter; which is not affected upon the addition of iodine T. S., tracheæ with simple pores and reticulate or scalariform thickenings, usually associated with wood parenchyma and with few or no wood-fibers; stone cells in groups resembling those of fruits and seeds, the cells more or less tabular in outline, and with thick, yellowish, porous walls; cork in yellowish-brown or dark brown fragments. Ash not exceeding 5 percent.

Quassia.—Jamaica Quassia: Usually in chips, raspings or shavings, occasionally in billets; yellowish-white or bright yellow, with a few light gray pieces somewhat coarsely grained; fracture tough, fibrous; odor slight; taste bitter. Under the microscope sections of Jamaica Quassia show large tracheæ either single or in groups of 2 to 5, the walls being marked by numerous, small bordered pores, and the contents being often of a yellowish color; medullary rays mostly 1 to 5 cells wide and from 10 to 20 rows deep; calcium oxalate in crystal-fibers near the medullary rays, in 4- to 6-sided prisms, from 0.006 to 0.030 mm. in length; wood-fibers with thin walls and oblique pores; starch grains few, spherical or ellipsoidal, 0.010 to 0.015 mm. in diameter. Surinam Quassia: The crude drug and microscopic sections closely resemble the Jamaica variety; tracheæ usually single or in pairs, sometimes in groups of 3 or 4; medullary rays in narrower and larger groups than in the Jamaica variety, from 1 to 4 cells wide and from 10 to 30 rows deep; calcium oxalate crystals few or entirely wanting and distinguishing this variety from Jamaica Quassia.

Rhamnus Purshiana.—The dried bark of the trunk and branches of Rhamnus Purshiana De Candolle (Fam. Rhamnaceæ). Usually in flattened or transversely curved pieces, occasionally in quills, bark 1 to 5 mm. in thickness; outer surface dark brown or brownish-red, longitudinally ridged, often nearly covered with grayish or whitish lichens, bearing small blackish apothecia, sometimes with numerous lenticels; and occasionally with mosses; inner surface light yellow, light brown, or reddish-brown, longitudinally striate, turning red when moistened with solutions of the alkalies; fracture short, with projections of bast-

fibers in the inner bark; in cross section inner bark shows diagonal or curved medullary rays, forming converging groups, the outer bark showing yellowish groups of stone cells which are especially apparent on moistening the freshly cut surface with phloroglucinol T. S. and hydrochloric acid; odor distinct; taste disagreeable, bitter, slightly acrid. Under the microscope a transverse section shows an outer yellowish-brown or reddish-brown corky layer consisting of 10 to 15 or more rows of cells; stone cells in outer bark in tangentially elongated groups of 20 to 50 cells, the walls being very thick and finely lamellated; medullary rays 1 to 4 cells wide, 15 to 25 cells deep, the contents being colored red upon the addition of solutions of the alkalies to the sections; bast-fibers in tangentially elongated groups in the inner bark, the walls being thick and strongly lignified; crystal-fibers around the bast-fibers with individual crystals from 0.008 to 0.015 mm. in length, parenchyma with spheroidal starch grains about 0.003 to 0.008 mm. in diameter, or with calcium oxalate either in rosette aggregates or prisms from 0.010 to 0.020 mm. in diameter. Add 0.100 Gm. of powdered Cascara Sagrada to 10 Cc. of hot water, shake the mixture occasionally until cold, filter it, and add sufficient water to make 10 Cc.; on the addition of 10 Cc. of ammonia water to this liquid it should be colored an orange yellow. Macerate 0.100 Gm. of powdered Cascara Sagrada with 10 drops of alcohol, boil the mixture with 10 Cc. of water, when cold filter it and shake the filtrate with 10 Cc. of ether; a yellow ethereal solution should separate. Shake 3 Cc. of this ethereal solution with 3 Cc. of ammonia water; the separated ammoniacal solution still should possess, on diluting with 20 Cc. of water, a distinct, yellowish-red color. Powder: Light brown to olive brown, showing the characteristic elongated groups of bast-fibers associated with crystal-fibers, the crystals in the latter being in the form of monoclinic prisms, from 0.008 to 0.015 mm. in length; stone cells in large groups, the cells having thick and finely porous walls; fragments of parenchyma and medullary ray cells colored red upon the addition of solutions of the alkalies; starch grains either free or in parenchyma cells, the individual grains being somewhat spheroidal, from 0.003 to 0.008 mm. in diameter; calcium oxalate in monoclinic prisms or rosette aggregates from 0.010 to 0.020 mm. in diameter; occasional fragments of reddish-brown cork. Ash not exceeding 8 percent.

Rheum.—In subcylindrical, barrel-shaped, conical pieces known in commerce as "rounds," or in plano-convex pieces known in commerce as "flats" or irregular pieces, frequently with a perforation; hard and moderately heavy; attaining a length of 17 cm. and a diameter of 10 cm., or cut in pieces of variable form and size; outer surface yellowish-brown, mottled, with alternating, longitudinal striæ of grayish-white parenchyma and reddish or brownish medullary rays, small stellate groups of fibro-vascular tissue and occasionally reddish-brown cork patches, smooth and sometimes covered with a bright, brownish-yellow powder; fracture uneven and granular, presenting a characteristic, mottled appearance; odor aromatic, characteristic; taste slightly bitter, astringent; gritty when chewed, tingeing the saliva yellow. Under the microscope sections of Rhubarb show numerous thin-walled parenchymatous cells containing either a large number of starch grains or a single rosette aggregate of calcium oxalate; scattered among the parenchyma are stellate groups of compound

fibro-vascular bundles, the latter composed of narrow medullary rays separating the wedges, having large tracheæ in the outer part and separated by a prominent cambium from an internal phloem or sieve; among the grayish-white parenchyma of the inner bark occur narrow, yellowish-brown, irregular medullary rays. Not more than 15 percent. of Rhubarb should have a hollow or dark central area. Powder: Bright orange-yellow to yellowish-brown; becoming red with alkalies; calcium oxalate in rosette aggregates, mostly 0.050 to 0.100 mm. in diameter, occasionally attaining a diameter of 0.150 mm.; starch grains numerous, somewhat spherical, single or 2- to 4-compound, each with a single cleft, from 0.002 to 0.020 mm. in diameter; tracheal fragments few, mostly reticulate, occasionally spiral. Boil 0.100 Gm. of powdered Rhubarb with 10 Cc. of an aqueous solution of potassium hydroxide, (1 in 100) allow it to cool, filter, acidulate the filtrate with hydrochloric acid and shake it with 10 Cc. of ether; on standing, the ethereal layer should be colored yellow. On shaking this ethereal solution with 5 Cc. of ammonia water, the latter should be colored cherry-red (presence of emodin) and the ethereal layer should remain yellow (presence of chrysophanic acid). Diluted alcohol extractive, not less than 30 percent. Ash not exceediing 13 percent.

Sabal.—The partially dried, ripe fruits of Serenoa serrulata (Roemer and Shultes) Hooker filius (Fam. Palmæ). Ellipsoidal or ovoid, occasionally compressed, 1.5 to 3 cm. in length, 1 to 1.5 cm. in diameter; externally brownish-black to bluish-black, smooth and somewhat oily, with a few large, somewhat angular depressions due to the contraction of the inner layer on drying, summit marked by scar of style, and base either with a short stalk or stem-scar; epicarp and sarcocarp together forming a thin coriaceous shell enclosing a hard but thin endocarp which is externally reddish-brown and somewhat fibrous as is also the inner layer of the sarcocarp; inner layer of endocarp smooth, enclosing a hard ellipsoidal or ovoid, somewhat flattened, reddish-brown seed; odor pronounced, aromatic; taste sweetish, aromatic, slightly acrid. Powder: Yellowish-brown, consisting of large, irregular fragments; parenchyma cells of sarcocarp containing a yellowish-brown or brownish-red, amorphous substance; whitish fragments of endosperm, the walls being considerably thickened and with large pores; stone cells occasional, nearly colorless, more or less tabular or irregular in shape, 0.125 mm. in length, walls 0.015 mm. in thickness and with numerous simple or branching pores.

Sanguinaria.—The dried rhizome "and roots" of Sanguinaria canadensis "collected after the death of the foliage" is omitted. Of horizontal growth, occasionally branching, more or less cylindrical, somewhat flattened, from 2 to 7 cm. in length, and from 5 to 15 mm. in diameter; externally dark brown, slightly annulate, with a few stem scars on the upper surface and numerous more or less broken filiform roots and root-scars on the lower surface; fracture short and somewhat waxy, brownish-red, occasionally yellowish-white, with numerous, small, circular, yellowish fibro-vascular bundles within about 1 mm. of the epidermis, pith very large; odor slight; taste persistently acrid and bitter. Under the microscope transverse sections of the rhizome show an outer layer of a single row of thin-walled epidermal cells, a cortex of 10 to 15 rows of thin-walled parenchyma cells containing numerous starch grains, or a small amount

of fixed oil; a zone of cambium, most of which is interfascicular; a narrow circular zone of small collateral fibro-vascular bundles, separated from each other by parenchyma; pith large, consisting of starch-bearing parenchyma cells; latex cells containing a red or orange colored secretion, either isolated or connected into irregular chains and distributed among the parenchymatous cells of the middle bark and pith; sections treated with glycerin show in the secretion cells, after 24 hours, spheroidal aggregates of crystals which strongly polarize light. Powder: Brownish-red, sternutatory; starch grains numerous, 0.003 to 0.020 mm. in diameter, being mostly single, seldom 2- to 3-compound, the individual grains nearly spherical or ovoid, sometimes more or less plano-convex, somewhat resembling those of wheat starch in outline but which polarize light more strongly; numerous fragments of short latex cells with reddish-brown resinous masses; tracheal fragments few, having numerous transverse slit-like pores.

Santalum Rubrum.—Usually in the form of a coarse powder, of a brownish-red or dark saffron color and nearly inodorous and tasteless. Under the microscope it shows numerous wood-fibers which are mostly irregular in outline, with sharply pointed and occasionally forked ends, the individual fibers from 0.300 to 0.750 mm. in length, the walls being very thick, porous, yellowish, unevenly thickened and strongly lignified, and the lumina being filled with a fine, granular, protoplasmic content; occasional tracheæ with simple or bordered pores and filled with light lemon-yellow, resinous masses; occasionally fragments showing medullary ray cells in narrow elliptical groups 1 cell wide and 3 to 6 cells deep; also occasional groups of crystal-fibers with calcium oxalate in the form of monoclinic prisms, from 0.010 to 0.020 mm. in diameter. Mounts in hydrated chloral T. S. are of a deep, rich, red color. Add 0.500 Gm. of Red Saunders to 10 Cc. of Alcohol; the solution should become distinctly red. Add 0.500 Gm. of Red Saunders to 10 Cc. of ether; the solution should assume an orange-yellow color and when held in a bright light should show a distinct, greenish fluorescence. Add 0.005 Gm. of Red Saunders to 10 Cc. of water; the solution should remain clear and colorless. Ash not exceeding 3 percent.

Sarsaparilla.—The dried root of Smilax medica Chamisso and Schlechtendal, known in commerce as Mexican Sarsaparilla; or Smilax officinalis Kunth, or an undetermined species of Smilax, known in commerce as Honduras Sarsaparilla; or Smilax papyracea Duhamel, known in commerce as Para Sarsaparilla; or Smilax ornata Hooker filius known in commerce as Jamaica Sarsaparilla (Fam. Liliaceæ). Mexican Sarsaparilla: In loose bundles, or pressed into bales, single bundles attaining a length of 60 cm. and composed of 20 to 35 folded roots attached to a crown with one or more stout stems; roots 3.5 to 6 mm. in diameter; externally grayish-brown to dark brown, minutely hairy, longitudinally furrowed, the furrows containing more or less of a blackish earth; fracture tough, fibrous; internally light brown with a more or less shrunken, mealy or sometimes horny cortex surrounding the porous central cylinder, pith distinct; nearly inodorous; taste mucilaginous, somewhat sweetish and acrid. The woody, knotty crown with portions of the overground stems should be removed. Honduras Sarsaparilla: In more or less compact, cylindrical bundles, attaining a length of 55 cm. and a diameter from 8 to 15 cm., consisting of the long, folded roots bound together by roots of the same plant; roots 2 to 6

mm. in diameter; externally dark or reddish-brown, longitudinally furrowed, the furrows usually free from soil; fracture fibrous; internally consisting of a grayish-white or dark brown cortex, a light yellow and porous central cylinder and a whitish pith; taste mucilaginous and slightly acrid. Para Sarsaparilla: In very compact, cylindrical bundles, attaining a length of 1 M. and a diameter of 20 cm., closely bound with the stem of a vine and with the ends evenly trimmed; the roots otherwise resembling those of Honduras Sarsaparilla. Jamaica Sarsaparilla: In more or less compact and somewhat flattened bundles, 30 to 45 cm. in length, 10 to 15 cm. in width, consisting of the folded roots loosely bound with roots of the same plant; roots 2 to 5 mm. in diameter; externally grayish-brown to reddish-brown, longitudinally wrinkled, more or less furrowed and bearing numerous coarse fibrous rootlets; taste slightly sweetish and bitterish. Under the microscope transverse sections of all of the commercial varieties of Sarsaparilla show an epidermal layer with basal portions of root hairs; a hypodermis composed of several layers of strongly lignified cells, the walls being uniformly thickened except in Mexican Sarsaparilla in which the inner walls are only slightly thickened; a cortex composed of numerous parenchyma cells mostly containing starch, some containing resin or raphides of calcium oxalate; and endodermis of a single layer of strongly lignified cells, the walls being uniformly thickened except in Mexican Sarsaparilla in which the outer walls are only slightly thickened; a central cylinder composed of radial bundles connected with sclerenchymatous fibers, the tracheæ being large and oval and the phloem in small groups at the periphery of the bundle; and a pith composed of starch-bearing parenchyma. Powder: Light grayish-brown to dark grayish-brown; starch grains numerous 0.003 to 0.023 mm. in diameter, spherical, or biconvex or spherical-tetrahedral, single, or 2- to 4-compound, and frequently with a central elliptical cleft; calcium oxalate in raphides, 0.006 to 0.035 mm. in diameter, occurring singly or in groups; cells of the hypodermis and endodermis with lemon-yellow or reddish-yellow porous walls and in the case of Mexican Sarsaparilla showing an uneven or irregular thickening, the individual cells, 0.080 to 0.500 mm. in length; fragments of tracheæ with simple and bordered pores or scalariform or reticulate thickenings associated with sclerenchymatous fibers having rather thin, very slightly lignified and porous walls. Ash not exceeding 10 percent.

Sassafras.—The drug may include not more than 2 percent. of adhering wood. In irregularly transversely curved or quilled pieces, 1 to 15 cm. in length, 1 to 4 mm. in thickness; outer surface orange-brown, nearly smooth and marked with more or less irregular ridges; inner surface light to dark reddish-brown, obscurely short-striate; fracture short with a thin reddish-brown corky layer and a yellowish-white inner bark; odor aromatic; taste slightly mucilaginous, astringent, aromatic and somewhat pungent. Powder: Light reddish-brown, containing numerous starch grains and prominent, characteristic bast-fibers; starch grains either single or 2- to 4-compound, the individual grains being more or less spherical or polygonal and frequently with a distinct cleft, 0.003 to 0.020 mm. in diameter, some of the swollen or altered grains attaining a diameter of 0.030 mm.; bast-fibers spindle-shaped, occasionally very irregular in outline, with sharply pointed ends, from 0.150 to 0.400 mm. in length, 0.025 mm. in

diameter, and with very thick, strongly lignified walls, the lumina being frequently nearly obliterated; parenchyma cells containing either starch grains or irregular yellowish-red masses of tannin and becoming bluish-black upon the addition of ferric chloride T. S., fragments of wood few, with large, thin-walled tracheæ marked by simple pores and associated with rather thin-walled wood-fibers. Ash not exceeding 30 percent.

Scammoniæ Radix.—The dried root of Convolvulus Scammonia, Linné (Fam. Convolvulaceæ), yielding when assayed by the process given below, not less than 8 percent. of total resins of Scammony Root. Cylindrical or somewhat tapering, from 10 to 25 cm. in length, 1 to 4.5 cm. in thickness; externally grayish to reddish-brown; usually distinctly twisted, deeply longitudinally furrowed, marked by distinct root scars, otherwise nearly smooth except for the lenticels and abraded cork, the upper portion terminated usually by a number of short stem branches; hard and heavy; fracture tough, irregular with projecting wood-fibers; internally somewhat mottled showing yellowish, porous wood-wedges separated by whitish parenchyma containing starch and resin; bark thin; odor slight, resembling that of jalap; taste very slightly sweet becoming slightly acrid. Under the microscope sections of Scammony Root show a corky layer consisting of 2 to 10 rows of cells with thin, yellowish-brown lignified walls; an outer cortex with numerous stone cells occurring singly or in small groups, the walls being moderately thick, porous and not strongly lignified; parenchyma with numerous starch grains and monoclinic prisms of calcium oxalate; fibro-vascular bundles numerous, circular or elliptical with a well developed wood consisting of large tracheæ surrounded with slightly lignified wood-fibers; phloem and sieve prominent and in which are included large resin ducts; the parenchyma both in and surrounding the bundles more or less collapsed and containing either starch or calcium oxalate crystals. Powder: Light grayish-brown; starch grains from 0.003 to 0.018 mm. in diameter, mostly single, occasionally 2- to 4-compound, the grains showing occasionally a central cleft; calcium oxalate crystals numerous, in monoclinic prisms from 0.010 to 0.045 mm. in length, fragments of leptome or sieve with yellowish-brown resin cells; tracheæ mostly with reticulate thickenings and simple or bordered pores and associated with short wood-fibers with prominent oblique pores; stone cells of variable shape and varying from 0.040 to 0.110 mm. in length, the walls being from 0.006 to 0.012 mm. in thickness, slightly lignified and traversed with prominent often branching pores; lignified cork cells relatively few.

Scilla.—The fleshy, inner scales of the bulb of the white variety of Urginea maritima Linné Baker (Fam. Liliaceæ) cut into pieces and carefully dried. In irregular, more or less curved, somewhat flattened and translucent pieces, 0.5 to 5 cm. in length, yellowish-white, nearly smooth and shiny with slight projections of fibro-vascular bundles, brittle when dry and somewhat flexible when damp; odor slight; taste bitter and acrid. Under the microscope sections of the scales show on the upper and lower surfaces a thin-walled, epidermal layer, a mesophyll of nearly isodiametric or slightly elongated thin-walled cells, and occasionally showing in alcoholic or glycerin mounts spheroidal aggregates of a carbohydrate; numerous more or less rectangular cells containing mucilage and bundles of raphides of calcium oxalate, the latter from 0.075 to 1.0 mm. in

length; fibro-vascular bundles few and isolated, with spiral or reticulate tracheæ. Occasionally some of the parenchyma cells contain a few, somewhat spherical starch grains. Powder: Light yellow, with a tendency to cake in moist atmosphere, consisting of very irregular fragments; single crystals and bundles of long raphides of calcium oxalate numerous; fragments of thin-walled, colorless parenchyma, frequently with dark intercellular spaces due to the inclusion of air; fragments with spiral or reticulate tracheæ occasional. Ash not exceeding 8 percent.

Senega.—The roots may include not more than 5 percent. of stems and other foreign matter. Usually in broken pieces, when entire, slenderly conical, more or less tortuous, somewhat branched, 3 to 15 cm. in length and 2 to 10 mm. in thickness and bearing a few rootlets; crown knotty with numerous buds and short stem-bases; externally brownish-yellow, the crown rose-tinted, longitudinally wrinkled, frequently marked by a keel; fracture short, wood pale yellow, usually eccentrically developed, odor peculiar, penetrating, taste sweetish, afterwards acrid. Under the microscope transverse sections usually show a characteristic eccentric development of wood, the central cylinder varying in outline from elliptical or ovate to irregularly fan-shaped, and being surrounded by an unevenly developed cortex being thickest outside the broadest strands of wood, and where the wood wedges are narrow and the medullary rays very broad, the cortical parenchyma occupies a very narrow zone of the cross-section; in older roots a corky layer of 4 or 5 rows of tangentially elongated, light yellowish or yellowish-brown cells; outer bark of about 20 rows of cells on one side of the root and only 10 or less on the other, the cells having slightly thickened walls and containing a colorless or pale yellowish amorphous substance, which is liberated in the form of large globules on the addition of a drop of potassium hydroxide T. S.; inner bark, the cells in radial rows, consisting of parenchyma, small groups of sieve tissue, and medullary rays, the latter 1 to 3 cells wide, all the cells in this zone show a collenchymatous thickening of the walls and contain an amorphous substance similar to that found in cells of the outer bark; woody layer of tracheæ with bordered pores, wood-fibers with oblique, simple pores, tracheids, and medullary rays, the latter being rather indistinct and resembling the wood-fibers; tissues of the central layer of wood colored yellowish or reddish-brown on the addition of a drop of potassium hydroxide T. S. Powder: Yellowish-gray to light yellowish-brown, odor penetrating, slightly sternutatory; consisting of a mixture of fragments of parenchyma containing oily globules and wood-fibers with tracheæ; wood-fibers, non-lignified and with oblique, simple pores, from 0.175 to 0.250 mm. in length; tracheæ with simple and bordered pores and about 0.175 mm. in length; medullary ray cells somewhat lignified and with large simple pores. Extract 10 Gm. of powdered Senega by means of a Soxhlet apparatus, using 50 Cc. of ether to which 2 drops of hydrochloric acid have previously been added. Continue the extraction for 4 or 5 hours and then add sufficient ether to make the liquid measure 50 Cc. Take 25 Cc. of this solution and evaporate it on a water-bath to dryness, the residue should not weigh less than 0.300 Gm. and upon dissolving the residue with 10 Cc. of chloroform, transferring it to a test-tube and pouring 5 Cc. of sulphuric acid beneath the solution, a reddish-brown color should be produced

at the zone of contact and the sulphuric acid should show a slightly green fluorescence after the mixture has stood for twenty-four hours. If 10 Cc. of the original ethereal solution be poured in a beaker in which previously has been placed 10 Cc. of water and the mixture warmed on a water-bath until the ether has been evaporated, the aqueous solution, upon filtering and adding a few drops of ferric chloride T. S., should become a bright pink-purple. Ash not exceeding 5 percent.

Senna.—The drug may include not more than 10 percent. of stem tissues, pods, seeds, and other impurities. Alexandria Senna: Usually entire, sometimes more or less broken, leaflets inequilaterally lanceolate or lance-ovate, from 2 to 3.5 cm. in length, from 6 to 10 mm. in breadth, having extremely short, stout petiolules; acutely cuspidate, entire, subcoriaceous brittle, pale green or grayish-green, sparsely and obscurely hairy, especially beneath, the hairs appressed; odor characteristic; taste somewhat mucilaginous and bitterish. Pods few, broadly elliptical, somewhat reniform, dark green, thin and membraneous. India Senna: Leaflets usually entire, from 2 to 5 cm. in length, and from 6 to 14 mm. in breadth, usually more abruptly pointed than those of Alexandria Senna, yellowish-green and smooth above, paler beneath; in odor and taste closely resembling Alexandria Senna. Pods few, elliptical, more or less reniform and from 4 to 5 cm. in length. Powder: Alexandria Senna; light green; nonglandular hairs, 1-celled, conical, often curved, from 0.100 to 0.350 mm. in length, walls thick and papillose; calcium oxalate in rosette aggregates, from 0.009 to 0.010 mm. in diameter, and in 4- to 6-sided prisms, about 0.015 mm. in length, usually in crystal-fibers; stomata broadly elliptical, about 0.020 mm. in long diameter. In India Senna the powder is slightly darker green than that of Alexandria Senna and the hairs are relatively fewer. Mix 0.5 Gm. of powdered Senna with 10 Cc. of a solution of potassium hydroxide in alcohol (1 in 10), boil the mixture for about 2 minutes, dilute it with 10 Cc. of water and filter. Then acidify the filtrate with hydrochloric acid, shake it with ether; remove the ethereal layer and shake it with 5 Cc. of ammonia water; the latter should be colored yellowish-red. Ash not exceeding 12 percent. Ash insoluble in hydrochloric acid not exceeding 3 percent.

Serpentaria.—The drug may include not more than 10 percent. of the stems. Rhizome oblique, subcylindrical, more or less curved, from 10 to 30 mm. in length and from 1 to 2 mm. in diameter; externally dark brown, upper portion with short stem-bases, from lower and lateral portions, and numerous, long, thin, nearly straight, yellowish-brown roots; fracture short; internally yellowish-white, wood with broad, eccentric wedges; odor terebinthinate; taste bitter, aromatic. Under the microscope transverse sections of the rhizome show an outer layer of cork cells; a cortex of 10 to 15 rows of parenchyma, inner bark with strongly lignified bast-fibers either single or distributed in a more or less interrupted circle; a xylem of broad wood wedges separated by broad medullary rays about 8 cells wide, the walls being strongly lignified and with numerous simple pores; pith eccentric, composed of polygonal cells, the walls being lignified and porous. Starch in the cells of cortical parenchyma, medullary rays and pith. The root in transverse section shows a compact, 4- to 6-rayed stele, and a large starch-bearing cortical area. The stem in transverse section

shows an interrupted circle of 6 to 10 fibro-vascular bundles; a cortex with a prominent, continuous ring of strongly lignified cells, and a few non-glandular hairs. Powder: Grayish-brown; starch grains numerous, single and 2- to 4-compound, the individual grains being more or less spherical or plano-convex, and frequently with a central cleft; from 0.003 to 0.014 mm. in diameter; lignified elements numerous, consisting of tracheæ, wood-fibers, medullary ray cells and pith cells; a few non-glandular hairs of the stem are occasionally present.

Sinapis Alba.—The drug may include not more than 5 percent. of other harmless seeds and other foreign matter. Subglobular, from 1.5 to 2.5 mm. in diameter; testa yellowish, nearly smooth; embryo yellowish, oily, with 2 large cotyledons; inodorous, taste mildly pungent, acrid. Powder: Light yellowish or pale brownish-yellow, developing a slight odor when moistened; consisting mostly of tissues of the embryo, containing small aleurone grains and a fixed oil, the latter forming in large globules on the addition of hydrated chloral T. S.; fragments of seed-coat comparatively few, nearly colorless with small, characteristic stone cells and large epidermal cells, the outer walls being mucilaginous. White Mustard does not yield allyl isothiocyanate upon distillation with steam (distinction from Black Mustard). Starch not exceeding 2.5 percent. Starch test of U. S. P. VIII omitted. Ash not exceeding 9 percent.

Sinapis Nigra.—The drug may include not more than 5 percent. of other harmless seeds and other foreign matter. Ellipsoidal or irregularly spheriodal, from 1 to 1.6 mm. in diameter; testa deep reddish-brown, sometimes yellowish-brown and with a grayish tinge, minutely pitted or reticulate; embryo greenish-yellow or dark yellow, oily, with 2 large cotyledons; odor when dry, slight, on moistening very irritating; taste strongly pungent, acrid. Powder: Light brown or greenish-brown; on moistening developing a strong, pungent, irritating, characteristic odor; consisting mostly of tissues of the embryo, the cells containing small aleurone grains and a fixed oil, the latter forming in large globules on the addition of hydrated chloral T. S.; fragments of seed-coat conspicuous, with large polyhedral, dark yellow areas, enclosing small yellowish stone cells each of the latter with a dark lumen. The powder should contain few or no starch grains. Black mustard upon distillation with steam yields allyl isothiocyanate (distinction from White Mustard). Starch not more than 2.5 percent. Starch test of U. S. P. VIII omitted. Ash not exceeding 9 percent.

Spigelia.—The rhizome and roots may include not more than 10 percent. of stems and other foreign matter. Rhizome horizontal or slightly oblique, more or less flexuous, somewhat branched, from 1.5 to 5 cm. in length, from 2 to 5 mm. in diameter; externally dark brown, slightly annulate with scars of bud scales, the upper surface knotty from approximate stem-bases, bearing cup-shaped scars; from the lower and lateral portions arise numerous long, rather coarse, sparingly branched, brittle roots; fracture short, internally differentiated into three nearly equal zones of pith, wood and bark; odor slightly aromatic; taste bitter, pungent. Few, if any, of the roots should exhibit thin, terminal portions with the bark stripped from the slender strands of wood; stems usually attached to the upper portions of the rhizome nearly cylindrical, attaining a length of 6 cm. and a diameter of 3 mm., light grayish-brown to purplish-brown, nodes

annulate, marked by opposite leaf-scars. Under the microscope transverse sections of the rhizome show a dark brown, more or less exfoliated epidermal layer; a cortex composed of 10 to 15 rows of starch-bearing parenchyma; a distinct zone of sieve tissue from 0.075 to 0.150 mm. in width; a compact woody area composed of tracheæ and tracheids which are hardly distinguishable from each other, both kinds of vessels being marked with bordered pores; an internal sieve closely resembling the sieve in the bark; and a pith composed of fairly uniform, nearly polygonal, thin-walled cells, more or less filled with small starch grains. Cystoliths and stone cells are both absent (distinction from Ruellia ciliosa Pursh. [Fam. Acanthaceæ]). Transverse sections of the root show a rather large cortex, the cells of which are more or less filled with small starch grains and a central stele of 6 or 8 radial fibro-vascular bundles which in the older roots are united by a strong development of lignified cells. The stem in transverse section is distinguished from the rhizome by a narrower woody zone, the tracheæ having spiral thickenings, and by a nearly uninterrupted circle of non-lignified bast-fibers in the bark. Powder: Grayish-brown; starch grains relatively numerous, frequently relatively few, spherical or slightly angular, from 0.002 to 0.006 mm. in diameter; fragments containing lignified tracheæ and tracheids conspicuous; fragments of tracheæ with spiral thickenings relatively few; bast-fibers few, very long, non-lignified, occasional fragments of the reddish-brown epidermal cells. Ash not exceeding 10 percent.

Staphisagria.—The drug may include not more than 2 percent. of foreign vegetable matter. Irregularly triangular, flattened, or somewhat tetrahedral, one side being convex, from 4 to 7 mm. in length, from 3 to 6 mm. in breadth; externally dark brown, becoming lighter with age, and coarsely reticulate; easily cut, showing a somewhat light brown oily endosperm, enclosing a small embryo at the pointed end; odor slight, disagreeable; taste intensely bitter and acrid. Under the microscope transverse sections show an outer layer of nearly tabular, thick-walled, non-lignified cells, some being extended centrifugally, and forming the reticulations of the seed-coat; 2 or 3 rows of parenchyma cells with more or less irregular thin walls; a thin layer of very small, thick-walled cells with numerous, lattice-like or reticulate pores; endosperm large, composed of polygonal cells enclosing small aleurone grains and fixed oil, the latter forming in large globules on the addition of hydrated chloral T. S.

Stillingia.—When entire, terete, unequally tapering, rarely branched, attaining a length of 40 cm., from 0.5 to 3 cm. in diameter, usually in pieces; externally reddish-brown, longitudinally wrinkled; fracture very fibrous, externally, the bark light reddish-brown, thick, spongy, finely fibrous, with numerous resin cells and easily separable from the porous, radiate wood; odor distinct; taste bitter, acrid and pungent. Powder: Pinkish-brown or light reddish-brown; starch grains numerous, from 0.005 to 0.035 mm. in diameter, mostly single, very variable shape, and usually with a central cleft, numerous fragments, with more or less tabular secretion cells, containing a reddish-brown, amorphous, resinous substance; fragments of tracheæ mostly with simple pores and associated with wood-fibers, the walls being very thin, lignified and possessing numerous, transverse slit-like, simple pores; bast-fibers long, narrow, the walls thick and slightly lignified; fragments of reddish-brown cork cells; occasionally a crystal of cal-

cium oxalate in rosette aggregates about 0.035 mm. in diameter. Ash not exceeding 5 percent.

Stramonium.—The dried leaves of Datura Stramonium Linné, or of Datura Tatula Linné, (Fam. Solanaceæ), with not more than 10 percent. of stems and other foreign matter. Usually much wrinkled and either loose or more or less matted together; laminæ when entire from 2 to 30 cm. in length, having petioles from 0.5 to 8 cm. in length; inequilaterally ovate, summits acute or acuminate, bases unequal, one side extending from 3 to 12 mm. below the other, margins sinuate, toothed or angled, the teeth being few, acute or acuminate and with rounded sinuses, frequently with numerous circular perforations which may have become filled with cork; upper surfaces dark green, sparsely hairy, especially upon the veins, lower surfaces light green; odor distinct, heavy and narcotic, taste unpleasant, nauseous; stems cylindrical, usually flattened, attaining a length of 30 cm. and a diameter of 7 mm.; longitudinally wrinkled, occasionally with 1 or more deep furrows, light greenish-brown to purplish-brown. Powder: Brownish-green; upon clearing the fragments with hydrated chloral T. S., numerous elliptical stomata are observed, about 0.025 mm. in length, and surrounded usually with 3 neighboring cells; cells of the mesophyll containing numerous small chloroplastids; calcium oxalate either in rosette aggregates, from 0.010 to 0.020 mm. in diameter, or in rod-like crystals, or in the form of sphenoidal micro-crystals; non-glandular hairs few, characteristic, 2- to 4-celled, attaining a length of 0.500 mm., the basal cell about 0.040 mm. in width, some of the cells more or less collapsed, the outer walls with numerous, slight, centrifugal projections; glandular hairs few, with 1- to 2-celled stalks and usually 2- to 4-celled, glandular heads; tracheæ annular or spiral, fragments of the tracheal wall frequently detached. Stem fragments show large annular or spiral tracheæ which occasionally are thickened, with simple or bordered pores and associated with wood parenchyma; fragments with long, narrow, unequally thickened collenchymatous cells; parenchyma with sphenoidal micro-crystals; wood-fibers occasional; bast-fibers absent. Ash not exceeding 20 percent.

Strophanthus.—The dried, ripe seeds of Strophanthus Kombé Oliver, or of Strophanthus hispidus De Candolle (Fam. Apocynaceæ), deprived of the long awn. Lance-ovoid, flattened and obtusely edged; from 7 to 20 mm. in length, about 4 mm. in breadth and about 2 mm. in thickness; externally of a light fawn color with a distinct greenish tinge, silky lustrous from a dense coating of closely appressed hairs, (S. Kombé), or light to dark brown, nearly smooth and sparingly hairy (S. hispidus), bearing on one side a ridge running from about the center to the summit; fracture short and somewhat soft, the fractured surface whitish and oily; odor heavy when the seeds are crushed and moistened; taste very bitter. Under the microscope sections of Strophanthus Kombé show a seed-coat composed of several layers of more or less collapsed, thin-walled cells and from the epidermal layer arise numerous non-glandular hairs, which are from 0.200 to 0.800 mm. in length, usually more or less bent, thin-walled, and slightly lignified at the base; in the raphe occurs a tangentially elongated fibro-vascular bundle having numerous spiral tracheæ; endosperm of from 9 to 30 rows of more or less polygonal cells with slightly thickened walls and containing small aleurone grains, a fixed oil and strophanthin, the latter being colored bright green

upon the addition of sulphuric acid; in the center occur two large plano-convex cotyledons having a distinct epidermal layer, a few fibro-vascular bundles and numerous parenchyma cells containing aleurone grains, a fixed oil and occasionally a small amount of strophanthin. Sections of Strophanthus hispidus resemble those of S. Kombé, the hairs being fewer, the bases of which are more strongly lignified. Powder: Grayish-brown to dark brown; odor distinct; consisting chiefly of thin-walled parenchyma cells and fragments of long, thin-walled hairs, the latter relatively few in S. hispidus; mounts made with hydrated chloral T. S. show oil globules; many of the fragments of the endosperm may be colored greenish upon the addition of sulphuric acid. The tests with iodine T. S., ferric chloride T. S. and mercuric potassium iodide T. S., omitted. Ash not exceeding 5 percent.

Sumbul.—The roots of Ferula Sumbul (Kauffmann) Hooker filius (Fam. Umbelliferæ). In transverse segments, attaining a length of 10 cm. and a diameter of 7 cm.; externally light brown to dark brown, longitudinally wrinkled and showing in the upper portions a smooth, grayish, epidermal layer, occasionally with the short stem-bases attached; fracture short, fibrous, spongy; internally light yellow or brownish-yellow, arrangement of wood irregular and with yellowish-brown or blackish resinous patches frequently extending over the entire ends of the segments; odor peculiar, musk-like; taste bitter and somewhat aromatic. Powder: Grayish-brown; consisting of numerous, irregular, brownish-black fragments and well defined isolated tracheæ, the latter with distinct end-walls, and mostly with reticulate thickenings and from 0.030 to 0.100 mm. in width, occasional fragments of polygonal epidermal cells with yellowish-brown walls; numerous, nearly colorless, yellowish-brown and reddish-brown fragments consisting of a granular substance in which the cellular structure is not well-defined; long, narrow fragments consisting of more or less collapsed leptome or sieve tissue; occasional fragments of well defined parenchyma with a few nearly spherical starch grains from 0.003 to 0.012 mm. in diameter.

Taraxacum.—The dried rhizome and roots of Taraxacum officinale Weber (Fam. Compositæ). Directions for collecting omitted. Cylindrical or somewhat flattened, gradually tapering, usually broken in pieces, from 6 to 15 cm. in length, from 5 to 15 mm. in thickness; externally brown or blackish-brown, longitudinally wrinkled, having numerous root and rootlet-scars; crown simple or branched with numerous leaf-bases showing annulate markings; odor slight or inodorous; taste bitter. Under the microscope sections of the root show a porous, pale yellow wood from 1 to 4 mm. in diameter, surrounded by a light brown bark from 2 to 6 mm. in thickness, the latter composed of concentric layers of laticiferous vessels and sieve tissues, alternating with whitish inulin-bearing parenchyma. The rhizome portions show a small pith. Powder: Light brown; parenchyma cells large, thin-walled and containing irregular masses of inulin; fragments with yellowish-brown laticiferous vessels; tracheæ reticulate; intermediate fibers non-lignified, with irregular, simple and oblique pores. Ash not exceeding 10 percent.

Tragacantha.—The spontaneously dried gummy exudation from the stems of Astragalus gummifer Labillardière, or from other Asiatic species of Astragalus (Fam. Leguminosæ). In flattened, lamellated fragments varying from ribbon-

shaped bands to long and linear pieces, which may be either straight or spirally twisted, and from 0.5 to 2.5 mm. in thickness; whitish to light brown in color, translucent and horny; fracture short, rendered more easily pulverizable by heating to 50° C.; inodorous; taste insipid, mucilaginous. Under the microscope sections made from Tragacanth previously softened in water and mounted in glycerin should show the lamellæ of mucilaginous walls and a few starch grains, the latter being mostly spherical and single, occasionally 2- to 3-compound, the individual grains from 0.003 to 0.017 mm. in diameter and colored blue with iodine. Indian Gum, derived from plants of uncertain origin, upon similar treatment and examination, shows numerous threads of a granular substance, sometimes the hyphæ of a fungus and chains of bacteria, and occasional fragments of a yellowish-brown or reddish-brown color, containing lignified wood-fibers, a few rosette aggregates of calcium oxalate from 0.020 to 0.030 mm. in diameter, and a few spherical starch grains from 0.003 to 0.007 mm. in diameter. Add 1 Gm. of Tragacanth to 50 Cc. of distilled water; it should swell and form a smooth, nearly uniform, stiff, opalescent mucilage and should be free from cellular fragments. Indian Gum upon similar treatment forms an uneven mucilage containing a few reddish-brown fragments which are more apparent and on stirring separate in the form of coarse, uneven strings. Shake 2 Gm. of Tragacanth with 100 Cc. of water until fully swollen and free from lumps, then add 2 Gm. of powdered sodium borate, and shake the mixture thoroughly until the salt is dissolved; the mucilage should not lose its transparency, nor exhibit any change in consistence, and on pouring should not be slimy or stringy, even after standing 24 hours (absence of foreign gums). Boil 1 Gm. of Tragacanth with 20 Cc. of water until a mucilage is formed, then add 5 Cc. of hydrochloric acid and again boil the mixture for five minutes; no pink nor red color should develop (absence of Indian Gum). Powder: Whitish; forming with water a translucent mucilage and exhibiting numerous starch grains from 0.003 to 0.025 mm. in diameter, varying from spherical to elliptical, with occasional 2- to 4-compound grains, many of the grains being swollen and more or less altered, due to the drying of the Tragacanth before powdering. Powdered Indian Gum shows numerous fragments of lignified vegetable tissue. Ash not exceediing 3.5 percent.

Triticum.—Usually cut in pieces from 4 to 12 mm. in length and from 1 to 2.5 mm. in diameter; externally light yellow or yellowish-brown, longtiudinally furrowed, smooth, shiny, nodes with circular leaf-scars, a few root-scars and occasional slender roots; fracture tough, fibrous; internally lemon-yellow and with a large, hollow pith; odor slight, aromatic; taste sweetish. Roots filiform, irregularly branching, attaining a length of 5 cm. and not more than 0.5 mm. in thickness, light brown or yellowish brown, frequently covered with long root-hairs. Under the microscope, transverse sections show a single layer of strongly lignified epidermal cells; a hypodermis of 3 to 6 rows of more or less polygonal cells with strongly lignified walls; a cortex of 10 to 16 rows of thin-walled parenchyma cells, occasionally with nearly spherical starch grains about 0.005 mm. in diameter, or with irregular masses of a more or less soluble carbohydrate; among the parenchyma cells and near the hypodermis occur small, widely separated fibro-vascular bundles each with a closed sheath of sclerenchymatous fibers;

an endodermis, the lateral and inner walls of the cells being moderately thickened, strongly lignified and somewhat porous; several layers of sclerenchymatous fibers immediately inside the endodermal ring, in which are embedded an interrupted circle of collateral fibro-vascular bundles having large tracheæ; adjoining these are usually 8 to 10 rows of parenchyma cells with a few fibro-vascular bundles and a pith in which the parenchyma cells are more or less broken or absent. Powder: Light yellowish; consisting of irregular, lignified fragments, numerous fragments showing tracheæ with annular or spiral thickenings or marked with simple pores and associated with long, narrow, rather thin-walled, strongly lignified, sclerenchymatous fibers; fragments of epidermis made up of cells rectangular in outline, the longer walls considerably thickened, strongly lignified and marked with numerous transverse pores; ends of epidermal cells usually separated from each other by a very narrow cell with thin walls and few pores; numerous fragments of parenchyma rectangular in outline and with thin, porous walls. Ash not exceeding 3 percent.

Ulmus.—Usually in bundles consisting of flat, oblong pieces 30 cm. in length, from 10 to 15 cm. in width; outer surface of a light brown or buff color with occasional dark brown patches of adhering cork, longitudinally striate and with detached bundles of bast-fibers, and colored blackish upon the addition of a very diluted iodine T. S.; inner surface light yellowish-brown nearly smooth and finely striate, only slightly darkened upon the addition of a very diluted iodine T. S.; fracture fibrous with projecting bast-fibers, the broken surface porous, due to the large mucilage cells; odor distinct; taste mucilaginous. Powder: Very light brown; consisting mostly of fibrous fragments, and a finely granular portion made up of small starch grains, the latter being immediately colored bluish-black upon the addition of iodine T. S.; starch grains mostly spherical or more or less polygonal, usually about 0.003 mm. in diameter, but also attaining a diameter of 0.025 mm.; bast-fibers very long, about 0.020 mm. in diameter, with rather thin, slightly lignified walls; calcium oxalate in monoclinic prisms, mostly in crystal-fibers, the individual crystals from 0.010 to 0.025 mm. in diameter; fragments of large mucilage cells with adhering starch grains. Macerate 1 part of powdered Ulmus with 40 Cc. of distilled water for an hour and filter; the filtrate should be of a rather thick, mucilaginous consistence.

Uva Ursi.—The drug may include not more than 5 percent, of stems and other foreign matter. Usually more or less entire, laminæ obovate or oblong, spatulate, from 12 to 30 mm. in length, 5 to 13 mm. in breadth; summits obtuse or rounded; margins entire, slightly revolute; bases cuneate, tapering into short, stout petioles; upper surfaces dark green, glabrous and shiny, finely reticulate; under surfaces yellowish-green and slightly pubescent, especially on the midribs; coriaceous; fracture short; odor aromatic, tea-like; taste astringent and somewhat bitter. Powder: Olive green; consisting of irregular fragments; epidermal cells polygonal, those of the lower surface showing broadly elliptical stomata about 0.035 mm. in length, surrounded by 5 to 8 neighboring cells; cells of mesophyll with chloroplastids and frequently irregular masses of a carbohydrate; fragments of fibro-vascular bundles with spiral tracheæ associated with narrow, strongly lignified sclerenchymatous fibers and frequently also with crystal-fibers

showing monoclinic prisms, from 0.006 to 0.015 mm. in diameter; numerous fragments made up of cells having a yellowish-brown content which are colored a bluish-black upon the addition of ferric chloride T. S. Add 0.100 Gm. of powdered Uva Ursi to a watch crystal, cover with another watch crystal and gently heat the powder; a crystalline sublimate should be formed consisting of long rods and feather-like aggregates which polarize light with a brilliant play of colors. Macerate 1 Gm. of powdered Uva Ursi with 10 Cc. of boiling water, shake the mixture occasionally until cold and then filter it; the filtrate should yield a grayish-purple precipitate upon the addition of a few drops of ferrous sulphate T. S.

Valeriana.—Rhizome upright, from 2 to 4 cm. in length, and from 1 to 2 cm. in diameter, usually cut longitudinally into 2 to 4 pieces; externally yellowish-brown or dark-brown, upper portion with stem-bases and frequently with a short horizontal branch or stolon, and from the outer surface arise numerous, slender, brittle roots; fracture of rhizome short and horny, internally light brown, with a thick bark and narrow central cylinder; odor pronounced, of valeric acid, becoming stronger upon aging; taste sweetish, camphoraceous and somewhat bitter. Under the microscope transverse sections of the root show a single epidermal layer of papillose cells, some being modified to root hairs; a hypodermal layer containing some secretion cells with suberized walls and in which are usually numerous small, oily globules and occasionally small prismatic crystals; cortical parenchyma, the cells filled with starch, some of the cells near the hypodermis containing a few oil globules; an endodermis of thin-walled cells surrounding a pericambium; a central cylinder with usually 3 to 5 fibro-vascular bundles; tracheæ with simple and bordered pores. Older roots show a large pith of starch-bearing parenchyma, a secondary thickening in the fibro-vascular bundles and a periderm of a few layers of cells. Sections of the rhizome show a thin periderm, a cortical parenchyma with scattered fibro-vascular bundles, a layer of altered cells of the endodermis, numerous, more or less twisted, collateral, fibro-vascular bundles and a large pith. Powder: Light brown to grayish-brown; starch grains numerous, from 0.003 to 0.020 mm. in diameter, spherical, plano-convex, polygonal, 2- to 4-compound and each usually with a central cleft; tracheal fragments, the walls having simple and bordered pores or scalariform and reticulate thickenings, accompanied by narrow sclerenchymatous fibers, the walls being thin, porous, and strongly lignified; occasional fragments of epidermis with root hairs, and fragments of cork. Ash not exceeding 20 percent.

Vanilla.—Yielding not less than —— percent of vanillin. Pods linear, flattened, from 15 to 35 cm. in length and from 5 to 9 mm. in breadth; summits terminating in flat circular scars; gradually tapering, more or less bent and curved or hooked at the bases, or in the Tahiti variety, broad in the middle and tapering towards either end, the base closely resembling the summit; externally blackish-brown, longitudinally wrinkled, moist-glossy, and occasionally with an efflorescence of vanillin in the form of acicular crystals or monoclinic prisms; frequently with narrow, elliptical or irregular, more or less wrinkled, dark-brown patches of cork; occasionally split into three parts near the tip; flexible and tough, 1-locular, containing a blackish-brown pulp and numerous blackish-brown seeds; the latter being flattened, irregularly triangulate or nearly

circular in outline, recticulate and varying from 0.250 to 0.300 mm. in diameter; odor and taste characteristic and very agreeable. Under the microscope transverse sections of the pods show an epidermis with a somewhat thickened outer cuticularized layer having occasionally rounded or conical masses of the excretion of a gum-like substance; a layer of collenchyma of 1 or 2 rows of cells; a thick sarcocarp composed of parenchyma cells in which are embedded an interrupted circle of fibro-vascular bundles; the parenchyma cells are deeply undulate in outline, and usually contain a thin protoplasmic layer enclosing numerous oily globules or may possess bundles of raphides of calcium oxalate, the individual crystals varying from 0.200 to 0.400 mm. in length; some of the parenchyma cells are specially modified and distinguished by their somewhat thickened walls with long, oblique, slit-like pores or the thickening may extend in the form of broad, spiral bands; in the fibro-vascular bundles the phloem is central, being more or less surrounded by a few tracheæ, the walls possessing slit-like pores or spiral thickenings, and at the outside of the bundle is a closed circle of sclerenchymatous fibers, the walls being rather thin, strongly lignified, provided with numerous, transverse, simple pores, the outer wall of the outer row of fibers being irregular or sinuate; from the inner walls of the endocarp arise the placentæ bearing numerous brownish-red or blackish seeds, otherwise from the cells of the endocarp arise numerous long, nearly straight hairs, the ends being rounded, the hairs being more or less matted together by a gummy or resinous mass in which some of the seeds are held; in mounts made in hydrated chloral T. S. or potassium hydroxide T. S., the immature, brownish-red seeds show a deeply reticulate seed-coat, the cells being of an oblong-polygonal form in surface view. Place a few of the crystals, occurring as an efflorescence on the fruit, on a microscopic slide or watch crystal and add a drop of phloroglucinol T. S. and hydrochloric acid; the solution should immediately acquire a carmine-red color (distinction from benzoic acid). Diluted alcohol extractive, not less than 12 percent. Ash not exceeding 6 percent.

Veratrum Viride.—The dried rhizome and roots of Veratrum viride Aiton, (Fam. Liliaceæ), known in commerce as American Hellebore, with not more than 5 percent. of stems and other foreign matter. Rhizome upright, obconical, usually cut longitudinally into 2 to 4 pieces, from 2 to 7 cm. in length, from 1.5 to 3 cm. in diameter, externally light brown to dark brown or brownish-black, frequently bearing at the summit numerous, closely arranged, thin leaf-bases, otherwise rough and wrinkled; somewhat annulate from scars of bud-scales and bearing in the outer portion numerous roots, the lower part more or less decayed; fracture hard and horny; internally yellowish or grayish-white, marked with numerous, irregular fibro-vascular bundles; inodorous but sternutatory; taste bitter and acrid. Roots: Nearly cylindrical, from 3 to 8 cm. in length, 1 to 3 mm. in diameter, externally light brown to yellowish-brown, deeply transversely wrinkled; fracture short, bark whitish, very thick, enclosing a porous central cylinder. Powder: Grayish-brown to dark brown, strongly sternutatory; starch grains numerous, from 0.003 to 0.020 mm. in diameter, spherical or ellipsoidal, single or 2- to 3-compound, the individual grains being often swollen or otherwise more or less altered; calcium oxalate in raphides, from 0.015 to 0.150 mm. in length; fragments with tracheæ, the walls being more or

less strongly lignified and marked with scalariform or reticulate thickenings, frequently containing a lemon-yellow substance and associated with narrow, slightly lignified, porous, sclerenchymatous fibers; reddish-brown or brownish-black cork fragments occasional.

Viburnum Opulus.—The dried bark of Viburnum Opulus Linné (Fam. Caprifoliaceæ), with not more than 5 percent. of wood and other foreign matter. In strips, or occasionally in quills or chip-like fragments, the bark attaining a thickness of 3 mm.; outer surface of the thinner pieces of a light gray color with crooked, longitudinal, purplish-brown stripes and very small brown lenticels, the thicker pieces purplish-red or occasionally blackish, except when very young, and more or less finely fissured or thinly scaly; inner surface varying in color from yellowish to rusty-brown, with very short oblique striæ, except where the outer wood layer adheres; fracture short and weak, the fractured surface mostly whitish, varying to pale brown in the inner layer, rusty-brown in the outer layer covering green, tangential, phelloderm plates; odor strong and characteristic; taste mildly astringent and decidedly bitter. Under the microscope sections show an outer corky layer, of 5 to 25 rows of cells, the walls nearly colorless, frequently thickened on the inner surface, individual cork cells from 0.015 to 0.045 mm. in radial diameter and from 0.030 to 0.075 mm. in tangential diameter; outer bark of about 10 rows of cells containing a brownish-yellow, amorphous substance, small starch grains or chloroplastids, medullary rays 1 to 2 cells in width, usually not more than 1 cell wide, inner bark with occasional groups of bast-fibers composed of 1 to 10 cells, the walls being very thick, non-lignified, lamellated and finely porous; adhering wood with large tracheæ having scalariform or reticulate thickenings, and being surrounded by wood-fibers with thick lignified walls; starch grains, mostly in cells of parenchyma and medullary rays, either single or compound, the individual grains not exceeding 0.006 mm. in diameter; calcium oxalate in rosette aggregates, from 0.015 to 0.040 mm. in diameter; numerous fragments of parenchyma cells, the lumina filled with a reddish-brown amorphous substance. The bark of Acer spicatum Lamarck (Fam. Aceraceæ), is distinguished by the smaller cork cells with very thick walls, the individual cells from 0.006 to 0.008 mm. in radial diameter and about 0.020 mm. in tangential diameter, medullary rays from 1 to 3 cells in width, mostly 2 to 3 cells wide; bast-fibers numerous, in tangential groups, calcium oxalate in monoclinic prisms, chiefly in the outer cortex, the individual crystals being from 0.010 to 0.040 mm. in length, smaller crystals being associated with the bast-fibers in the inner bark. Powder: Light grayish-brown, consisting of irregular fragments; cork cells polygonal, with thin, colorless walls; parenchyma with rosette aggregates of calcium oxalate, from 0.010 to 0.040 mm. in diameter; starch grains very small and mostly in parenchyma cells; fragments of parenchyma containing a brownish-yellow amorphous substance; occasional tracheal fragments associated with lignified wood-fibers. The powder of the bark of Acer spicatum shows numerous prismatic crystals of calcium oxalate, from 0.010 to 0.040 mm. in length, and groups of bast-fibers with adjoining crystal-fibers.

Viburnum Prunifolium.—The bark may include not more than 5 percent. of wood and other foreign matter. In irregular, transversely curved or quilled

pieces, from 1.5 to 6 cm. in length, from 0.5 to 1.5 mm. in thickness; outer surface grayish-brown, or where the outer cork has scaled off, brownish-red, longitudinally wrinkled; inner surface reddish-brown, longitudinally striated; fracture short but uneven, showing in bark which is young or of medium thickness a dark brown cork, a brownish-red outer cortex, and a whitish inner cortex in which are numerous light yellow groups of sclerenchymatous tissues; odor slight; taste distinctly bitter and somewhat astringent. Powder: Dark brown; stone cells numerous, large, often elongated, thick-walled and strongly lignified; bast-fibers few; crystals of calcium oxalate from 0.015 to 0.035 mm. in diameter, occurring mostly in rosette aggregates, occasionally in crystal-fibers; monoclinic prisms of calcium oxalate few.

Zanthoxylum.—The dried bark of Zanthoxylum americanum Miller, known in commerce as Northern Prickly Ash Bark, of Zanthoxylum Clava-Herculis Linné, known in commerce as Southern Prickly Ash Bark (Fam. Rutaceæ). Northern Prickly Ash Bark: In transversely curved fragments or quills, from 2 to 15 cm. in length; bark from 0.5 to 2 mm. in thickness; outer surface light gray to brownish-gray with grayish patches of foliaceous lichens bearing numerous small black apothecia; longitudinally wrinkled and with numerous whitish lenticels, the cork occasionally abraded showing the yellowish or orange colored inner bark; inner surface yellowish-white, finely longitudinally striate and usually with numerous, bright, shining crystals; fracture short, uneven; odor slight, taste bitter, acrid, becoming pungent. Under the microscope transverse sections of Northern Prickly Ash Bark show an outer corky layer consisting of 4 to 20 rows of cells, the tangential walls being strongly thickened and lignified, a layer of collenchyma composed of 8 to 10 rows of tangentially elongated cells, with very thick walls and containing plastids; a more or less indistinct row of endodermal cells beneath which is an interrupted circle of small groups of primary bast-fibers; the inner bark consists of numerous parenchyma cells among which are included large oil secretion reservoirs, separated by medullary rays which are mostly one-cell in width; the parenchyma cells as well as the oil secretion reservoirs contain numerous colorless oily globules. Scrapings from the inner surface show numerous rod-shaped crystals and flat prisms from 0.015 to 0.250 mm. in length, which polarize light with a display of bright colors. Southern Prickly Ash Bark: In transversely curved or irregular, oblong flattened pieces, or in quills, from 2 to 40 cm. in length, bark from 1 to 4 mm. in thickness; outer surface light gray to brownish-gray marked by numerous large barnacle-shaped projections of cork from 0.5 to 3.5 cm. in thickness, otherwise with numerous grayish patches of foliaceous lichens, bearing numerous blackish apothecia, and numerous, elliptical lenticels; inner surface light yellowish-brown to olive brown, obscurely longitudinally striate and free from crystals, odor and taste as in Northern Prickly Ash Bark. Under the microscope transverse sections of Southern Prickly Ash show a strong development of lignified cork occurring in the form of rings, the successive layers being separated by several rows of narrow tabular cells strongly thickened on the tangential walls; a thin layer of collenchyma followed by the other tissues of the primary cortex and consisting of small groups of rather large stone cells and occasional, scattered groups of bast-fibers and parenchyma; the inner bark consists of parenchyma,

a more or less indistinct leptome or sieve tissue and among which are numerous large, light yellowish oil secretion reservoirs, medullary rays from 1 to 2 cells in width; and occasional groups of stone cells and bast-fibers; starch grains numerous, nearly spherical, from 0.002 to 0.010 mm. in diameter, and occurring in the parenchyma cells and medullary rays; calcium oxalate chiefly in monoclinic prisms from 0.010 to 0.025 mm. in diameter, occurring in crystal-fibers and in parenchyma cells of the primary cortex. Powder of Zanthoxylum: Light grayish-brown, consisting mostly of irregular fragments; cork cells nearly colorless and strongly lignified fragments of parenchyma containing either small starch grains, oily globules or monoclinic prisms of calcium oxalate; stone cells in small groups with thick, colorless walls contain frequently a reddish-brown content, bast-fibers few and non-lignified. In the Northern Prickly Ash, the stone cells and calcium oxalate crystals are usually absent and the fragments of cork relatively less numerous.

Zingiber.—The outer cortical layer may be either partially or completely removed. Jamaica Ginger: Rhizomes free from the outer corky layers, in horizontal, laterally compressed, irregularly branched pieces, 4 to 16 cm. in length, and from 4 to 20 mm. in thickness; externally light brown, longitudinally striate, ends of the branches with depressed stem scars; fracture short-fibrous, mealy and resinous; internally yellowish to light brown, cortex thin, endodermis, a thin yellow layer enclosing a large central cylinder with numerous groups of fibro-vascular bundles and yellowish oil cells; odor agreeably aromatic; taste aromatic and pungent. African Ginger: Rhizomes with cork partly removed on the flattened sides, the patches without cork smooth and of a light brown color. the portions with cork longitudinally or reticulately wrinkled and grayish-brown; fracture short or short-fibrous; internally lemon-yellow or dark bluish with yellowish oil secretion cells and light yellow to reddish-brown resin cells; odor strongly aromatic, taste intensely pungent. Calcutta Ginger: Rhizomes resembling the African Ginger, the branches or "fingers" being somewhat larger, and with a considerable proportion of shriveled pieces; externally grayish-brown or grayish-blue; fracture short and mealy, or horny; internally light yellow or light brownish-yellow with numerous yellowish oil cells and yellowish-brown resin cells; odor aromatic; taste starchy and strongly pungent. Calicut Ginger: Rhizomes resembling African Ginger, more of the periderm being usually removed; externally more or less uniformly light brown; fracture short or short-fibrous and mealy; internally light or brownish-yellow with numerous yellowish oil and resin cells; odor aromatic; taste very pungent. Cochin Ginger: Rhizomes with most of the corky layer removed on the flattened sides; externally light brown to grayish-yellow; fracture short and mealy; internally yellowish-white with numerous yellowish oil cells and brownish-red or blackish resin cells; odor aromatic; taste pungent but not so persistent as in the African variety. Japanese Ginger: Rhizome somewhat resembling Cochin Ginger but usually with a thin coating of lime; externally nearly smooth or slightly wrinkled and of a whitish color; fracture short and very mealy; internally varying from a yellowish-white to light brown and with numerous brownish-red resin cells; odor aromatic; taste pungent. Powder: Light yellow, or light brown to dark brown; starch grains numerous and varying greatly in the different varieties, in form

and size being nearly spherical, ovoid, ellipsoidal or pear-shaped and frequently with a characteristic beak, usually from 0.005 to 0.040 mm., occasionally from 0.045 to 0.060 mm., in long diameter; sclerenchymatous fibers long, thin-walled, non-lignified, with oblique pores, and distinctly undulate on one side; oil secretion cells with suberized walls and containing a light yellowish or yellowish-brown, oily substance; cork cells absent in the Jamaica variety. Non-volatile ether extract not less than 2 percent. Alcoholic extract not less than 4 percent. Ash not exceeding 8 percent.

SOME REFORM MEASURES FOR THE A. PH. A.

The Association Has Grown So Fast That Reorganization is an Imperative Necessity—Particularly is This True of the Annual Conventions, Which are in Need of More System and Method.

HARRY B. MASON, DETROIT.

The time has come for the American Pharmaceutical Association to undergo a more or less radical reorganization. This statement does not imply that the A. Ph. A. has lost its vitality and is in need of fresh energy. Not at all. On the contrary, indeed, the trouble arises from too much energy instead of too little, and what is needed is that this energy, in its manifold manifestations, shall be harnessed up and co-ordinated in a more intelligent manner. This is particularly true of the annual meetings.

The fact of it is, the A. Ph. A. has undergone a great development during the last ten years. It has spread out in many directions. It is like a growing boy whose original suit of clothes has been lengthened in the legs, extended in the arms, widened in the seat, and enlarged here and there until the result is somewhat grotesque. What is required is a new suit of clothes, cut to fit the A. Ph. A. in its present proportions.

The Confusion at Nashville. The situation at Nashville last August was one of confusion worse confounded. There were the seven regular sections of the Association, each holding two or three sessions. There was the annual meeting of the National Association of Boards of Pharmacy with four or five sessions. There was the annual meeting of the Conference of Pharmaceutical Faculties. There was the joint conference of the latter two bodies and the section on education and legislation of the A. Ph. A. The Revision Committee of the U. S. P. seized upon the occasion to hold two or three meetings. The Revision Committee of the N. F. did precisely the same thing. The Pharmaceutical Syllabus Committee met every night from 9:30 until 12 or 1 in an effort to complete the second edition of the book. The new House of Delegates of the A. Ph. A., organized the year before, held three sessions, and its Committee on Resolutions one or two in addition. The new Section on Pharmacopœias and Formularies held two